ABSTRACT BOOK

Medical Student Research Forum & Poster Day

January 12 and 13, 2022

Presented by:
Medical Student Research Committee
Scholarly Project Course
Dean's Research Scholar Program
Office for Medical Student Research Programs

Keck School of Medicine of USC

Keck School of
Medicine of USC

Donna Elliott, M.D.,Ed.D.
Vice Dean for Medical Education
Chair, Department of Medical Education

MEDICAL STUDENT RESEARCH FORUM & POSTER DAY

January 12 and 13, 2022

The Keck School of Medicine of the University of Southern California is committed to training the future leaders of academic medicine. To this end, all KSOM medical students are required to participate in hypothesis-driven research as part of the Scholarly Project course during their tenure at Keck. In addition, KSOM offers select students the opportunity to participate in the Dean's Research Scholars program, a fifth-year option of intensive mentoring and immersion in research.

This year's Forum represents an important milestone of the current research activities of all second-year students and our Dean's Research Scholars. The works of many of our students have garnered awards at regional and national meetings over the years and, as you read these abstracts, we are confident you will appreciate and enjoy the remarkable efforts and accomplishments of our talented students.

KSOM is dedicated to fostering and promoting medical student research activity. KSOM looks forward to continuing to enhance and expand the training, mentoring and scope of research opportunities provided to our students, and we deeply appreciate the considerable effort, skill and passion with which our faculty support and develop our students into skilled scientists and future leaders.

Sincerely,

Donna D. Elliott, MD, EdD
Vice Dean for Medical Education
Chair, Department of Medical Education

University of Southern California
1975 Zonal Avenue, Los Angeles, California 90089-9024 • Tel: 323 442 1875 • Fax: 323 442 1876 • delliott@med.usc.edu

MEDICAL STUDENT RESEARCH FORUM & POSTER DAY

January 12 and 13, 2022

KECK SCHOOL OF MEDICINE UNIVERSITY OF SOUTHERN CALIFORNIA

The Medical Student Research Forum and Poster Day is an annual event, which allows Keck School of Medicine of USC medical students the opportunity to present their Scholarly Projects and Dean's Research Scholar projects to their peers and the USC community at large. The Scholarly Project course is a longitudinal research experience that spans the first two years of medical school. The Dean's Research Scholar program is a distinguished opportunity for an optional fifth year of medical school dedicated to research. The projects presented by our students represent a wide variety of disciplines, from basic science to clinical and translational research.

We are extremely appreciative of the supportive faculty who have volunteered their expertise to mentor students through these exciting research initiatives. We also thank faculty who have volunteered their time teaching the key principles required to successfully conduct research. To the incredibly dedicated staff, we thank you for your outstanding coordination of all medical student research-related activities.

We would like to thank all of those involved with organizing this Forum and are very appreciative of the faculty and student judges who review the poster presentations. Special acknowledgments to Donna Elliott, MD, EdD, Vice Dean for Medical Education; Jeffrey Riddell, MD, Director for the Scholarly Project; David Hinton, MD, FARVO, Director of the Dean's Research Scholars program; Nuria Pastor-Soler, MD, PhD, Assistant Dean for Research Mentoring and Stephanie Zia, MD, MACM, Assistant Dean for Student Affairs for their support and participation in this Forum. Finally, we are incredibly grateful to our benefactors, the Baxter Foundation, the Meira and Shaul G. Massry Foundation, the Wright Foundation, the Medical Faculty Assembly, the Medical Faculty Family and Friends, Ms. Michele Black, Drs. Edna Chow and Dan Maneval, Mr. and Mrs. Gary and Marita Robb, and Mr. and Mrs. Timothy and Helen Tai for their commitment and support of medical student research at the Keck School of Medicine.

PROGRAM SCHEDULE

Poster Presentations, Virtual through Zoom
January 12, 2022, 2:00 - 3:30 p.m.

Presenters:
Dean's Research Scholars
Class of 2024 Medical Students

Podium Presentations, Virtual through Zoom
January 13, 2022, 1:00 - 2:30 p.m.

Moderated by:
Nuria Pastor-Soler, MD, PhD
Director, Medical Student Research Programs
Associate Vice Chair for Faculty Development, Department of Medicine

Opening Remarks
Jeffrey Riddell, MD
Director, Scholarly Project Course

Welcome Address
Steven D. Shapiro, MD
Senior Vice President for Health Affairs, USC
Interim Dean, Keck School of Medicine of USC

A Snapshot of Research Electives and Summer Research
Nuria Pastor-Soler, MD, PhD
Director, Medical Student Research Programs
Associate Vice Chair for Faculty Development, Department of Medicine

2022 PODIUM PRESENTATIONS

Dean's Research Scholars

Wooseong Choi
(Mentor: **Darrin J. Lee, MD, PhD;** Department: **Neurological Surgery**)
Using Functional Ultrasound Imaging to Identify How Deep Brain Stimulation of the Medial Septum Modulates Memory Networks

Manan Mehta
(Mentor: **April Armstrong, MD, MPH;** Department: **Dermatology**)
Utilizing Google Trends to Explore Psoriasis and Atopic Dermatitis Pathogenesis

Dhiraj Pangal, Wright Research Scholar
(Mentor: **Gabriel Zada, MD;** Department: **Neurosurgery**)
Expert Surgeons and Deep Learning Models Can Predict the Outcome of Surgical Hemorrhage from One Minute of Video

Micalla Peng
(Mentor: **Kimberly Gokoffski, MD, PhD;** Department: **Ophthalmology**)
Electric Fields Direct Full-Length Optic Nerve Regeneration and Partial Restoration of Visual Function

Class of 2024

Swathi Balaji
(Mentor: **Mark Swanson, MD;** Department: **Otolaryngology - Head & Neck Surgery**)
Qualitative Interview on Patient Perceptions of Head and Neck Cancer Treatment

Jonathan Lee
(Mentor: **Vishal Patel, MD, PhD;** Department: **Radiology**)
Deep Learning Model for Predicting Fazekas Scores of White Matter Lesions in FLAIR MRI Sequences for Clinical Studies

Erik Munoz
(Mentor: **Alan Epstein, MD, PhD;** Department: **Pathology**)
Generation of Bioluminescent T Cells for the *in vivo* Tracking of Cellular Localization

Deepika Sarode
(Mentor: **Juliet Emamaullee, MD, PhD;** Department: **Surgery**)
The Peripheral Immune Profile of Acute Rejection in Pediatric Liver Transplantation: New Mechanisms of Alloimmunity and Potential Non-Invasive Biomarkers of Rejection

MEDICAL STUDENT RESEARCH COMMITTEE

Jeffrey Riddell, MD
Director, Scholarly Project Course

Ron Ben-Ari, MD, FACP
Associate Dean, Curriculum Associate Dean, Continuing Medical Education
Vice Chair, LAC+USC Affairs, Department of Medicine

Jennifer Dinalo, PhD, MLIS
Associate Director, Research Services & Library Liaison to KSOM

Fernando Fleischman, MD
Associate Professor of Clinical Surgery; Director, Aortic Center
Associate Program Director, Cardiothoracic Surgery

Cha Chi Fung, PhD
Vice-Chair, Medical Education Assistant Dean, Medical Education

David Hinton, MD, FARVO
Director, Dean's Research Scholar Program Director, USC-Caltech MD-PhD Program
Vice-Chair, Department of Pathology

William Mack, MD, MS
Professor of Neurosurgery

Sonia Michail, MD
Professor of Clinical Pediatrics

Kevin Nash, PhD
Assistant Dean for Curriculum
Director, Medical Student Education for Pathology

Nuria Pastor-Soler MD, PhD
Director, Medical Student Research Programs
Associate Vice Chair for Faculty Development, Department of Medicine

Joyce Richey, PhD
Associate Dean, Diversity and Inclusion

Christopher Russell, MD, MS
Assistant Professor of Clinical Pediatrics

Sita Reddy, PhD
Assistant Professor of Biochemistry and Molecular Medicine

Kian Kani, PhD
Assistant Professor of Research Medicine

Nhu Tran, PhD, RN, MSN
Assistant Professor of Clinical Pediatrics

Ashwini Lakshmanan, MD, MS, MPH
Assistant Professor of Clinical Pediatrics and Preventive Medicine

Saahir Khan, MD, PhD
Assistant Clinical Professor of Infectious Diseases

Junaid Zaman, MD
Clinical Assistant Professor of Medicine

Rayudu Gopalakrishna, PhD
Associate Professor of Integrative Anatomical Sciences

OFFICE FOR MEDICAL STUDENT RESEARCH PROGRAMS

Jeffrey Riddell, MD
Director, Scholarly Project Course

David Hinton, MD, FARVO
Director, Dean's Research Scholar Program Director,
USC-Caltech MD-PhD Program

Nuria Pastor-Soler, MD, PhD
Director, Medical Student Research Programs
Associate Vice Chair for Faculty Development, Department of Medicine

Han Chang
Associate Director for Medical Student Research Programs

Roland Rapanot
Student Services Advisor, MD-PhD Program, Dean's Research Scholar

MEDICAL STUDENT RESEARCH CHAIR

Tyler Gallagher, MSII
MSII Research Chair

KECK MEDICAL STUDENT RESEARCH BENEFACTORS

The Keck School of Medicine of USC is sincerely grateful to our benefactors who generously support our student research programs.

Donald E. and Delia B. Baxter Foundation
Michele Black
Edna Chow and Dan Maneval
Meira and Shaul G. Massry Foundation
Medical Faculty Assembly
Medical Faculty, Family, and Friends
Gary and Marita Robb
Timothy and Helen Tai
Wright Foundation
Office of the Dean

TABLE OF CONTENTS

Research Categories

Adolescent and Young Adult Medicine....43
Anesthesiology....46
Dentistry....49
Dean's Research Scholars....12
Dermatology....51
Emergency Medicine....59
Family Medicine....64
Internal Medicine....73
Medical Education....83
Neurological Surgery....85
Obstetrics and Gynecology....94
Oncology....100
Ophthalmology....103
Orthopedic Surgery....111
Otolaryngology – Head and Neck Surgery....128
Pathology....137
Pediatrics....141
Plastic and Reconstructive Surgery....158
Population and Public Health Sciences....163
Psychiatry....170
Radiology....173
Surgery....179
Urology....196

Dean's Research Scholars

Adigwu, Yvonne....13
Baertsch, Hans....13
Bajouri, Zabi....14
Brasfield, Kaevon....15
Castellanos, Carlos....16
Chang, Stephanie....17
Choi, Wooseong....17
Cutri, Raffaello. 20
Gallo, Matthew....21
Im, Deborah 22
Khan, Sabrina 23
Madrigal, Paloma....23
Martinez, Eduardo 24
Maynard, Nicole 25
Mehta, Manan....26
Mehta, Preeya 27
Mora, Richard....28
Orozco, Francis....29
Pangal, Dhiraj 32
Peng, Micalla....33
Rao, Arthi. 34
Repajic, Michael 35
Stanton, Eloise....36
Sung, Cynthia....37
Syder, Nicole....37
Ulloa, Ruben 39
Wang, Jennifer....40
Wang, Johnny 40
Zhou, Sarah....41

Class of 2024 Medical Student Researchers

Aghi, Armen....50
Allee-Munoz, Alec....164
Ashrafi, Arman 180
Ayala, Rene....174
Bagrodia, Neelesh....180
Baker, Chelsea....95
Bazikian, Sebouh 182

Becerra, Jacob 112
Belur, Pooja 142
Bexfield, Arianne 60
Blair, Kayla 95
Brown, Michael 183
Calero, Tiffany 183
Calero, Kenneth 184
Carvalho, Benjamin 104
Chan, Justin 86
Chen, Allen 52
Chen, Emily 165
Chen, Eric 52
Chen, Michelle 96
Cho, Raymond 142
Chou, Brendon 175
Cleary, Peter 44
Cohen, Kenzie 184
Colbath, Rachel 185
Cooper, Ryan 101
Dani, Komal 175
Deadwiler, Brittney 112
Demetriou, Alexandra 86
DiPaolo, Nicola 185
Drake, Andrew 113
Duong, Andrew 114
Duran, Erica 143
Fathi, Amir 115
Faye, Ethan 144
Frediani, Tanner 159
Gallagher, Tyler 129
Gao, Leland 186
Garcia, Richard 74
Garza, Priscilla 65
Ge, Brandon 87
Gheissari, Roya 165
Gilbert, Zachary 87
Gomez, Jacob 166
Gomez, Annette 53
Gonzalez, Melissa 65
Gukasyan, Jaklin 104
Han, Sung Min 88

Hao, Audrey 54
Haque, Taseen 197
Hernandez, Alfredo 144
Hernandez, Fergui 187
Herrera, Kevin 129
Herrman, Sarah 97
Huang, Connie 105
Hurtado, Alondra 74
Kagan, Odeya 145
Kang, Sara 105
Karipineni, Silpa 145
Khalifeh, Zain 166
Khalil, Zoya 171
Khan, Abdulhaseeb 89
Kikuchi, Robin 159
Kim, Alexander 187
Kim, Jamie 97
Kim, Michael 115
Kim, Sean 189
Kohli, Priya 198
Kolluru, Ajay 106
Krapf, John 47
Kristensen, Tyler 146
Kuromaru, Yuki 160
Kwok, Charlotte 101
Kwon, Ashley 147
Laifman, Eric 147
Lasky, Sasha 161
Lavenant, German 66
Lee, Austin 75
Lee, Heewon 130
Levian, Brandon 54
Li, Shirley 107
Li, Joy 66
Liaw, Reanna 67
Longo, Emma 76
Lopez, Joshua 89
Luna Bojalil, Gilberto 138
Luna Centeno, Luis Diego 76
Ma, Harrison 131
Malkoff, Nicolas 189

Marshall, Glenda....116
Martinez, Michelle....44
McCarthy, Lauren....98
McCool, Katherine....192
Menard, Nathan....167
Mendoza, Matthew....77
Merkel, Carlin....148
Millman, Noah....131
Minaeian, Nare....148
Moshal, Tayla....161
Mulugeta, Selam....90
Nagatani-Short, Lindsay....68
Nielsen, Diana....45
Ninh, Katrina....149
Obed, Ogechi....150
Obinelo, Adaeze....193
Occhino, Lucas....91
Odelson, Annie....69
Okolo, Obianeze....150
Okonkwo, Brian....117
Oljaca, Maria....132
Overholtzer, Lloyd....151
Paik, Sophia....70
Palmer, Ryan....119
Parikh, Neil....193
Pavlov, Hannah....152
Perez, Joshua....152
Polyakov, Daniel....55
Pritikin, Ethan....108
Raj, Christine....132
Renslo, Jonathan....176
Robinson, Kevin....70
Rodriguez, Ivan....71
Rodriguez, Eddie....56
Ross, Erin....194
Saboori, Nima....122
Sakurai, Kenton....84
Santos, Eduardo....91
Santoyo, Amairani....47
Saranath, Ritika....56
Shelby, Tara....123

Shen, Adriana 78
Sheppard, Justin 123
Sirivolu, Shreya 108
Smith, Julia 78
Smith, Scotti 79
Soto, Raul 153
Srinivasa, Varsha 80
Stevens, Claire 109
Sudharshan, Rasika 133
Sun, Alexander 71
Sun, April 14
Sundaram, Shivani 134
Tabarsi, Emiliano 92
Tang, Diana 154
Telang, Sagar 126
Toomer, Carmen 60
Truong, Andrew 98
Urnes, Cole 138
Urness, Matthew 127
Varghese, Susmitha 99
Vazquez, Jessica 61
Vervaet, Helena 155
Victoria, Nikolas 80
Vojvodic, Vanya 81
Vosooghi, Aidan 61
Wang, Jennifer 172
Wang, Mark 195
Wang, Rachel 155
Webb, Thomas 81
Wishart, Danielle 82
Wu, Kevin 92
Xu, Mindy 156
Xu, Wilson 177
Yang, Jane 134
Yao, Iris 48
Yi, Ashley 135
Yoo, Kristy 110
Yoon, Paul 168
Yu, Roy 57
Zhang, Edie 139
Zhou, Charles 62

DEAN'S RESEARCH SCHOLARS

Cochlear Implant Outcomes in Pediatric Patients with Cochlear Nerve Deficiencies

Yvonne Adigwu, BS, Karen Johnson, PhD, Debra Schrader, EdD

Background: It is estimated that every year about 4000 children are born with severe or profound bilateral sensorineural hearing loss, while an additional 8000 children are born with unilateral or milder degrees of hearing loss. Childhood hearing loss can have detrimental effects on language development, academic performance, and behavior. Cochlear implants (CI) have been demonstrated to improve outcomes in children with both significant bilateral and unilateral hearing loss. One important anatomical consideration when evaluating for CI is a diagnosis of cochlear nerve deficiency (CND). There remains a lack of consensus as to whether children with CND receive sufficient benefit to warrant cochlear implantation. This lack of clarity has the potential to result in disparities in access to CI for this pediatric population.
Objectives: The goal of this study is to describe outcomes of cochlear implantation in a series of pediatric patients with CND. The specific aim of this research is to determine whether pediatric patients with CND demonstrate improved outcomes on objective or subjective measures of auditory performance after CI.
Methods: This is a retrospective chart review of children evaluated through the USC Caruso Family Center for Childhood Communication with a diagnosis of CND based on pre-CI MRI. Descriptive and summary statistics will be used to characterize our study population at the group level. Further data analysis will be conducted at the level of the individual child. We will describe the presence versus absence of neuronal response telemetry done intra-operatively and/or at initial activation. We will also describe changes in auditory detection thresholds from pre- to post-CI immediately following activation and at subsequent follow-up intervals. Lastly, we will describe changes in raw score on the LittlEARS Auditory Questionnaire from pre- to post-CI immediately after activation and at subsequent follow-up intervals.
Results: Once participant data is collected from the medical record, the study will move into the data analysis stage. Although there is conflicting evidence in the literature, there have been studies of patients with CND who show improved outcomes after CI. We hypothesize outcomes in this patient population will be highly variable, and there will likely be a prolonged post-CI time course for patients in whom improvement is observed.
Conclusion: As criteria for CI in this population continue to evolve, additional research on post-CI outcomes may provide further evidence to evaluate relative risk versus benefit of CI in children with CND.

***Sox2* Deletion from Native or Regenerated Type II Vestibular Hair Cells Causes Conversion to Type I-like Cells and Increased Motor Activity in Adult Mice**

Hans Baertsch, Hendrik Dorssers, Amanda Ciani, Emmanuel Jauregui, Jonathan Phillips, Ingrid Mejia Bibriesca, Tot Nguyen, James Phillips, Brandon Cox, Jennifer Stone

Background: A subpopulation of vestibular hair cells (HCs) is regenerated when HCs are destroyed by diphtheria toxin in adult *Pou4f3*^{DTR} mice. All regenerated HCs are type II. Vestibular function does not recover. In adult mice, conditional knock-out (CKO) of *Sox2* from type II vestibular HCs causes them to convert into type I-like HCs. We hypothesized that 1) manipulation of the type I:II proportion via *Sox2* CKO would disrupt vestibulo-motor behaviors and 2) conversion of regenerated type II HCs to type I HCs would ameliorate vestibulo-pathic behaviors resulting from HC damage. We also deleted *Atoh1*, which acts downstream of Sox2, from regenerated type II HCs and hypothesized that type II HCs would also convert into type I-like HCs.
Methods: We administered tamoxifen to *Atoh1-CreER*$^{TM:}$*:Sox2*$^{loxP/loxP}$*:Rosa26*^{tdTomato} adult mice, with or without the *Pou4f3*^{DTR} allele, to delete *Sox2* from undamaged (homeostatic) type II HCs

or from regenerated type II HCs. Using tdTomato labeling to identify cells with *Sox2* deletion, we examined HC markers, morphology, ultrastructure, and innervation for several months post-tamoxifen. In these mice, we examined open field behaviors, rotarod performance, and the vestibulo-ocular reflex (VOR). In addition, we administered tamoxifen to *Pou4f3^{DTR}:Atoh1-CreER$^{TM:}$:Atoh1$^{loxP/loxP}$:Rosa26^{tdTomato}* adult mice and examined HC markers, morphology and innervation.

Results: *Sox2* CKO from regenerated type II HCs resulted in loss of calretinin (a selective marker of type II HCs), elongation of stereocilia to type I-like proportions, and increased numbers of HCs with a calyceal afferent terminal (a type I-specific feature) in utricles by 4 months post-tamoxifen. Deletion of *Atoh1* from regenerated HCs also caused them to acquire type I-like features. Mice with *Sox2* CKO from native type II HCs exhibited increased motor activity relative to *Sox2* wildtype controls, as reflected by total distance travelled and average velocity. Mice with regenerated HCs after damage had increased motor activity (distance travelled, average velocity, spinning, and climbing) compared to mice without HC damage, and these behaviors were increased following *Sox2* CKO. We noted no changes in rotarod performance between any groups. The VOR was essentially lost from mice with HC destruction and not regained after *Sox2* deletion from regenerated HCs.

Conclusions: *Sox2* CKO from regenerated type II HCs induces them to acquire type I features. Conversion of native type II HCs to type I-like HCs during homeostasis produces abnormal motor activity. Conversion of regenerated type II HCs has a similar effect, which does not support the hypothesis that increasing numbers of type I-like cells will ameliorate vestibulopathology. Further studies are required to understand the mechanisms underlying the alterations in motor activity. We are also assessing the impact of type II-to-I conversion upon other organs and the VOR under undamaged conditions.

Complication Rates after Cervical Spine Surgery in Parkinson's Disease: A nationwide database study

Zabi Bajouri[1], Annelise Bui[2], Blake Formanek[2], Zoe Fresquez[2], John Liu MD[1,2], Zorica Buser PhD[1,2]

[1]*Department of Neurological Surgery, Keck School of Medicine USC, Los Angeles, CA*
[2]*Department of Orthopedic Surgery, Keck School of Medicine USC, Los Angeles, CA*

Introduction: Parkinson's disease (PD) is a neurodegenerative disease characterized by resting tremor, bradykinesia, gait dysfunction, and instability. As a result of this neurodegeneration, PD can lead to muscular imbalances and atrophy, increased rates of osteoporosis, and increased spinal degeneration necessitating surgical spine procedures. In patients with PD, post-operative complications are known to be high and result in increased length of stay, cost, morbidity, and in-hospital mortality—factors prudent to consider when offering surgical procedures for this population. With that said, type of complications, and their rates, after cervical spine surgery in patients with PD is not well classified. Here we use a nationwide database to study complications among patients with PD who receive cervical spine surgery.

Materials and Methods: Using the national Medicare database PearlDiver, we identified patients who underwent anterior cervical discectomy and fusion (ACDF), posterior cervical fusions (PCF), or discectomy/decompressions (DD) with concomitant PD between 2011-Q3 of 2019. The procedures listed above were identified using Current Procedural Terminology (CPT) codes. PD was identified using ICD-9 and ICD-10 codes. Patients with a previous diagnosis of PD who underwent previous listed procedures with one year of follow up were included in the study. Complications 30, 60, and 90 days after index surgery were identified; these were aggregated into buckets based on body systems (pulmonary, cardiovascular, genitourinary,

neurological, psychiatric, and dermatology). Demographic factors such as age, sex, US geographical region were collected. Patients were matched to a control group receiving cervical spine procedures without concomitant Parkinson's Disease. Statistical analysis was conducted using R through PearlDiver.
Results: There were a total of 259,443 ACDF, 30,929 PCF, and 29,563 discectomies/decompressions performed during the study period. 1117 patients with PD underwent one of the above C-Spine procedures. The incidence of C-spine surgery in PD were 744 (0.29%) for ACDF, 235 (0.76%) for PCF, and 138 (0.47%) for discectomies. Females with PD had lower rates of ACDF (30.84%), PCF (32.77%), and discectomy (33.33%) procedures than males. Patients over 65+ made up a majority of those receiving cervical spine procedures (74.83% of ACDF patients, 83.26% of PCF patients, and 98.04% of DD patients)**.** Within 90 days of ACDF procedure, complications rates were high in the Pulmonary (6.05%), GI (6.05%), and Neuro (5.24%) buckets. 90-day complication rates for PCF were high in Pulmonary (6.38%), GI (5.11%), and Neuro (8.51%) buckets. 90-day complication rates for discectomies and decompressions were high in the Pulmonary (9.38%) and GU (11.72%) buckets.
Conclusion: Patients with Parkinson's Disease who receive cervical spine procedures like ACDF, PCF, or DD have high rates of Pulmonary, GI, Neuro, and GU complications within 90 days of surgery. A majority of complications are experienced within the first 30 days after surgery. Careful consideration of these complications after cervical spine surgery in this population of patients can help reduce morbidity, readmission, and improve recovery.

An Investigator Initiated Pilot Study to Examine the Effects of Active Emotional State on Transcranial Magnetic Stimulation (TMS) Efficacy

Brasfield, Kaevon

Background: The most prevalent of all ED phenotypes is binge eating disorder (BED), which affects 3-5% of the US population[1], and portends an array of deleterious medical and psychiatric sequalae, including weight gain[2], metabolic syndrome[3, 4] diabetes[2], abnormal cardiac function[2], and elevated suicidality[5]. Transcranial magnetic stimulation (TMS) – a non-invasive and flexible neuromodulatory treatment–has shown preliminary promise in the treatment of BED[6-9]. The neural effects of TMS depend not only on the parameters of external stimulation, but also on the endogenous state of the targeted brain region[10]. However, clinical practice may expose psychiatric patients to TMS in a non-standardized and broadly heterogenous array of cognitive and affective contexts. The impact of patient activity while receiving TMS, is therefore a critical consideration when interpreting the effects.
Methods: 32 patients with a current DSM-5 diagnosis of BED of at least 6 months duration will be enrolled in a double-blind pseudorandomized crossover trial to assess the impact of symptom provocation while receiving left dlPFC TMS for BED. Participants will receive pre- and post-treatment MRI as well as neuropsychiatric assessments.
Results: This study is currently pending preliminary data.
Conclusion: To our knowledge, this will be the first study to standardize patient cognitive activity during TMS for BED, as well as the first TMS study we know of in the ED field to undertake pre- and post-treatment neuroimaging during engagement of disorder-specific neural circuitry. These design elements will help to develop the foundation for utilizing TMS and symptom provocation for BED. Our findings will inform a larger randomized double-blind control trial exploring these specific treatment modalities for this unmet need.
References:

1. Smink FRE, van Hoeken D, Hoek HW. Epidemiology, course, and outcome of eating disorders. *Curr Opin Psychiatry* 2013; 26(6): 543–8.

2. Mitchell JE. Medical comorbidity and medical complications associated with binge-eating disorder. *Int. J. Eat. Disord*. 2016; 49(3): 319-23.
3. Hudson JI, Lalonde JK, Coit CE, et al. Longitudinal study of the diagnosis of components of the metabolic syndrome in individuals with binge-eating disorder. *Am. J. Clin. Nutr.* 2010; 91(6): 1568–1573.
4. Tanofsky-Kraff M, Shomaker L, Stern E, et al. Children's binge eating and development of metabolic syndrome. *Int J Obes* 2012; 36(7): 956–62.
5. Udo T, Bitley S, Grilo CM. Suicide attempts in US adults with lifetime DSM-5 eating disorders. *BMC Med* 2019; 17: 120.
6. Maranhão MF, Estella NM, Cury MEG, et al. The effects of repetitive transcranial magnetic stimulation in obese females with binge eating disorder: a protocol for a double-blinded, randomized, sham-controlled trial. *BMC Psychiatry* 2015; 15: 194
7. Eynde FVD, Claudino AM, Mogg A, et al. Repetitive transcranial magnetic stimulation reduces cue-induced food craving in bulimic disorders. *Biological Psychiatry* 2010; 67(8): 793-5.
8. Dalton B, Bartholdy S, Campbell IC, Schmidt U. Neurostimulation in clinical and sub-clinical eating disorders: A systematic update of the literature. *Curr Neuropharmacol.* 2018; 16(8): 1174-92.
9. Baczynski TP, Chaim CHA, Nazar BP, et al. High frequency rTMS to treat refractory binge eating disorder and comorbid depression: a case report. *CNS Neurol Disord Drug Targets* 2014; 13(5): 771-5.
10. Silvanto J, Pascual-Leone A. State-dependency of transcranial magnetic stimulation. *Brain Topography* 2008; 21(1): 1–10.

The Effects of Psychosocial Determinants on Post Operative Complications of Head and Neck Free Flap Patients

Carlos X Castellanos, Liyang Tang, Daniel Kwon, Niels Kokot

Objective: To determine if a patient's pre-operative self-perception and quality of life affect post-operative complications and hospital length of stay after free flap surgery.
Design, Setting, and Participants: This was a prospective cohort study. Patients who underwent a free flap surgery at an academic tertiary care center between January to September 2021 were asked to fill out the Rosenberg Self Esteem Scale and the Short Form 36 before surgery. A chart review of their medical records was then performed. Analysis of the data was performed using the Fisher exact test and Mann-Whitney on STATA 15.
Main Outcomes and Measures: Rosenberg Self Esteem Scale score, Short Form 36 subset scores, demographic characteristics, post-operative complications, length of stay
Results: Thirty patients (21 males, 9 females, mean [SD; range] age: 59.5 [14.5; 23.1 - 84.9]) who underwent free flap surgery agreed to participate in the study. Sixteen patients (53.5%) were Caucasian and fourteen patients (46.7%) had preferred provider organization (PPO). Insurance status did not affect post-operative complications. The most common indication for surgery was malignancy (93.3%). Nine patients (30%) had one or multiple post-operative complications. Post-operative complications included 2 hematoma (6.7%), 2 free flap failure (6.7%), 1 wound dehiscence (3.3%), 4 salivary fistulas (13.3%), and 2 aspiration pneumonia (6.7%). There were no mortalities. The mean physical functioning subscore [SD; range] and social functioning subscore of the SF-36 were 86 [20.6, 10-100] and 76 [25.1, 12.5-100]. The mean Rosenberg Self Esteem Scale score was 24.4 [4.6, 13 – 30]. Improved physical functioning score and social functioning score were associated with fewer overall post-operative complications ($p = 0.029$ and 0.030, respectively), but was not correlated with length of stay. Mean self-esteem score was not associated with post-operative complication rates.

Conclusions and Relevance: In this study, patients who perceived that they could do more physically and had less social limitations had fewer post-operative complications. It is important to continue to explore how pre-operative quality of life and other psychosocial factors can affect surgical outcomes as they can affect the patients' post-operative course.

The Role of Donor Physiology on Human Adipose Derived Stem Cell Mediated Osteogenic Potential

Kevin Collon, MD[1], Jennifer A. Bell, MD[1], **Stephanie Chang, BA[1],** Matthew C. Gallo, BA[1], Sofia Bougioukli, MD[1], Osamu Sugiyama, MD PhD[1], Jay R. Lieberman, MD[1]
[1]Department of Orthopaedic Surgery, University of Southern California, Los Angeles, CA

Background: Adipose-derived mesenchymal stem cells (ASCs) are an attractive option for cell-based gene therapy for bone regeneration. Human ASCs transduced with lentivirus to express BMP-2 have been shown to reliably repair critical sized bone defects in the nude rat model. Previous studies have found that donor physiology may affect the function of non-transduced ASCs, but these studies have been limited by small sample size and lack of cohort diversity. The purpose of this study was to evaluate the influence of donor health, age, sex and race on ASC yield, proliferation and in vitro osteogenic potential.
Methods: All procedures were approved by the university institutional review board. Human adipose tissue was collected from infrapatellar fat pads of patients undergoing total knee arthroplasty. Patient demographics and medical co-morbidities were recorded. ASCs were isolated and expanded in culture. At passage 3, a subset of donor cells underwent additional in vitro analysis. This included Alizarin red staining, CFU-F, population doubling time and BMP-2 production at 2, 7 and 14 days.
Results: Overall 122 patients were included in the study. There were no significant differences in yield or growth characteristics when compared by health status or race. However, female donors had significantly greater cell numbers at passage 2 and 3. Out of the 122 patients, 44 ASC harvest (21 healthy, 23 non-healthy) underwent additional analysis. LV-BMP-2 transduced cells from healthy donors produced significantly more BMP-2 at day 2 compared to non-healthy. By day 7 there was no difference in BMP-2 production. There were no significant differences in cell growth, mineralization, or CFU-F between healthy and non-healthy.
Conclusion: These results reinforce that ASCs, both transduced and non-transduced, are a promising resource for cell-based gene therapy application regardless of donor physiology. Future studies should investigate impact of ASC donor physiology on in vivo bone formation.

Using Functional Ultrasound Imaging to Identify How Deep Brain Stimulation of the Medial Septum Modulates Memory Networks

Wooseong Choi, Lindsey Crown, Kofi Agyeman, Naim Lazkani, Isabella Hoang, Charles Liu, Vasileios Christopoulos, Darrin Lee

Introduction: It has been demonstrated that MK-801, an NMDA-antagonist used to model schizophrenia, induces spatial memory impairments in rodents (Ward, et al., Pharmacol Biochem Behav. 2013). These spatial memory deficits can be ameliorated by theta-frequency deep brain stimulation (DBS) of the medial septal nucleus (MSN), suggesting its use to treat schizophrenia. Intriguingly, while MK-801 alters electrophysiological activity, DBS does not appear to have lasting changes on these measures. This suggest that DBS improves memory function through mechanisms other than direct alterations to electrical brain activity. Functional ultrasound (fUS) imaging was recently introduced as a breakthrough technology for large-scale

recordings of neural activity (Mace et al. 2011, Nature Methods). It provides a unique combination of (i) great spatial coverage, (ii) high spatiotemporal resolution (~100 μm, 10 ms) and (iii) sufficient sensitivity to detect hemodynamic changes of only 2%. The present study applies fUS imaging to examine hemodynamic changes across the septo-hippocampal network, including areas such as the hippocampus and thalamus, following MK-801 administration and DBS to the MSN.

Methods: There were 4 groups in the study. Saline-administered mice were divided into 1) theta 2) no stimulation groups. MK-801-administered mice were also divided into 3) theta 4) no stimulation groups. During the entire procedure, Mice were anesthetized with isoflurane and fixed in a stereotactic frame **(Fig 1B)**. Bipolar stimulating electrodes were implanted into the MSN in the left hemisphere. Coronal and sagittal recording of the cerebral blood volume doppler signal was acquired during the 60-min fUS recording **(Fig 1C-E).** During the recording **(Fig 1F)**, mice were injected with either 0.2cc of saline or MK-801 (1mg/kg), intraperitoneally. At the 45-minute mark, the mice received either theta or no stimulation for 5 minutes. Isoflurane and oxygen levels were kept constant during the fUS recording.

Results: The results showed that MK-801 injection specifically causes reduction of blood perfusion across all ROIs, albeit at different rates (**Figs. 2A-C**). Preliminary data of the DBS (N=7 mice with saline, 6 mice MK-801 with stimulation and 2 mice MK-801 with no-stimulation) showed that theta-frequency stimulation halt the decrease in blood perfusion following MK-801 injection, even after the cessation of stimulation (**Fig. 2D-F**).

Discussion: Our findings provide direct evidence that pharmacologic NMDA receptor antagonism has regionally distinct effects on blood perfusion. Consistent with our hypothesis, it seems that DBS MSN alters the septo-hippocampal circuit by modulating the vascular activity, a finding that open new avenues on improving the effectiveness of DBS neuromodulation for schizophrenia.

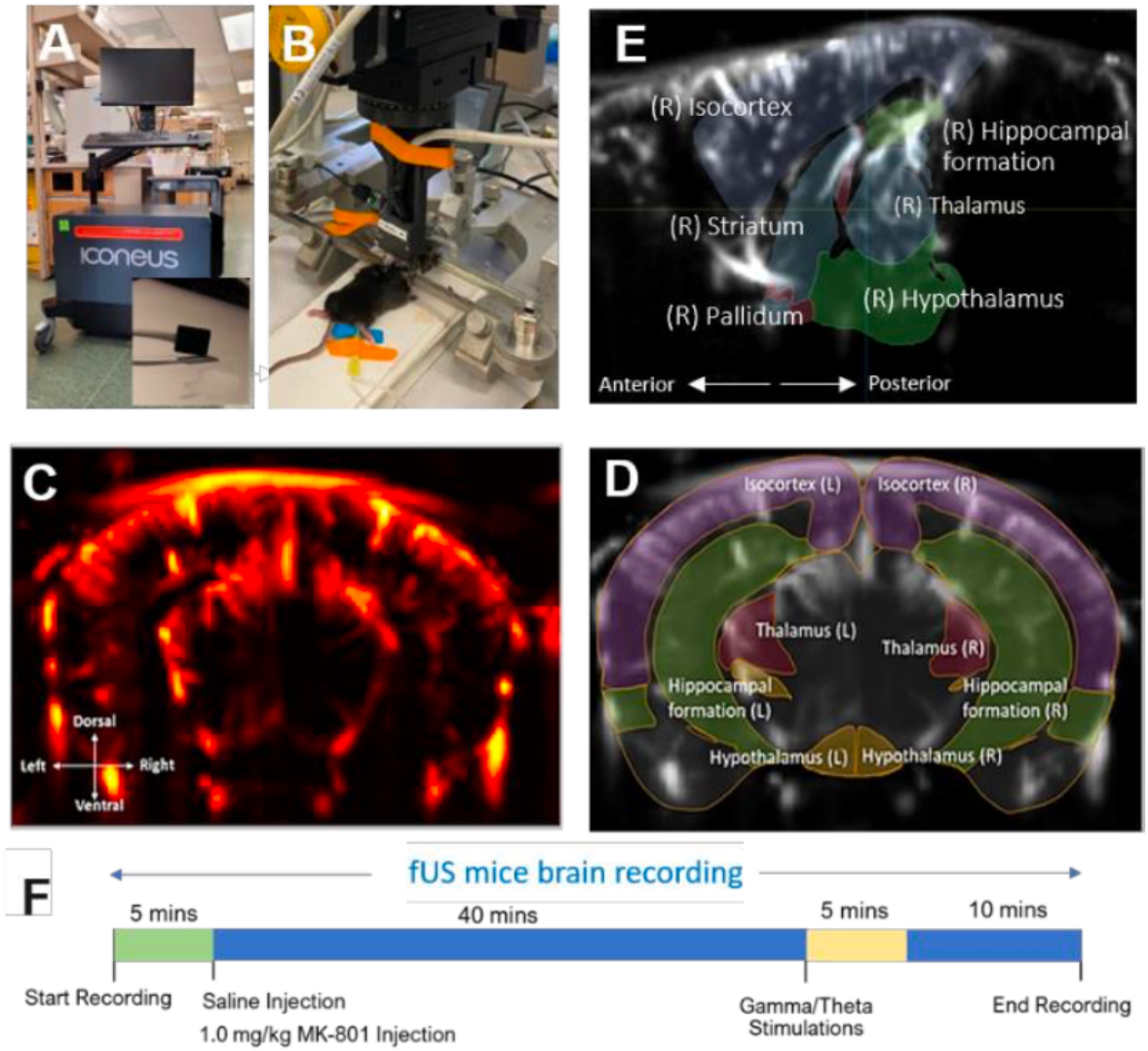


Figure 1 (A): (**A**) The Iconeus One functional ultrasound scanner (inner panel: The 15 MHz probe). (**B**) Illustration of the fUS coronal acquisition in mouse brain. (**C**) Coronal ultrafast functional ultrasound imaging. (**D**) Regions of interest on a coronal and (**E**) sagittal acquisition plane superimposed into the vascular map of the mouse brain (**F**) Experimental paradigm

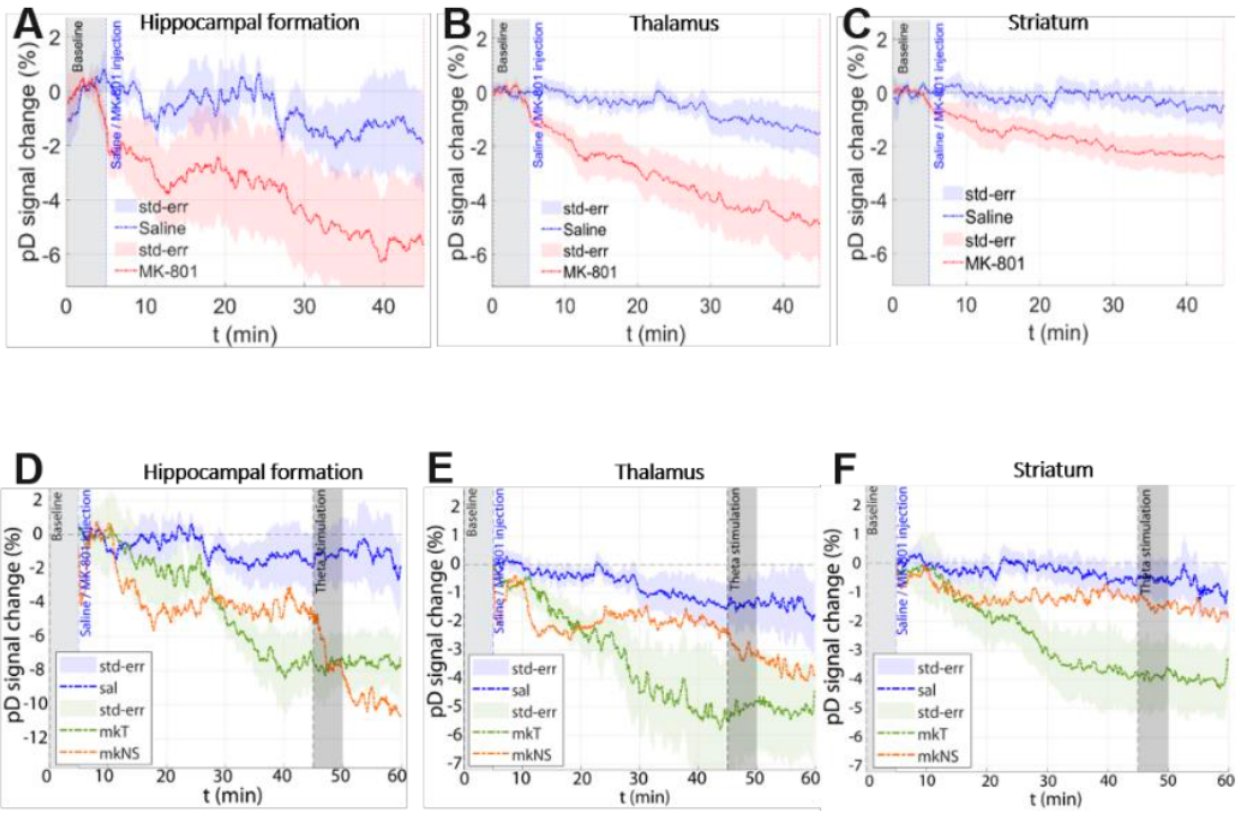


Figure 2: (**A**-**C**) Temporal course (45 min) of the CBV changes from baseline (first 5 min) in (*A*) hippocampus, (*B*) thalamus and (*C*) striatum in saline (blue) and MK-801 (red) injection. Injection occurred 5 min after starting fUS acquisition (gray area). (**D**-**F**) Temporal course (60 min) of the CBV changes from baseline in MK- 801 or saline (blue) injection, following by theta (green) or no stimulation (orange) at 40 minutes after MK-801 injection in (*D*) hippocampus (*E*) thalamus and (*F*) striatum. Standard error in no stimulation (orange) was not computed due to the low number of animals (2) imaged so far.

Incidence of Postoperative CSF leaks in Class III Obese Patients Undergoing Middle Cranial Fossa Approach forSpontaneous CSF Leak Repair

Raffaello M. Cutri, Seiji B. Shibata, MD, PhD, Huan Zhang, MD, Bruce J. Gantz MD, Marlan R. Hansen, MD

Objective: Over the past few decades, spontaneous CSF (sCSF) leaks have increased in incidence, coinciding with an increase in obesity in the general population. We sought to determine the rate of surgical complications and postoperative CSF leaks in morbidly obese patients (BMI 40+) versus those with a BMI (18.5-40) following MCF craniotomy for CSFleak repair.
Study Design: Retrospective chart review study.
Setting: Tertiary academic center.
Patients: All adults, n = 57 (21 patients with BMI > 40 vs. 36 patients with BMI 18.5-39.9), undergoing sCSF leak repair via a middle cranial fossa approach were evaluated.

Main Outcome Measures: Clinical records were reviewed for age, gender, BMI, comorbidities, complications at <30 days and between 30-60 days, and material used for CSF leak repair.
Results: 64 operative MCF repairs were performed for sCSF leaks on 57 patients (7 had bilateral CSF leaks). The average age was 60 years, and 45% were female. There were no postoperative complications in 78% (49 of 64) of cases. The surgical complication rate was 22% in adults with BMI (18.5-40) and 21.7% in adults with BMI (40+). The percentage of postoperative CSF leaks in adults with BMI (18.5-40) was 9.8% and 13% in adults with BMI (40+). Differences between rate of surgical complications and postoperative CSF leaks were not statistically significant (Chi-Square p-values = 0.98, 0.69, respectively).
Conclusions: Surgical complication rates and postoperative CSF leaks between adults with (BMI 18.5-39.9) and adults with BMI 40+ undergoing MCF approach for sCSF leak repair were comparable.
Professional Practice Gap & Educational Need: There exists a strong correlation between obesity and spontaneous CSF leaks, as well as an increased incidence of CSF leaks in obese patients undergoing intracranial surgery. However, data evaluating the complication rate of MCF sCSF leak repair in the morbidly obese population (BMI 40+) is limited.
Learning Objective: To better understand the role of obesity in spontaneous CSF leaks, as well as its influence on rates of postoperative CSF leaks and surgical complications when undergoing intracranial surgery.
Desired Result: Given that obesity is suspected to play a role in an increased incidence of CSF leaks, we hope to clarify any CSF-related complications and adverse events associated with MCF procedures on morbidly obese patients.

Effects of Cell Seeding Technique on BMP-2 Production in Transduced Human Mesenchymal Stem Cells

Kevin Collon, MD[1], Jennifer A. Bell, MD[1], **Matthew C. Gallo, BA[1]**, Stephanie Chang, BA[1], Osamu Sugiyama, MD, PhD[1], Jay R. Lieberman, MD[1]
[1]Department of Orthopaedic Surgery, Keck School of Medicine of USC, Los Angeles, CA

Introduction: Seeding cells onto a scaffold prior to implantation is a critical step in regional cell-based therapy approaches: it determines cell delivery to a region of interest. The purpose of this study was to evaluate the effect of seeding method on seeding efficiency and transgene expression with human adipose-derived mesenchymal stem cells (ASCs) transduced to overexpress BMP-2.
Methods: ASCs were isolated from healthy human donors. At passage 3, ASCs were transduced with lentiviral vectors containing BMP-2. Three described seeding techniques were evaluated with collagen-ceramic scaffolds: (1) static (pipetting), (2) static plus negative pressure (-100mmHg for 100s), and (3) orbital shaking (a 4mL cell suspension combined with a scaffold in a 50mL tube and placed on an orbital shaker set to 150rpm for 6 hours). Each technique was evaluated with 5M transduced ASCs (n=5/group). After seeding, scaffolds were transferred to a new culture dish and maintained for 7 days. Seeding efficiency immediately after loading was calculated using cells remaining in media. BMP-2 production was quantified at 2d and 7d post-transduction. Group-based comparisons were performed using one-way ANOVA or Kruskal-Wallis tests.
Results: Static (75%) and negative pressure (84%) seeding methods were significantly more efficient compared to the orbital shaking method (29%, overall p value <0.01). Higher seeding efficiency was associated with greater overall BMP-2 production at 2d and 7d. Interestingly, when BMP-2 production was estimated based on the number of successfully seeded cells, we found that BMP-2 production per cells was significantly higher in the orbital shaking group at both time points.

Conclusions: Mechanostimulation during cell seeding may be a useful tool to increase the BMP-2 produced per cell but an optimized cell seeding method will need to balance cell seeding efficiency with BMP-2 production in order to maximize the therapeutic potential for cell-based gene therapy applications.

Potential of Aqueous Humor as a Liquid Biopsy for Uveal Melanoma

Deborah Im, BS[1, 2], Chen-Ching Peng, PhD [1, 2], Liya Xu, PhD[1, 3], Mary E. Kim, BA[1, 2], Dejerianne Ostrow, PhD[4, 5], Venkata Yellapantula, PhD[4, 5], Moiz Bootwalla MS[4, 5], Jaclyn A Biegel, PhD[4, 5], Xiaowu Gai, PhD[4, 5], Peter Kuhn, PhD[3, 6, 7, 8], James Hicks, PhD[3, 6, 9], Jesse L. Berry, MD[1, 2, 6, 10]

[1]The Vision Center at Children's Hospital Los Angeles, Los Angeles, CA 90027, USA.
[2]USC Roski Eye Institute, Keck School of Medicine of the University of Southern California, Los Angeles, CA 90033, USA.
[3]Department of Biological Sciences, Dornslife College of Letters, Arts, and Sciences, University of Southern California, Los Angeles, CA 90007, USA.
[4]Center for Personalized Medicine, Department of Pathology and Laboratory Medicine, Children's Hospital Los Angeles, Los Angeles, CA 90027, USA.
[5]Department of Pathology and Laboratory Medicine, Keck School of Medicine of USC, Los Angeles, CA 90033, USA.
[6]Norris Comprehensive Cancer Center, Keck School of Medicine, University of Southern California, Los Angeles, CA 90033, USA.
[7]Department of Aerospace and Mechanical Engineering, Viterbi School of Engineering, University of Southern California, Los Angeles, CA 90007, USA.
[8]Department of Biomedical Engineering, Viterbi School of Engineering, University of Southern California, Los Angeles, CA 90007, USA.
[9]Department of Biochemistry and Molecular Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA 90033, USA.
[10]The Saban Research Institute, Children's Hospital Los Angeles, Los Angeles, CA 90027, USA.

Purpose: Tumor biopsy for uveal melanoma (UM) can identify prognostic biomarkers for metastatic disease. Aqueous humor (AH) biopsy is less invasive and repeatable, thus facilitates longitudinal monitoring of disease. We investigated whether the AH of UM eyes has sufficient tumor-derived DNA to perform genetic analysis of the tumor.
Methods: Case series of 37 AH samples from 12 choroidal and 8 ciliary body (CB) tumor patients. Of 12 choroidal AH samples there were 9 paired pre- and post-radiation, 2 at post-radiation only and 1 at enucleation. There were 8 paired pre- and post-radiation CB AH samples. One choroidal tumor biopsy wash sample was collected. AH was analyzed for nucleic acids (Qubit Assay Kits). AH samples and cells from tumor wash underwent DNA isolation followed by 150bp paired-end whole-genome sequencing to detect somatic copy number alterations (SCNAs) followed by targeted sequencing and mutation detection using a custom hybridization panel that covers *BAP1* and *GNAQ* gene exons. Clinical tumor testing by Castle Biosciences included amplifying genomic DNA regions (Ion Custom Ampliseq panel and Ion GeneStudio 55 Prime Instrument) to identify variants.
Results: Comparing paired pre- and post-radiation AH samples revealed significantly higher nucleic acid concentrations post-radiation with highest increases seen in CB eyes (most significant seen in miRNA, 9 choroidal pairs P=0.016 and 8 CB pairs P=0.008). Comparing just post-radiation AH samples, there was a significantly higher concentration of dsDNA (P=0.033), ssDNA (P=0.033) and RNA (P=0.018) in CB eyes. Highly recurrent UM SCNAs were identified in 5/8 (62.5%) post- CB and 0/9 choroidal samples. In the only available tumor

sample, there was high concordance of DNA profiles between tumor wash and post- AH sample (r=0.978). Of 5 SCNA+ samples that underwent tumor mutation detection, *BAP1* or *GNAQ* mutations were detected in 3/5 (60%) post- AH samples.
Conclusions: AH is a source of cell-free DNA (cfDNA) in UM eyes, with a higher yield of nucleic acids post-radiation. This is the first-time that UM SCNAs and mutations were identified in cfDNA isolated from the AH. This suggests the AH can serve as a liquid biopsy for UM.

Mycobacterium Lepromatosis and Leprosy Reactions

Sabrina Khan, BS[1], Brandon Adler, MD[1], April W. Armstrong, MD MPH[1], Maria T. Ochoa, MD[1]
[1]*Keck School of Medicine, University of Southern California, Los Angeles, CA, USA*

Background: Hansen's disease (HD) may cause severe immunologic reactions in patients, such as reversal reaction (RR), erythema nodosum leprosum (ENL), and Lucio reaction (LR). Previously, *Mycobacterium leprae* was thought to be the sole pathogen responsible for HD. A novel pathogen, *Mycobacterium lepromatosis*, was found to be the causative agent of HD in some patients in Mexico, Central, and South America. Our team previously demonstrated that patients of Mexican descent were more likely to experience multibacillary leprosy. However, it is important to know whether *M. lepromatosis* is associated with RR, ENL, and LR.
Objective: Compare demographic characteristics between those infected with *M. leprae* and *M. lepromatosis*. Determine whether an association exists between *Mycobacterium lepromatosis* and RR, ENL, and LR.
Methods: A retrospective analysis of HD clinic patients from 2011 to 2021 was performed. Patient records were reviewed for demographic characteristics, clinical outcomes, PCR results, and treatment course. Two-tailed t-tests and χ^2 tests were applied. The threshold for significance was set at p-value <0.05.
Results: Of the 187 HD patients with available electronic medical records between 2011 and 2021, 19 patients had positive PCR results for *M. leprae*, and five patients had positive PCR results for *M. lepromatosis*. Mean age at diagnosis, mean follow-up duration, sex, ethnicity, and country of origin did not significantly differ by pathogen. Compared to those infected with *M. leprae*, HD patients infected with *M. lepro*matosis had a significantly higher percentage of LR (*M. lepromatosis* vs *M. leprae*, 80.0% vs 5.3%, p<0.001). RR and ENL did not significantly differ by pathogen.
Limitations: Small sample size due to limited number of PCR results for *M. leprae* and *M. lepromatosis*.
Conclusion: There is a higher prevalence of LR among HD patients infected with *M. lepromatosis* compared to HD patients infected *with M. leprae*. Given the significant morbidity and mortality resulting from LR, early diagnosis and understanding of the different clinical presentations between *M. leprae* and *M. lepromatosis* are necessary to provide adequate care to HD patients.

A Comparison of Negative Pressure Wound Therapy Modalities, VAC Versus Low-Cost NPWT Alternatives: A Systematic Review of RCTs/CCTs

Paloma Madrigal, BS, Tayla Moshal, BS, Rendell Bernabe, BS, Justin Gillenwater, MD

Background: NPWT has been described as an effective treatment for wounds of various etiologies, however it is expensive. Various authors have investigated low-cost alternatives to commercial NPWT devices. A systematic review summarizing their findings is needed for clinicians operating in resource-limited locations.

Methods: We searched the following databases in October 2021: Cochrane, Pubmed and EMBASE. There were no restrictions on the date of publication. We searched for published randomized controlled trials (RCTs) or controlled clinical trials (CCTs) that compared commercially available Vacuum-Assisted Closure devices with low-cost NPWT modalities in human subjects. We excluded studies written in languages other than English. Two review authors independently performed study selection and data extraction. We assessed risk of bias using the Cochrane Risk of Bias Tool.
Results: The review contains six studies with a total of 409 participants. The wounds were of various etiologies. All six studies were RCTs. Four studies delivered NPWT via wall suction applied to a gauze dressing (GSUC), one study used an AquaVac system, and one study used a Redon drain. All compared the low-cost NPWT modality to a commercially available vacuum-assisted closure device (in most cases the VAC system, KCI, San Antonio, TX, USA). Four studies were found to have high risk of bias for at least one outcome. One study was low risk and one had some concern for bias. Outcomes described in this review: granulation tissue formation, skin graft take when NPWT was used as a bolster dressing, costs, the time required to change dressings and pain levels experienced with dressing changes.
Conclusion: Due to the high risk of study bias, definitive conclusions regarding the benefits of low-cost NPWT modalities over commercialized vacs cannot be made. The decision to use the former intervention should be based on the resources available to the clinician and patient.

The Usage of Stereociliary Mechanoelectrical Transduction (MET) Channel Blockers to Induce Endolymphatic Hydrops and its Effect on Cochlear Vibrometry

Eduardo Martinez, B.S., Dorothy Pan, M.D., PhD[1], Brian Applegate, PhD[1], John Oghalai, M.D.

Background: Ménière's disease is a disorder of the inner ear which affects approximately 12 out of every 1000 people worldwide. Also known as idiopathic endolymphatic hydrops, it is caused by increased osmotic pressure within the Scala Media of the inner ear. Excess pressure accumulation in the endolymph can lead to sensorineural hearing loss, episodic vertigo, tinnitus, and/or aural fullness.

Previous literature suggests that disruption of intracochlear fluid homeostasis may play a role in the formation of endolymphatic hydrops. Both the scala vestibuli and the scala tympani contain perilymph, which has high [Na^+] and low [K^+]. In contrast, the scala media contains endolymph, which has high [K^+] and low [Na^+]. The organ of Corti and Reissner's membrane separate these three scalae. The stria vascularis of the inner ear secretes the high K^+-containing endolymph that bathes the apical poles of the hair cells with their mechanoreceptors. Potassium cycles into and out of the endolymph.

Blocking MET channels leads to endolymphatic hydrops because the channel blockers prevent Potassium from entering hair cell tip links which hinders Potassium cycling and leads to Potassium build up with water entering the endolymph. Aminoglycosides such as Streptomycin cause toxic side effects to the inner ear. There is strong evidence that AGs enter hair cells through MET channels located at the stereocilia tip and act as channel blockers.

Using Optical Coherence Tomography (OCT), we will visualize the anatomical changes to the Organ of Corti (particularly the changes in Reissner's membrane) after injection of Streptomycin into the posterior semicircular canal, as well as monitor changes in cochlear vibrometry. We hypothesize that blocking of hair cell MET channels will lead to endolymphatic hydrops and prevent hair cell depolarization, therefore pausing normal hearing function.
Methods: Canalostomy is the approach used for drug delivery into the inner ear of mice. Drugs are injected into the posterior semicircular canal via polythene/polyimide tubing and a syringe pump at a rate of 0.5 microliters per minute. In order to ensure that injected solutions remained completely in the perilymphatic space, 50nm Au-PEG nanoparticles were added to a solution of

artificial perilymph 305mOsm/kg, pH 7.4. Serial OCT scans and OCT vibrometry measurements were taken after injection to monitor for changes.

The experimental drug consists of 50 mM solution of Streptomycin Sulfate salt in 305 mOsm/kg (normotonic) artificial perilymph which had an osmolality of 345 mOsm/kg. Normotonic artificial perilymph as composed of 140 mM NaCl, 4 mM KCl, 2 mM $MgCl_2$, 2 mM $CaCl_2$, 10 mM Hepes, and 10 mM glucose. The control solutions consisted of A) a 50 mM solution of Streptomycin Sulfate salt in 286 mOsm/kg (hypotonic) artificial perilymph which had an osmolality of 305 mOsm/kg and B) a hypertonic solution of sucrose (342.2965 g/mol) in normotonic artificial perilymph with an osmolality of 345 mOsm/kg.

Results: Endolymphatic hydrops does not appear to occur before or after gold particle perfusion into the PSCC (Fig 2B). Gold particles are initially seen in the Scala Vestibuli, however within 5 minutes of injection, they are no longer visible. OCT vibrometry measured at the basilar membrane showed no significant changes in characteristic frequency or sensitivity. The plots indicate an ongoing active mechanical process. Canalostomy and Gold NP injection both caused no changes in Reissner's membrane or cochlear vibrometry.

Injection of 50 mM solution of Streptomycin Sulfate salt in 305 mOsm/kg (normotonic) artificial perilymph which had an osmolality of 345 mOsm/kg into the Posterior Semicircular Canal at a rate of 0.5 microliters per minute for 2 minutes (Figure 3) OCT imaging of the cochlea at various intervals following injection showed bowing outwards of Reissner's membrane. OCT vibrometry measured at the basilar membrane which shows an active mechanical process prior to canalostomy, an active mechanical process after canalostomy but before injection, and a passive mechanical process 87 minutes after injection. A passive mechanical process in a live mouse indicates a disruption to normal hearing.

Conclusion: Meniere's disease is a disabling syndrome of vertigo and hearing loss due to increased endolymph volume which affects 12 out of every 1000 people worldwide. Here, we investigated mice who received delivery of Streptomycin sulfate into the bony labyrinth of posterior semicircular canal which is continuous with the perilymphatic spaces of the cochlea. In vivo cochlear imaging revealed an increase in the volume of endolymph, the fluid withing the scala media, termed endolymphatic hydrops. Endolymphatic hydrops was initiated by blocking of the mechanoelectrical transduction (MET) channels and was K^+-dependent.

Evaluating Accuracy of Online Health Information and Perception of Biologics Among Patients with Psoriasis and Psoriatic Arthritis

NP Maynard[1], AW Armstrong[1]

[1]*Keck School of Medicine, University of Southern California, Los Angeles, CA, USA*

Background: Many patients use social media as one key source of health information to guide them on medical decision-making. This includes the psoriasis and psoriatic arthritis communities, who may turn to social media to gain insight on treatments such as biologics.

Objective: The primary goal is to identify psoriasis and psoriatic arthritis patients' perceptions regarding biologic use on social media platforms.

Methods: Publicly accessible Facebook and Reddit groups regarding psoriasis and psoriatic arthritis (PsA) were identified. Posts uploaded between March 1, 2021 and June 31, 2021 were reviewed, and posts regarding psoriasis/PSA and biologic use were identified. Sentiment, higher-order themes (HOTs), second-order themes (SOTs), third-order themes (TOTs), and engagement scores were then assigned to posts and corresponding comments. Posts and comments surrounding biologics and the COVID vaccine were excluded.

Results: PENDING

Conclusion: Information regarding biologics on social media is generally opinion-based, with a mix of sentiment in favor of and against biologic use. It is important to consider the primary concerns of patients when counseling on starting a biologic, such as efficacy, safety, and cost.

Utilizing Google Trends to Explore Psoriasis and Atopic Dermatitis Pathogenesis

Manan D. Mehta, BS[1]; Caterina Zagona-Prizio, BS[2]; Danielle Yee, MD[3]; Rasika Reddy, BA[4]; Nicole Maynard, BS[1]; Samiya Khan, BS[5]; Sabrina Khan, BS[1]; April W. Armstrong, MD, MP[1]

[1] *University of Southern California Keck School of Medicine, Los Angeles, California, USA*
[2] *University of Colorado School of Medicine, Aurora, Colorado, USA*
[3] *Oakland University William Beaumont School of Medicine, Auburn Hills, Michigan, USA*
[4] *University of Texas Southwestern Medical Center, Dallas, Texas, USA*
[5] *Long School of Medicine, University of Texas Health Science Center at San Antonio, San Antonio, Texas, USA*

Goal: Air pollution is a major public health concern affecting over 90% of the world's population. While its effects on pulmonary and cardiovascular health are well established, air pollution has recently been linked to the pathogenesis and progression of inflammatory skin diseases. Specifically, newly emerging in-vivo and in-vitro based research have shown that particulate matter (PM 2.5), a type of pollutant up to 20 times smaller than human pores, can cause cutaneous inflammation and damage. However, a critical gap exists studying the relationship between pollution and inflammatory skin diseases at a population-based level. This study aims to explore the association between two inflammatory diseases (atopic dermatitis and psoriasis) and air pollution using a digital epidemiological approach.
Methods: We performed a multivariate analysis comparing Google Trends search volume index (SVI) for "eczema" and "psoriasis" to PM 2.5 levels gathered from the CDC. The analysis adjusted for potential confounders such as precipitation, temperature, population density, and percentage of the population living in an urban environment. Lastly, we repeated the analysis using CO2 levels in each state instead of PM 2.5 levels to serve as a negative control.
Results: We found that eczema SVI (R^2 = 0.41, p=0.0004) and psoriasis SVI (R^2 = 0.27, p=0.018) had a modest and significant association with PM 2.5 levels. CO_2 levels showed no correlation to eczema SVI (R^2 = 0.02, p=0.36) and psoriasis SVI (R^2 = 0.004, p=0.66).
Conclusion: Air pollution, specifically fine particulate matter, may serve as an important environmental factor contributing to the pathogenesis of atopic dermatitis and psoriasis.
Paragraph on oral presentation: I would present the above data during the oral presentation. I believe this topic is important because 1) the prevalence of pollution (WHO states it harmful levels of pollution affect over 90% of the world's population) and 2) the prevalence of inflammatory skin diseases (psoriasis alone affects approximately 2-4% of the world adult population, and atopic dermatitis affects approximately 15-20% of the children in the world). This data is also interesting because it is a unique method to investigate further into a relatively recent discovery that is still only in the infancy of being understood. While use of Google Trends is not new (in fact, its use in epidemiological studies continually increases - see screenshot below from PubMed showing its increasing use in the literature), the way we have applied it provides a unique approach in investigating this topic compared to traditional epidemiological studies. Additionally, because this topic is relatively new, it really has only been explored and validated in in vivo animal models and in-vitro human keratinocyte-based lab experiments. There remains a critical gap in exploring this relationship at a larger, population-based level. Because of these main factors, along with the data we have that supports the current emerging literature in this topic, we will be submitting these results to be published separately in BJD and JAMA Dermatology, two of the best journals in Dermatology.

A Split-Face Comparison Between Onabotulinumtoxin A and Prabotulinumtoxin A in Treatment of Glabellar Frown Lines

Preeya Mehta, BA; Leslie Pfeiffer, MD; David Samimi, MD; Sandy Zhang-Nunes, MD

Introduction: We sought to evaluate a difference in efficacy and safety between OnabotulinumtoxinA, a neuromuscular blocking agent widely used for cosmetic rejuvenation of the face, and PrabotulinumtoxinA, a novel neurotoxin.
Methods: A prospective, double-blinded, randomized trial was performed to investigate the noninferiority of OnabotulinumtoxinA and PrabotulinumtoxinA in the treatment of glabellar lines. 22 patients were randomized for 8-10 unit injections, with one side receiving OnabotulinumtoxinA and the other receiving PrabotulinumtoxinA. Photos were taken at rest and maximal frown before injection. Patients completed a survey regarding adverse events (pain, bruising, headache), day of onset, perceived effectiveness at 3 weeks, and day of offset for each side. Patients returned after 3 weeks for evaluation of effectiveness by the injector and photos. Pre- and post-treatment photos were graded by two masked oculoplastic surgeons on a validated five-point Merz scale. Mean and SD were reported for onset, adverse effects, effectiveness, offset, duration, and Merz score of the two treatments. A Wilcoxon signed-rank test was used to compare differences between the two treatments with significance at $\alpha=0.05$.
Results: No difference was found in days to onset, adverse effects, and effectiveness between the neurotoxins. Mean days to complete offset was 118.75 for OnabotulinumtoxinA and 118.50 for PrabotulinumtoxinA while mean duration was 115.70 days and 115.55 days, respectively, with no statistical difference. At 3 weeks, efficacy as graded by the patient was found to be 8.82 for OnabotulinumtoxinA and 8.97 for PrabotulinumtoxinA. A statistically significant change ($p < 0.05$) was found for OnabotulinumtoxinA and PrabotulinumtoxinA in their pre and post treatment Merz scores, but there was no significant difference between the two neurotoxins. Interrater reliability using Spearman's coefficient was 0.87.
Conclusion: In our split-face study, OnabotulinumtoxinA and PrabotulinumtoxinA were both effective in treating glabellar lines at frown and rest with 16-20 units total when evaluated after three weeks. No difference was seen between the neurotoxins in effectiveness as well as onset, offset, duration, and adverse effects.

References:

1. Beer KR, Shamban AT, Avelar RL, Gross JE, Jonker A. Efficacy and Safety of PrabotulinumtoxinA for the Treatment of Glabellar Lines in Adult Subjects: Results From 2 Identical Phase III Studies. Dermatol Surg. 2019 Nov;4s5(11):1381-1393. doi: 10.1097/DSS.0000000000001903. PMID: 30893162; PMCID: PMC6819028.
2. Dessy LA, Fallico N, Mazzocchi M, Scuderi N. Botulinum toxin for glabellar lines: a review of the efficacy and safety of currently available products. *Am J Clin Dermatol*. 2011;12(6):377-388. doi:10.2165/11592100-000000000-00000
3. Flynn TC, Carruthers A, Carruthers J, Geister TL, Görtelmeyer R, Hardas B, Himmrich S, et al. Validated assessment scales for the upper face. *Dermatologic Surg Off Publ Am Soc Dermatologic Surg [et al]*. 2012;38(2 Spec No.):309-319. doi:10.1111/j.1524-4725.2011.02248.x
4. Rzany BJ et al. A Multicenter, Randomized, Double-Blind, Placebo-Controlled, Single-Dose, Phase III, Non-Inferiority Study Comparing PrabotulinumtoxinA and OnabotulinumtoxinA for the Treatment of Moderate to Severe Glabellar Lines in Adult Subjects. *Aesthet Surg J*. 2019 Apr 5. pii: sjz110. doi: 10.1093/asj/sjz110.

Table 1: Comparison of Onabotulinumtoxin A with Prabotulinumtoxin A

	OnabotulinumtoxinA Mean (SD)	PrabotulinumtoxinA Mean (SD)
Pain, 0-10	2.53 (1.27)	2.78(1.82)
Bruising, 0-10	1.15 (1.79)	0.50 (0.95)
Headache, 0-10	0.50 (2.24)	0.65 (2.25)
Time to Onset, days	3.39 (3.55)	3.28 (2.99)
Patient Efficacy, 0-10	8.82 (1.50)	8.97 (1.27)
Injector Efficacy, 0-10	8.82 (1.23)	8.76 (1.27)
Time to Offset, days	88.25 (21.18)	85.15 (19.50)
Time to complete Offset, days	118.75 (29.09)	118.50 (28.93)
Duration, days	115.70 (29.70)	115.55 (28.95)
Merz Score: Rest Baseline, 0-4	0.56 (0.84)	0.44 (0.77)
Merz Score: Rest 3 weeks, 0-4	0.08 (0.28)	0.11 (0.40)
Merz Score: Frown Baseline, 0-4	2.39 (1.08)	2.31 (1.09)
Merz Score: Frown 3 weeks, 0-4	0.39 (0.80)	0.47 (0.94)

The Neovaginal Microbiome

Richard Mateo Mora, BS[1]; Preeya Mehta, BA[2]; Ryan Ziltzer, BS[2]; Mary K. Samplaski, MD[1]

[1]*University of Southern California Institute of Urology, 1441 Eastlake Avenue, Los Angeles, California, USA, (323) 865-3700*
[2]*University of Southern California, 1985 Zonal Avenue, Los Angeles, California, USA, (480) 298-5654*

Objective: To review neovaginal colonization patterns and inflammation, and factors that may impact this.
Methods: A systematic review of the neovaginal microbiome was conducted in concordance with PRISMA guidelines through October 2021.
Results: Thirteen articles were included, totaling 458 patients. Of these, six were penile skin, three were sigmoid derived, one was peritoneum, and three were other graft types. Generally, the neovaginal microflora were polymicrobial and shared similarities with the native tissue. Nine studies identified *Lactobacillus*, 5/6 for penile skin, 1/3 for sigmoid, 1/1 for peritoneum, and 2/3 for other graft types, suggesting that the neovagina may support *Lactobacillus* species either innately, via rectal migration or oral probiotic supplementation. Nine studies identified a polymicrobial, bacterial-vaginosis-like environment. Neovaginas demonstrated increased inflammatory response elements and lower antimicrobial and anti-inflammatory compounds: 2/6 for penile skin, 2/3 for sigmoid, 0/1 for peritoneum, and 1/3 for other graft types. Scant data were available on the impact of postoperative duration, oral hormones, dilating, sexual practices, or douching.
Conclusion: The neovaginal microbiome may influenced by the grafted tissue, post-operative duration, hormone or probiotic use, neovaginal maintenance, and sexual practices. Understanding this microenvironment is important for clinicians as this may predispose patients to inflammation, pain, and infectious outcomes.

The Role of Health Literacy on Head and Neck Cancer Patients' Postoperative Health

Francis Reyes Orozco, BA; Ian Kim, MFA/MS; Meredith D. Xepoleas, BA; Christine K Raj, BA; Harrison J Ma, BA; Kevin Hur, MD; Tamara Chambers, MD; Niels C. Kokot, MD; Daniel I. Kwon, MD; Uttam K. Sinha, MD; Mark S. Swanson, MD
University of Southern California Keck School of Medicine

Objectives: The extant body of research supports parts of the mechanisms that predict one's postoperative health. Yet, there is a paucity of data evaluating the relations of preoperative health, age, health literacy, ethnicity and primary language and their sequential effects on postoperative health among head and neck cancer (HNC) patients undergoing surgical treatment. The current study assessed relations between levels of preoperative health and age on HNC patients' postoperative health as mediated by baseline health literacy levels.
Methods: Prospective analyses were performed on adult HNC patients receiving surgical treatment at one of three Otolaryngology centers located throughout Los Angeles, California. Self-reported health was assessed preoperatively and postoperatively using a scale of 0-100, with 0 indicating the worst health imaginable and 100 indicating the best health imaginable. Health literacy was assessed with the Brief Health Literacy Screen, with scores less than 10 indicating inadequate health literacy. A multi-mediator model was estimated at baseline with age, ethnicity, and primary language, predicting postoperative health at follow-up as mediated by preoperative health and health literacy at baseline. To test the model, a path analysis (a simultaneous multivariate regression analysis) was conducted.
Results: In total, 66 patients were evaluated pre and postoperatively (mean age: 53 years, SD=14.38; 47% female; 52% Hispanic or Latino). Of the patients surveyed, 29% were found to have inadequate health literacy. Additionally, Health literacy (β _= 0.41; $p < .001$) had significant direct effects on postoperative health. The impact of lower health literacy on the decreased postoperative health was significantly greater in non-English speaking patients, compared to English speaking patients (β _= 0.49; $p < .05$).
Conclusion: In HNC patients receiving surgical treatment, higher health literacy had a direct effect on significantly greater postoperative health. The impact of higher health literacy on post-operative health improvement is moderated by "primary language". The direct impact of lower health literacy on postoperative health was significantly greater on non-English speaking patients.

Table 1. Demographical characteristics of the study sample (N=66).

Variables		Total N=66	
		Mean/count	SD/Freq
Mean Age (SD)		53.5	14.4
Gender (%)			
	Female	31	47.00%
	Male	35	53.00%
Race (%)			
	White or Caucasian	19	28.80%
	African American or Black	3	4.50%
	American Indian or Alaska Native	1	1.50%
	Native Hawaiian or Pacific Islander	3	4.50%
	Asian	7	10.60%
	Other	33	50.00%

Ethnicity (%)			
	Not Hispanic or Latino	32	48.50%
	Hispanic or Latino	34	51.50%
Income (%)			
	< $20,000	26	39.40%
	$20,000 to $49,999	11	16.70%
	$50,000 to $100,000	7	10.60%
	$100,000 to $200,000	6	9.10%
	> $200,000	8	12.10%
	Unknown	8	12.10%
Marital Status (%)			
	Single (never married)	15	22.70%
	Married, or in a domestic partnership	41	62.10%
	Widowed	1	1.50%
	Divorced	5	7.60%
	Separated	3	4.50%
	Unknown	1	1.50%
Education (%)			
	Elementary school	9	13.60%
	Middle school	6	9.10%
	High school	20	30.30%
	College or University	24	36.40%
	Graduate degree or higher	7	10.60%
Stage (%)			
	0-I	5	7.60%
	III-IV	60	90.90%
Charleson Comorbidity Index Mean (SD)		5.1	2.5
Preoperative Health		69.2	19.9
Postoperative Health		67	16.9

Table 2. Parameter estimates derived from the path analysis

	Standardized Effects (Beta)		
	Direct	**Indirect**	**Total**
→ Postoperative Health			
Preoperative Health	0.375***	-	0.375***
Primary Language*Health Literacy	0.199*	-	0.199*
→ Health Literacy			
Age*Ethnicity	0.490***	-	-0.490***

*p < .05; **p <. 01; ***p < .001

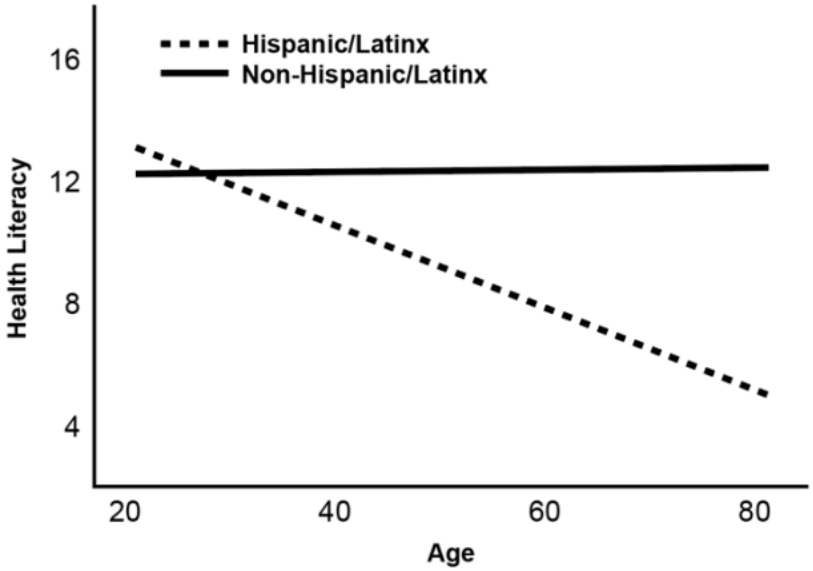


Figure 1. Moderation effect of ethnicity on the link between age and health literacy.

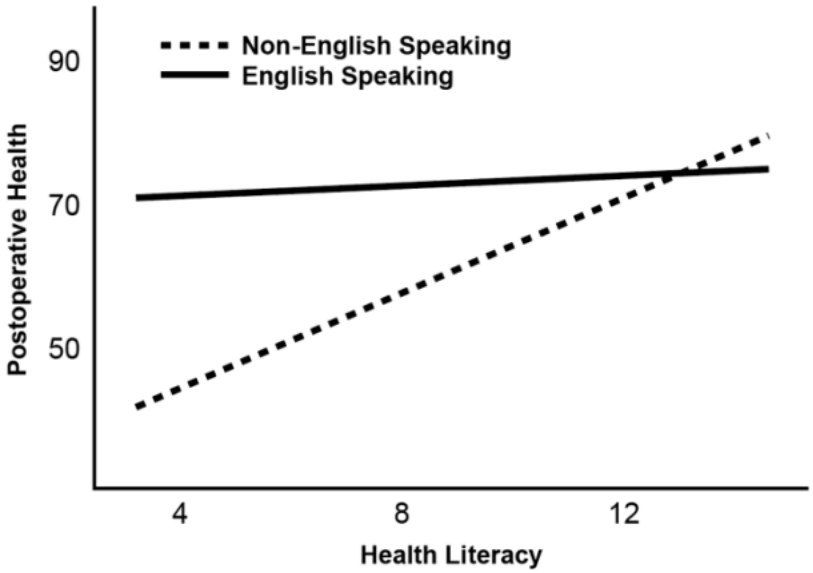


Figure 2. Moderation effect of primary language on the link between health literacy and postoperative health.

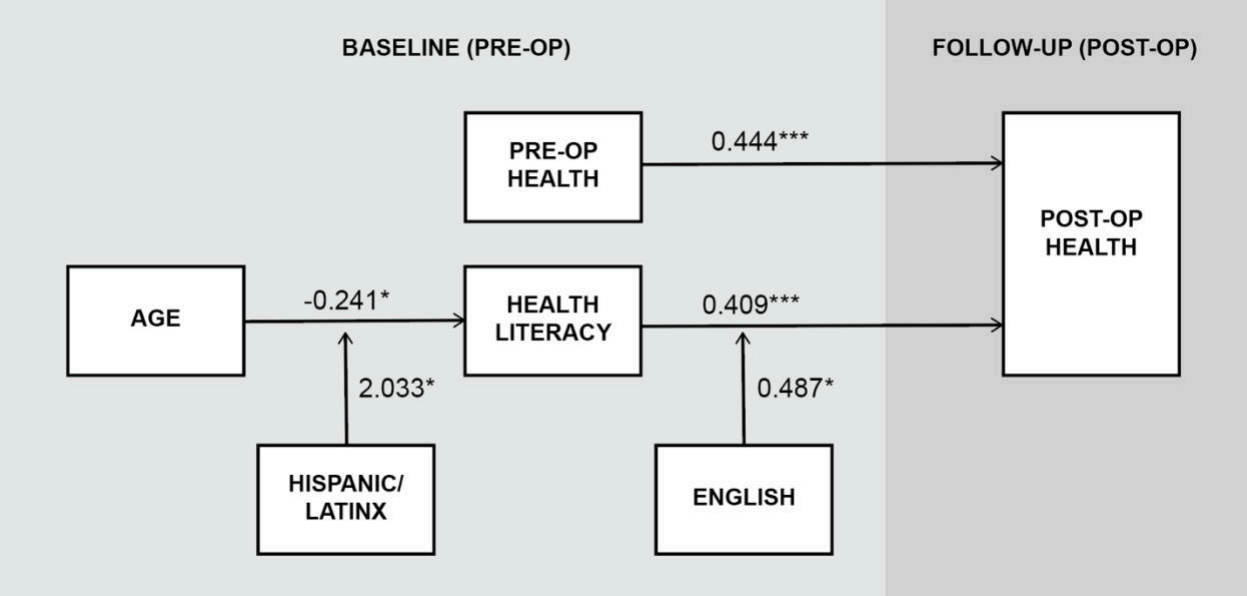


Figure 3. Path model diagram of relations between predictors and moderator with postoperative health (standardized coefficients)

Expert Surgeons and Deep Learning Models Can Predict the Outcome of Surgical Hemorrhage from One Minute of Video

Dhiraj J Pangal BS[1], Guillaume Kugener MEng[1], Yichao Zhu BS[2], Aditya Sinha BS[3], Vyom Unadkat BS[2], David J Cote MD, PhD[1], Ben Strickland MD[1], Martin Rutkowski MD[4], Andrew Hung MD[5], Animashree Anandkumar PhD[6,7], X.Y. Han MS[8], Vardan Papyan PhD[9], Bozena Wrobel, MD[10], Gabriel Zada MD MS[1], Daniel A Donoho MD[11]

Introduction: At the outset of hemorrhage, surgeons do not know how much blood will be lost or whether their attempt at hemostasis will succeed. Our objective was to compare human experts to SOCALNet, a deep learning neural network (DNN), in predicting hemostasis control ability using the first minute of surgical video.

Methods: The publicly available SOCAL dataset contains 147 videos of attending and resident surgeons managing hemorrhage in a validated, high-fidelity cadaveric simulator. Videos are labeled with outcome and blood loss (mL). The first minute of 20 videos was shown to four, blinded fellowship trained skull-base neurosurgery instructors and SOCALNet (a DNN trained on SOCAL videos). Experts independently assessed surgeon skill, predicted outcome and blood loss (mL). SOCALNet architecture included a convolutional network (ResNet) identifying spatial features and a recurrent network identifying temporal features (LSTM). Measured outcomes: prediction of outcome (success or failure) and blood loss (mL). Surgeon skill and experts' confidence in ratings (Likert scale).

Results: Expert inter-rater reliability was 0.95. Experts correctly predicted 14/20 trials (Sensitivity: 82%, Specificity: 55%, Positive Predictive Value (PPV): 69%, Negative Predictive Value (NPV): 71%). Expert predictions of the highest and lowest skill surgeons and expert predictions reported with maximum confidence were more accurate. SOCALNet correctly predicted 17/20 trials (Sensitivity 100%, Specificity 66%, PPV 79%, NPV 100%) and correctly identified all successful attempts. Experts systematically underestimated blood loss (mean error -131 mL, RMSE 350 mL, R2 0.70) and fewer than half of expert predictions identified blood loss > 500mL (47.5%, 19/40). SOCALNet had superior performance (mean error -57 mL, RMSE

295mL, R2 0.74) and detected most episodes of blood loss > 500mL (80%, 8/10). In validation experiments, SOCALNet evaluation of a critical on-screen surgical maneuver and high/low-skill composite videos were concordant with expert evaluation.
Conclusion: Using only the first minute of video, experts and SOCALNet can predict outcome and blood loss during surgical hemorrhage. Experts systematically underestimated blood loss, and SOCALNet had no false negatives. DNNs can provide accurate, meaningful assessments of surgical video. We call for the creation of datasets of surgical adverse events for quality improvement research.

Electric Fields Direct Full-Length Optic Nerve Regeneration And Partial Restoration of Visual Function

Micalla Peng BS[1], Phillip Lam BS[1], Manjunath Machnoor PhD[2], Javad Paknahad PhD[2], Ege Iseri MS[2], Xiecheng Shao BS[2], Nathanael Matei PhD[1], Mahnaz Shahidi PhD[1], Gianluca Lazzi PhD[2], Kimberly Gokoffski MD PhD[1]
[1]USC Roski Eye Institute, USC Keck School of Medicine, Los Angeles, CA
[2]Ming Hsieh Department of Electrical and Computer Engineering, USC Viterbi School of Engineering, Los Angeles, CA

Purpose: Restoration of vision in patients blinded by advanced optic neuropathies requires therapies that promote retinal ganglion cell (RGC) survival and direct RGC axon regeneration. Previously, we demonstrated that electric fields (EFs) direct RGC axon growth towards the cathode (negative electrode), *in vitro*. We are now testing whether exogenous application of EFs can be exploited to direct optic nerve regeneration *in vivo.*
Methods: Adult Long-Evans rats underwent optic nerve crush injury with intra-orbital and intracranial electrode implantation. Five days later, rats were stimulated with various electrical waveforms for 5 hours daily for 10 or 30 days, unless they were in the untreated group. Efficacy of treatment was assessed via 1) histologic studies, including RBPMS staining for surviving RGCs and Cholera-toxin-B (CTB) anterograde labeling of regenerated axons, 2) behavioral testing, including optokinetic reflex (OKR) and visual cliff testing, and 3) electrophysiologic studies, including visual evoked potential (VEP) recordings and pattern electroretinogram (PERG).
Results: 10 days of EF treatment directed 3-fold more RGC survival and axon regeneration over untreated animals (N=5, $p < 0.05$). Full length optic nerve regeneration was noted with 30 days of stimulation. VEP recordings demonstrated partial recovery of visual function in 68% of sites (max 32 to 38 sites) on average in the superior colliculus of 30-day treated animals (N=3) compared to no sites in untreated animals (N=3, $p < 0.05$). On PERG, the normalized N95 peak amplitude (crushed nerve normalized to maximum of contralateral uncrushed nerve) was 0.69 in 30-day treated animals (N=4) compared to 0.28 in untreated animals (N=4, $p < 0.05$). On visual cliff testing, 67% of treated animals (N=3) dismounted correctly onto the shallow side (average latency=184 seconds) compared to none in the untreated group (N=3).
Conclusions: Our results demonstrate that EF application can promote RGC survival and direct axon regeneration and suggest that EF application may be a viable therapeutic to help restore visual function in patients blinded by advanced optic nerve disease.
Application for Oral Presentation: If chosen to give an oral presentation, I would discuss our current results on the effect of exogenous electric field (EF) stimulation on optic nerve regeneration *in vivo* as structured in my abstract. I would begin by providing background information on the clinical problem we are addressing: regenerating the optic nerve to restore vision to patients blinded by diseases like glaucoma. I would then present the premise for our approach including sharing our prior *in vitro* work which demonstrate that electric fields direct retinal ganglion cell axon growth. I would then present our exciting *in vivo* results demonstrating

that electric field application to living rodents directs 1) full length nerve regeneration and 2) partial restoration of visual function. This would include a description of our experimental set-up and methods. Lastly, I conclude by sharing our next steps forward.

Differences in Peripapillary and Macular Vessel Density following Glaucoma Treatment: A Comparative Study Using Optical Coherence Tomography Angiography

Arthi Rao MS[1], Connie Huang BS[1], Jae Lee BS[1], Bruce Burkemper PhD, MPH[1], Van Nguyen MD[1], Grace Richter MD, MPH[1], Brian Song MD, MPH1

[1]*Keck School of Medicine, Department of Ophthalmology*

Background: Glaucoma is a progressive optic neuropathy that is often associated with elevated intraocular pressure (IOP). Improvement of retinal blood vessel density on Optical Coherence Tomography Angiography (OCTA) has been previously reported following glaucoma filtration surgery (trabeculectomy). We hypothesize that similar improvements in retinal vessel density are seen in glaucoma patients following treatment with topical prostaglandin analogue (PGA) eye drops.

Methods: 77 patients were imaged using Spectral Domain OCTA with 6x6 dimensions at the macula and the optic nerve head (Carl Zeiss Meditec, Dublin, CA). All images were quality graded for inclusion with a custom scale, underwent segmentation through custom Zeiss software, and vessel density in the peripapillary and macular regions were quantified using a MATLAB code. Further analysis was conducted using Microsoft Excel and SAS. Patient charts were retrospectively reviewed for demographic and clinical data, including IOP measurements. Patients with a diagnosis of primary open angle glaucoma who experienced >20% reduction in IOP following either treatment with a PGA or glaucoma filtration surgery (trabeculectomy or XEN gel stent) were included in the study. Based on the inclusion and exclusion criteria, some patients had more than one eye included in the study.

Results: Of all patients with sufficient quality OCTA images in the peripapillary region prior to and after treatment, 25 eyes received filtration surgery while 4 eyes underwent treatment with a PGA. Mean follow up was 2.91 ± 0.88 months and 5.99 ± 5.27 months, respectively. Mean IOPs at baseline were 20.8 ± 3.1 mmHg and 15.3 ± 2.5 mmHg and at follow up IOPs were 9.3 ± 1.6 mmHg and 10.8 ± 2.4 mmHg for the surgical and PGA groups, respectively. There was a -1.5%± 7.0% change in vessel density at the peripapillary region for the surgical group and -1.8% ± 11.1% for the PGA group at last follow up. When using an unpaired test, neither group showed any significant difference at final follow-up compared to baseline (surgery: p =0.61, PGA: p = 0.77). Furthermore, there was no statistically significant difference in change in peripapillary vessel density between the two groups from baseline to final follow-up (p=0.99). Of all patients with sufficient quality OCTA images in the macular region prior to and after treatment, 18 eyes received surgical treatment while 23 eyes underwent treatment with a PGA. Mean follow up was 4.28 ± 1.52 months and 6.33 ± 2.87 months for the surgery and PGA groups, respectively. Mean IOPs at baseline were 18.4 ± 2.8 mmHg and 21.0±2.6 mmHg and at follow up, IOPs were 8.8 ± 2.2 mmHg and 13.0 ± 1.5 mmHg for the surgical and PGA groups, respectively. There was a +1.5±2.4% change in macular vessel density for surgical patients and +1.2± 1.8% for PGA patients at final follow-up. Neither group had a statistically significant change of density from baseline (surgery: p = 0.25, PGA: p = 0.23), and there was no statistically significant difference between the change in vessel density for two treatment groups at the macular region from baseline to final follow up (p=0.84).

Conclusions: A mild decrease in peripapillary vessel density was seen following treatment with glaucoma filtration surgery or a PGA, while a mild increase in macular vessel density was seen following treatment in both groups. However, these differences were not statistically significant. Further study is needed to determine the utility of macular and peripapillary vessel density on

OCTA as a biomarker for monitoring disease progression and therapeutic efficacy after intervention.

Use of Radiomics to Predict Post-Ablation Outcomes in Hepatocellular Carcinoma

Michael J. Repajic, BA[1], David R. Mittelstein, PhD[1], Jenanan Vairavamurthy, MD[1], Vinay A. Duddalwar, MD[1], Darryl Hwang, PhD[1], Bino Vargese, PhD[1], Steven Cen, PhD[1], Xiaomeng Lei, MPH[1]

[1]*Department of Radiology, Keck School of Medicine of USC, Los Angeles, California*

Background: Image-guided percutaneous tissue ablation is a clinically proven therapy for small solid tumors and for patients that are not candidates for surgical resection. Thermal ablation techniques such as microwave and cryoablation are better tolerated due to their minimally invasive nature. Specifically, in hepatocellular carcinoma (HCC) and more recently in renal cell carcinoma (RCC), ablation has emerged as a therapeutic option for certain presentations of the cancer. However, the indications for triaging patients for ablation versus other forms of therapy, including local regional therapy, has a scarcity of data. A clinical need exists for data to help determine patients that would benefit from ablation versus other techniques. Radiomics, the extraction of quantitative metrics from medical imaging, has been used in cancer research to predict treatment response, detect early recurrence, and guide individual therapy. Some studies have suggested that radiomics can be used to predict long-term outcomes in HCC tumor ablation. In this project, we use clinical and radiomic data from HCC cases performed at USC to predict post-intervention clinical outcomes in a manner that can aid in clinical decision-making.
Methods: Electronic medical records from Los Angeles County - University of Southern California (LAC-USC) and Keck Hospital (Keck) were queried using Montage and PowerScribe to identify ablation procedures. Criteria included patients with hepatocellular carcinoma that have undergone radiofrequency or microwave ablation between May 2007 to present. To be included, an ablated lesion must have pre-ablation 4 phase liver CT scan, and post-ablation imaging within one year to determine ablation outcomes. 153 ablated lesions were identified in this manner. Cerner and Synapse were used to obtain relevant clinical and imaging data, respectively. Imaging data was exported, de-identified, and labeled using the identification number described above. For each lesion, the pre-ablation 4 phase liver CT scan was evaluated using 3D segmentation. 3D segmentation of the liver, IVC, hepatic arteries, hepatic veins, portal veins, and lesions ablated was performed using Synapse 3D. These segmented volumes were exported into DICOM for future radiomic analysis. Post-ablation imaging was evaluated by review of charted radiologists' dictations and manual read by senior radiologist Dr. Vairavamurthy. Outcomes were characterized as "Stable", "Suspicious", "Recurrent", or "Transplant." Statistical significance between pre-clinical variables and binary outcomes: "Stable" vs "Suspicious"/"Recurrent" disease assessed. For binary variables, chi-squared analysis was performed. For numeric variables, unpaired two tailed student t test was performed.
Results: Out of the 107 hepatic microwave ablated lesions, 74% were classified as stable, 14% were classified as having recurrence, 6.5% were classified as transplant, and 5.6% were classified as suspicious. Out of the 46 hepatic radiofrequency ablated lesions, 78% were classified as stable, 11% were classified as having recurrence, 6.5% were classified as transplant, and 6.5% were classified as suspicious. Preliminary data analysis suggests a potential confounding factor in that cases prior to 2015 were primarily radiofrequency ablation and cases after 2015 are primarily microwave ablation. Furthermore, cases of ablation prior to 2013 did not have pre-clinical data to evaluate available in Cerner. There is a strong statistically significant impact between radiofrequency ablation and lack of clinical data. However, there is no significant association between ablation outcome and not having clinical data. Final radiomic

analysis results will be available for the final representation of data. The most suggestive single variable, though not significant, is a trend for increased lesion recurrence in HCV+ patients.
Discussion/Conclusions: Final analysis utilizing proven radiomics algorithms and data analysis workflow used by Dr. Vinay Duddalwar's laboratory group is currently in progress. Shape and texture analysis algorithms will then be applied to extract quantitative features from the voxels within the segmented volume. The current algorithms that we plan to use generate 33 shape and 760 texture features, though not all of these features will be used in the final training dataset. In the case of missing data (e.g. missing phases within multiphase CT data), we will use a Markov Chain Monte Carlo method to replace missing data and allow the generation of an intact radiomic dataset. A detailed description of the radiomic algorithms used is described by Duddalwar et al. [1]. These radiomic imaging features and results will be used to correlate with clinical data and patient outcomes to distinguish a relationship between pre-intervention imaging features and clinical outcomes. Based on these relationships, conclusions will be drawn about what types of imaging features and pre-intervention variables may correlate to more favorable outcomes to ultimately determine patient candidacy for ablation.
References:
[1] Yap FY, Varghese BA, Cen SY, Hwang DH, Lei X, Desai B, Lau C, Yang LL, Fullenkamp AJ, Hajian S, Rivas M, Gupta MN, Quinn BD, Aron M, Desai MM, Aron M, Oberai AA, Gill IS, Duddalwar VA. Shape and texture-based radiomics signature on CT effectively discriminates benign from malignant renal masses. Eur Radiol. 2020 Aug 15. doi: 10.1007/s00330-020-07158-0. Epub ahead of print. PMID: 32803417.

Twist1 Mutation and Environmental Factors Synergistically Exacerbate Craniosynostosis
Eloise Stanton, Mark Urata, Yang Chai

Background & Purpose: Craniosynostosis, the premature closure of calvarial sutures, leads to debilitating neurologic dysfunction. *TWIST1* gene mutation leads to Saethre-Chotzen syndrome, characterized by unilateral or bilateral coronal synostosis. Recently, study has shown that *in utero* exposure to a serotonin selective reuptake inhibitor (SSRI), citalopram, increases the incidence of craniosynostosis in mice coupled with depletion of Gli1+ mesenchymal stem cells (MSCs), suggesting environmental risk factors may interplay with genetic mutations in craniosynostosis etiology. In this study, we sought to determine how *Twist1* mutation interacts with maternal usage of citalopram to disrupt cranial suture MSCs, leading to craniosynostosis.
Method/Description: *Twist1*$^{+/-}$ mutant mice with or without *in utero* citalopram exposure (20 mg/kg per day) were generated, including (1) wild type (WT) (n=14), (2) *Twist1*$^{+/-}$ (n=150), (3) WT + citalopram (n=, (44) *Twist1*$^{+/-}$ + citalopram (n=30). MicroCT analysis was performed at P14 to examine the extent of calvarial suture fusion, since the coronal suture typically completes fusion at P9-13 in *Twist1*$^{+/-}$ mice. Histological analysis was completed to confirm suture fusion. RNAscope was also conducted to allow for quantitative molecular analysis.
Results: *In utero* exposure to citalopram on the background of *Twist1*$^{+/-}$ led to increased aberrant suture fusion and skull deformation. WT mice had 0% cranial suture fusion. *Twist1*$^{+/-}$ mice without citalopram had between 70-80% suture fusion. WT mice with citalopram exposure had 36.4% suture fusion or skull dysmorphology. Importantly, *Twist1*$^{+/-}$ mice with *in utero* exposure to citalopram had the highest rate of suture fusion, 93.3%. Histological analysis of the craniosynostotic mice treated with citalopram also demonstrated lack of suture patency. In addition, RNAscope gene expression analyses demonstrated that Gli1+ cells were diminished in mice exposed to citalopram *in utero*.
Conclusions: Exposure to citalopram *in utero* leads to an increased frequency of craniosynostosis both in WT and *Twist1*$^{+/-}$ mice. Our preliminary data suggests that there is a combinatorial effect of genetic mutations and environmental factor in the development of

craniosynostosis. Developing a fuller understanding of the signaling mechanisms that mediate suture morphogenesis and underlie the gene-environment interactions will provide crucial insight into the pathophysiology of this devastating disease.
Main Objectives of Presentation The reader will appreciate the importance of both genetic mutation and environmental exposures in the development of craniosynostosis.
Funding support: This study was supported by grants from the National Institute of Dental and Craniofacial Research, NIH (R01 DE026339, R01 DE012711, R01 DE022503, and U24 026914 to Y.C.).

Development of early biomarker-based criteria that will guide the initiation and duration of pharmacologic therapy for secondary lymphedema

Cynthia Sung BS, Sun Young Park MS, Noah Trac PhD, Eun Ji Chung PhD, Alex K. Wong MD

Introduction: Lymphedema is a chronic and debilitating disease characterized by chronic swelling of a part of the body due to insufficiency of the lymphatic system. In the United states, over 5 million people are affected by secondary lymphedema, most commonly from cancer-related therapies. Despite increasing prevalence and associated morbidities of lymphedema, there is no cure. Current clinical assessment of lymphedema is not predictable on which patients will ultimately develop chronic lymphedema. By the time tissue swelling is appreciated on a physical exam, it may be too late for a drug to mitigate its pathology. Thus, the greatest opportunity to have a significant impact on the disease is to identify patients at risk early on and develop strategies based on our increasing understanding of lymphedema pathophysiology to mitigate disease progression.
Methods: We use the well-established hindlimb lymphedema model in rats. Animals are randomized to either experimental lymphedema surgery or a sham skin incision group. The following outcomes are measured every 2 days for 42 days post-operatively: 1) % change in paw thickness using electronic calipers, 2) hyaluronic acid (HA)/total protein measured using microneedle sampling arrays, 3) L-Dex ratio using an ImpediVest. Microneedle sampling arrays are utilized to collect interstitial fluid from two different sites of the paw in the operated hindlimb and contralateral unoperated control hindlimb. The concentration of HA and total protein are measured using HA ELISA and Bradford Assay, respectively. L-Dex is measured using an ImpediVest single channel, tetrapolar BIS device. L-dex ratio is calculated by dividing L-Dex of operated limb by L-Dex of unoperated limb.
Results: Using the data from the experiment including HA/total protein and L-Dex ratio, we will build a Cox Proportional Hazards model based on the time to development of lymphedema and HA and L-Dex ratios. Lymphedema is diagnosed once the change in paw thickness from baseline is >10%. We will determine if HA and L-Dex cut off ratios are associated with the onset of lymphedema.
Conclusion: Our study will develop a model to assess the time to the development of lymphedema using HA and L-Dex values. Based on our model, we will prospectively assess HA and L-Dex lymphedema prediction model to guide need based 9-cis retinoic acid treatment.

Vitiligo and Makeup: Analyzing Interest and Usage Trends in the 21st Century

Nicole C. Syder, BA, Nada Elbuluk, MD, MSc
Department of Dermatology, Keck School of Medicine of USC, University of Southern California

Background: Given the psychological, social, and emotional impact of vitiligo, makeup and camouflage options have been used for years by many with vitiligo to help provide increased confidence, self-esteem, and quality of life. Recent national and global movements in the beauty

industry and across social media platforms have worked to foster a greater sense of self-acceptance and self-love. Slogans such as “Love the skin you’re in”, marketed by the popular beauty brand Oil of Olay, have come to take on even greater significance within the past few years and these positive changes have had an impact on many including the vitiligo community. Countless makeup companies have expanded the range of color hues offered to make their products more inclusive. Top modeling agencies have also diversified the models that represent their brand. These include Winne Harlow and Amy Deanna, models with vitiligo who have gained global recognition and prominence within the last 7 years. We hypothesized that this movement of diversity, inclusivity, and self-acceptance may have led to a downward trend in interest in makeup and coverup use for those with vitiligo.

Objective: The objective for this study was to evaluate shifts in Google searches and trends for vitiligo makeup options since 2004. Additionally, YouTube was evaluated for interest in makeup tutorials for Vitiligo starting in 2011. We hypothesized an overall downtrend in searches for vitiligo makeup options, which may parallel an increase in self-acceptance within the vitiligo community.

Methods: The analysis engine “Google Trends” was used to analyze the trends in searches for the phrase “vitiligo makeup” since 2004, the first year in which trends are available. Additional phrases such as “vitiligo coverup” and “vitiligo camouflage” were also searched but did not produce data significant enough to establish a trend. Google Trends analyzes overall search trends based on relative search volume (RSV), a value that quantifies the relative amount of searches for a specific topic on a scale of 0 to 100. The analysis tool provides monthly RSVs as well as data on the geographic distribution of searches. These monthly RSVs were then averaged over the course of each year to determine the mean RSV for each year since 2004. Additionally, YouTube was investigated as a platform for makeup tutorials for vitiligo. The term “makeup for vitiligo” was searched and results were filtered based on upload date. Other terms such as “vitiligo coverup” and “vitiligo camouflage” were also searched but there were very few relevant videos available. Posts with the greatest number of views each year starting in 2011 were recorded with data on likes, dislikes, number of comments, and number of subscribers.

Results: According to Google Trends, the estimated annual RSV for the phrase “Vitiligo makeup” ranged from 6 to 29, with the peak being reached in 2018. Of note, starting from 2018, there appears to be a downward trend in searches, with the estimated annual RSV reaching 17 in 2020, the lowest it has been since 2014. The yearly times of peak interest were mostly around the late Spring and summer months, from April to August. Geographically, the states associated with the highest RSVs were New York and California, respectively. An analysis of YouTube makeup tutorials revealed that after 2016, there was a steady yearly decline in views for vitiligo makeup tutorials. The top YouTube Vitiligo makeup tutorial in 2020 garnered 7,285 views, 108 likes, and 2 dislikes, the lowest numbers of any vitiligo makeup tutorial video since 2015.

Conclusion: With the societal advent of greater self-acceptance and challenging the idea of outdated and orthodox beauty standards, individuals with vitiligo have had the opportunity to see greater public visibility and acceptance of their condition. Beauty campaigns to align with the mantra of loving and celebrating all skin tones and types, including those with dyspigmentation, have become more commonplace and this shift is mirrored online and on social media platforms. Furthermore, the visibility and celebration of models with vitiligo such as Winne Harlow and Amy Deanna, as well as the creation of a Mattel© Barbie with vitiligo and use of vitiligo models in commercial stores such as Target, may all play a role in positively influencing individuals with vitiligo to feel more self-acceptance and less stigmatization from their condition. These factors may account for this study’s findings in which over the last four years there appears to be a downward trend in searches for vitiligo and makeup online.

Enhanced Recovery for Head and Neck Oncologic Surgery: Evaluating Chronic Opiate Use following Free Flap Reconstruction

Ruben Ulloa BA[1], Carlos X. Castellanos MS[1], Mark Swanson MD[2]
[1] *Keck School of Medicine of USC, Los Angeles, California*
[2]*Department of Otolaryngology, Keck School of Medicine of USC, Los Angeles, California*

Background: Enhanced Recovery after Surgery (ERAS) is set of evidence-based perioperative care guidelines implemented across multiple surgical specialties designed to optimize the recovery process[1]. ERAS guidelines for head and neck cancer surgery with free flap reconstruction were published by the ERAS society in 2017 and implemented at our institution in August 2018[2,3]. ERAS based protocols have been shown to reduce length of stay, postoperative pain, and opiate requirements in the immediate postoperative period without an increase in complication rates[4,6]. Long term outcomes for opiate prescriptions required up to a year after head and neck surgery with free flap reconstruction using an ERAS based perioperative protocol have not been investigated.
Methods: A retrospective review was done on patients who underwent head and neck oncologic surgery with free flap transfer between July 2017 – December 2019. Patients who had surgery prior to August 2018 were assigned to the pre-ERAS group. The ERAS group consisted of patients who had surgery on or after August 1, 2018. Chart review was done to collect demographic data, perioperative opiate use, average pain score at discharge, and complication rates. A request for data from the Controlled Substance Utilization Review and Evaluation System (CURES) was sent to the California Department of Justice to obtain data about long term opiate use up to a year after discharge.
Results: A total of 91 charts were reviewed, 41 (45.1%) in the pre-ERAS group and 50 (54.9%) in the ERAS group. Mean postoperative pain score at discharge was lower in the ERAS group (2.64± 2.61 VS. 1.45±1.61, P=.001). Strong opiates prescribed at discharge were higher in the pre-ERAS group (24.3% VS 10.9%) although the chi-square test did not yield significance. There was no difference in wound related complications between groups.
Conclusion: ERAS based perioperative management protocols reduces strong opiate prescriptions at discharge without increasing wound complications for patients following head and neck oncologic surgery with free flap transfer. Associations with long term opiate consumption will be investigated upon receipt of prescription data from CURES.

References:

1. ERAS® Society. 2022. *Home - ERAS® Society*. [online] Available at: <https://erassociety.org> [Accessed 11 January 2022].
2. Dort JC, Farwell DG, Findlay M, et al. Optimal Perioperative Care in Major Head and Neck Cancer Surgery With Free Flap Reconstruction: A Consensus Review and Recommendations From the Enhanced Recovery After Surgery Society. *JAMA Otolaryngol Head Neck Surg.* 2017;143(3):292–303. doi:10.1001/jamaoto.2016.2981
3. Clark BS, Swanson M, Widjaja W, Cameron B, Yu V, Ershova K, Wu FM, Vanstrum EB, Ulloa R, Heng A, Nurimba M, Kokot N, Kochhar A, Sinha UK, Kim MP, Dickerson S. ERAS for Head and Neck Tissue Transfer Reduces Opioid Usage, Peak Pain Scores, and Blood Utilization. Laryngoscope. 2021
4. Bertelsen C, Hur K, Nurimba M, Choi J, Acevedo JR, Jackanich A, Sinha UK, Kochhar A, Kokot N, Swanson M. Enhanced Recovery After Surgery-Based Perioperative Protocol for Head and Neck Free Flap Reconstruction. OTO Open. 2020 Jun 2;4(2):2473974X20931037. doi: 10.1177/2473974X20931037. PMID: 32537554; PMCID: PMC7268136.
5. Won HR, An JY, Lee JJ, Kim DY, Jang JY, Kim CH, Shin YS. The effectiveness of an enhanced recovery after surgery protocol in head and neck cancer surgery with free-flap

reconstruction. Ann Surg Treat Res. 2019 Nov;97(5):239-244. doi: 10.4174/astr.2019.97.5.239. Epub 2019 Nov 1. PMID: 31742208; PMCID: PMC6848008.

Positive COVID-19 Diagnosis Following Primary Elective Total Joint Arthroplasty: Increased Complication and Mortality Rates

Jennifer C. Wang BS[1], Amit S. Piple MD[1], Gabriel J. Bouz MD[1], Brian C. Chung BS[1], Daniel A. Oakes MD[1], Alexander B. Christ MD[1], Jay R. Lieberman MD[1], Nathanael D. Heckmann MD[1]
[1]*Department of Orthopaedic Surgery, Keck School of Medicine of USC, Los Angeles, California*

Introduction: Postoperative complications following total hip (THA) and total knee arthroplasty (TKA) have been studied extensively. However, little is known about the effects of contracting COVID-19 following primary elective total joint arthroplasty (TJA). The aim of this study is to analyze complication rates following primary elective TJA in patients that subsequently contracted COVID-19.
Methods: The Premier Database was used to identify patients >18-years-old who underwent primary elective THA or TKA from January-December 2020. Patients who contracted COVID-19 after their index TJA were identified through emergency department visits, inpatient admissions, and ambulatory diagnostic data. Complications examined included thromboembolic events, infectious complications, respiratory sequelae, acute kidney injury, myocardial infarction, wound complications, and death. COVID-19 patients were matched in a 1:2 ratio based on age and gender to TJA patients who did not contract COVID-19. Univariate analyses were performed to compare differences between groups. Multivariate analyses were performed to account for differences in patient and hospital factors between cohorts.
Results: In 2020, 165,722 primary TJA were identified, of which 795 (0.48%) comprised the COVID-19 cohort. Of these, 277 (34.8%) required subsequent readmission due to COVID-19. The COVID-19 and control cohorts had an average age of 67.2±10.2 years and were 43.0% male. Compared to the control cohort, the COVID-19 cohort had higher rates of acute respiratory failure (3.25% vs. 0.72%, $p<0.001$) and pneumonia (2.47% vs. 0.20%, $p<0.001$). The COVID-19 cohort was at increased risk of pulmonary embolism [PE] (adjusted odds ratio [aOR]: 2.80, $p<0.001$), periprosthetic joint infection [PJI] (aOR: 2.73, $p<0.001$), and sepsis (aOR: 8.72, $p<0.001$). Discharge to a skilled nursing facility (aOR: 3.25, $p<0.001$) or acute rehabilitation unit (aOR 3.19, $p<0.001$) was associated with a subsequent COVID-19 readmission. African American race (aOR 2.25, $p<0.001$) and rural hospital settings (aOR: 1.60, $p<0.001$) were also associated with COVID-19 readmission. The mortality rate was 2.99% in the COVID-19 cohort and 7.94% in readmitted COVID-19 patients compared to 0.52% in the control cohort, representing a 5.90 OR (95% CI: 2.68-13.0) and 16.5 OR (95% CI: 7.41-36.7) of death, respectively.
Conclusion: Patients who contracted COVID-19 following elective TJA were at greater risk of PE, PJI, sepsis, and death. These patients represent a unique, high-risk cohort that the orthopaedic surgeon should be aware of as they may require more aggressive medical interventions.

Npseal® A Novel Closed Incisional Negative Pressure Wound Therapy: A First Post-Market Study

Wang, Johnny

Purpose/Background: Use of ciNPWT decreases SSIs. Current ciNPWT devices are not routinely used due to high cost and complexity of use. A study using a novel, cost effective, FDA cleared ciNPWT device is presented.

Hypothesis/Aim: To assess the safety and efficacy of the NPseal® ciNPWT on patients having colorectal procedures.
Methods/Interventions: Patients undergoing laparoscopic or robotic-assisted colorectal resections were invited to participate. Patients were screened and consented per protocol. A single NPseal® device was placed for each patient and preferentially over a specimen extraction site. All selected incision site skin wounds were primarily closed in running subcuticular or deep dermal fashion. An integrated hand actuated pinch pump on the NPseal® device was used to create negative pressure ranging from -75 to -125 mmHg. The dressing was left on for a maximum of 72 hours. The device was changed if drainage soaked >50% of the padded surface area or if there was any exudate presence into the device pump. Nursing staff monitored the device integrity and pump status Q8H from post-op day 1-3 and were instructed to pinch the device, if needed, until the requisite negative pressure was re-established. At the time of device removal, the wound and surrounding skin were inspected by the clinical team for any signs of excoriation, maceration, blistering or active drainage. A patient-reported survey assessing comfort and ease-of-use was also administered at this time. The surgical site was also re-evaluated at a 30-day post-op visit by the clinician for the presence of seroma, hematoma, wound dehiscence, and SSI.
Results/Outcomes: A total of 20 patients were included in this study (50% females vs. 50% males) with a median age of 64 ± 10 years. The mean incision length was 2.9 ± 1.8 cm. On average, 12 ± 3 pinches of hand actuated pump were required to create the initial negative pressure within -75 to -125 mmHg. The majority of patients (80% [16/20]) did not require additional pumps to maintain the requisite pressure during the 72-hour period. 3 (15%) patients required <2 subsequent pump actuations to maintain negative pressure. On two occasions, NPseal® was changed due to exudate presence in the pump body. At 30-day follow-up, none of the patients had seroma, hematoma, wound dehiscence, or any signs of SSI. 70% of patients reported the device as “very comfortable” and none reported any restriction in movement. Most patients (70%) reported that it was “very easy” to judge whether the device needed re-pumping. The mean length of hospital stay was 5 ± 4 days.
Limitations: This is a prospective observational study with small sample size and no concurrent control.
Conclusion/Discussion: NPseal® appears to be a safe and efficacious option of NPWT on closed surgical wounds. Further study with larger sample size and randomization is warranted.

Role of Refractive Error and Anterior Chamber Depth as Risk Factors in Primary Angle Closure Disease

Sarah Zhou[1], Anmol A. Pardeshi[2], Bruce Burkemper[2], Galo Apolo[2], Xuejuan Jiang[2,3], Mina Torres[4], Roberta McKean-Cowdin[1,3], Rohit Varma[4], and Benjamin Y. Xu[2]

[1]Keck School of Medicine at the University of Southern California, Los Angeles, California
[2]Roski Eye Institute, Department of Ophthalmology, Keck School of Medicine at the University of Southern California, Los Angeles, California
[3]Department of Population and Public Health Sciences, Keck School of Medicine at the University of Southern California, Los Angeles, California
[4]Southern California Eye Institute, CHA Hollywood Presbyterian Medical Center, Los Angeles, CA

Purpose: To assess the role of refractive error (RE) and anterior chamber depth (ACD) as risk factors in primary angle-closure disease (PACD).
Design: Retrospective cross-sectional study.

Methods: Chinese American Eye Study (CHES) participants received complete eye exams including refraction, gonioscopy, A-scan biometry, and anterior segment OCT (AS-OCT) imaging. PACD included PACS (≥3 quadrants of angle closure on gonioscopy) and PAC/G (peripheral anterior synechiae or IOP>21mmHg). Logistic regression models were developed to assess the association between PACD and RE and/or ACD adjusted for sex and age. Locally weighted scatterplot smoothing (LOWESS) curves were plotted to assess continuous relationships between variables.
Results: 4,401 eyes (3802 open angle; 599 PACD) were included in the analysis. Risk of PACD increased with increasing hyperopia (OR=1.40 per diopter; p<0.001) and shallower ACD (OR=1.64 per 0.1mm; p<0.001) overall and stratified by PACD severity. Hyperopia (>+0.5D; OR=5.57) and emmetropia (-0.5D to +0.5D; OR=2.97) conferred significantly higher risk of PACD compared to myopia (<-0.5D). ACD (standardized regression coefficient=-1.18) was a 4-fold stronger predictor of PACD risk compared to RE (SRC=0.31) when both variables were included in the same multivariable model. Anterior segment biometrics were similar but vitreous cavity and axial length differed between hyperopes, emmetropes, and myopes (p<0.001).
Conclusion: Risk of PACD, including PAC/G, rises rapidly even with low degrees of hyperopia while remaining relatively low for all degrees of myopia. Although RE is a weaker predictor of PACD than ACD, it remains a useful screening tool for identifying patients for gonioscopy in the absence of biometric data.

ADOLESCENT AND YOUNG ADULT MEDICINE

Race/Ethnicity Gaps in Transgender Youth Accessing Hormone Blockers

Peter Cleary, BA, Johanna Olson-Kennedy, MD, Julie McAvoy-Banerjea, MPH, CCRP, Mona Desai, MPH, Bo Herrera, MSW, Leo Almanza, MPH

Background - GnRH agonists to prevent pubertal development (puberty blockers) are a common and effective treatment for gender dysphoria among transgender and gender nonconforming (TGNC) youth which reduce associated psychiatric distress and suicidality. TGNC youth prescribed puberty blockers are disproportionately white. Qualitative research into why TGNC youth of color present to youth gender care clinics at lower rates than white peers is needed to design interventions that address barriers to care for this population.
Methods - Focus groups composed of TGNC participants >25 years of age who identify as African-American and Latino/a were facilitated to identify barriers to puberty blockers and ways to overcome them. Sessions were audio-recorded and transcribed, and inductive coding and thematic analysis were used to develop a codebook. Two members of the research team applied codes to the same transcript narratives and discussed and resolved disagreement once consensus was established to ensure inter-coder reliability.
Results - Emergent themes/barriers include: lack of knowledge, negative experiences with healthcare, lack of support for TGNC identity, cisheteronormativity, racism, barriers to accessing healthcare generally, and barriers to TGNC-specific care at social, familial, organizational, provider, and patient levels. These themes will be iterated fully in table format.
Conclusion - These data illustrate the challenge TGNC youth of color face in accessing puberty blockers, and they identify targets for public health intervention and education to reduce/eliminate these barriers. Further research should seek to quantify the degree to which these barriers prevent access to this care.

The Role of Religiosity on Mental Health in Transgender Adolescents at Baseline in the Impact of Early Medical Treatment in Transgender Youth Study

Michelle Martinez, BS MS, Johanna Olson-Kennedy, MD MS
KSOM, CHLA, Department of Adolescent Medicine

Background: Transgender youth are at increased risk for anxiety, depression, suicide and substance use resulting from gender dysphoria. Lack of research and stigmatization contribute to insufficient data and knowledge necessary to care for transgender youth. Transgender youth with a history of religiosity may experience poorer mental health as a result of internalized transphobia, increased exposure to transphobic beliefs and comments and stress relating to incongruence with their gender-identity and religious beliefs. Research done to examine the effects of religiosity on mental health in sexual minority youth has focused predominantly on cis-gender youth, leading to a need for more data on transgender and non-binary youth.
Methods: To evaluate if religiosity has a protective effect on mental health in transgender youth, data collected within the Impact of Early Intervention in Transgender Youth (Trans Youth Care) study at the Children's Hospital of Los Angeles division will be utilized. Data collected at gender-affirming hormone (GAH) cohort enrollment using Duke University Religion Index (DUREL) questions was utilized to place participants into religious and non-religious subgroups. Religious and spiritual identities of CHLA GAH cohort were compared to 2015 USTS data on transgender adults. A one-step ANOVA was performed to assess for statistical differences between CHLA GAH religious vs. non-religious groups using NIH subscale domains of perceived social support, isolation, negative affect and psychological wellbeing. Religious institutional views of transgender individuals were also studied through a literature review to assess the possibility of certain religions having a more harmful impact on mental health than others.

Results: CHLA GAH Cohort demonstrated lower rates of religiosity (44.9%), compared to USTS adults (57%). Similar proportions of transgender youth (45.7%) and adults (48%) identified as spiritual and/or agnostic. One-step ANOVA comparison of CHLA GAH cohort religious vs. non-religious groups yielded scores of 0.571, 0.979, 0.698 and 0.881 between groups using NIH subscale domains of perceived social support, isolation, negative affect and psychological wellbeing respectively. A literature review of religious views of gender and sexuality demonstrated that certain institutions such as the Roman Catholic Church, Church of Jesus Christ of Latter Day Saints, Orthodox Judaism and Seventh Day Adventists as having more policies and publications opposing gender-affirming care. Various Christian denominations and Reform Judaism were found to have published statements in support of transgender identify, whereas religions without central governing bodies such as Islam and Buddhism did not have official stances.
Conclusions: Despite having a protective effect on mental health for cis-gender heterosexual individuals, religiosity is associated with a more complex impact on mental health for transgender and non-binary adolescents. Comparison of existing data of religiosity in transgender adults through the 2015 USTS and transgender adolescents through the CHLA TYC study was consistent with previous research demonstrating higher rates of religiosity in adults. These findings suggest that religiosity may be more important for the adult population. There was no statistical difference in any of the NIH-subscale domains between religious and non-religious CHLA GAH participants, confirming that more research is needed to examine the intricate impact of religiosity on transgender youth.

Perceptions of Long Acting Reversible Contraception among Adolescents and Young Adult Females with Chronic Illness

Diana Nielsen, Ellen Iverson, Jessica Rocha, Claudia Borzutzky

Background: Long-acting reversible contraceptives (LARC) are first-line birth control methods recommended by the American Academy of Pediatrics. However, only 4.3% of teens using birth control choose a LARC. While there is a growing amount of literature examining the perceptions and barriers of uptake of LARC, there is little data examining the attitudes and acceptance of LARC among adolescents and young adults (AYA) with chronic illness.
Approximately 30% of AYAs live with one or more chronic conditions. Previous literature shows that pediatric subspecialists have limited comfort and knowledge related to sexual health and contraception. Chronic illness can confer additional risks should AYAs become pregnant, so it is important that they receive appropriate reproductive health counseling from their pediatric subspecialist.
Methods: This is a qualitative observational study with a goal of 130 AYA females between the ages of 16-21 recruited from 10 CHLA subspecialties. Qualitative thematic analysis will be employed to analyze the content of 26 focus groups and 22 individual interviews. A discussion guide was developed to facilitate data collection from the groups. The transcripts of the focus groups will be imported into Dedoose to be coded and analyzed.
Results: The study is in the recruitment and data collection phase with 64 participants enrolled and 10/26 of focus groups completed and transcribed. Initial analysis of the completed focus groups has yielded a preliminary codebook consisting of 33 thematic codes. When data collection is complete, the codes will be applied to the transcripts for analysis.
Conclusion: Understanding the attitudes and acceptance of LARC in AYA with chronic illness can help improve patient counseling and the understanding of sexual and reproductive health needs. With this knowledge, pediatric subspecialty providers will be able to improve their reproductive health counseling of medically complex AYAs and lead to better health outcomes4

ANESTHESIOLOGY

Case Review of Impella Device vs ECMO techniques for Cardiogenic Shock Patient Outcomes

Dr. Anahat Dhillion, Dept of Anesthesia, **John Krapf, Medical Student**

Background: The Impella is a smaller catheter based subcutaneous left ventricular assist device compared to the tradition ECMO device. These devices assist in the movement of oxygenated blood rom the left ventricle to the aorta. As the utilization of these Impella devices increases, the impact on patient outcomes becomes of important clinical interest.
Methods: We are conducting a case review assessing cardiogenic shock cases from 2019 to present across 7 metrics to identify areas of statistical differences between ECMO and Impella device procedures. It is expected that across these metrics: length of ICU stay, days of mechanical ventilation, days of CRRT, blood products transfused, emergent surgery, vascular exploration/fasciotomy, mortality, percentage recovered, recipient of durable LVAD, and recipient of OHT.
Expected Results: There will be a statistically significant improvement in 1 or more favoring the outcomes of the transition to Impella. There is potential to have improvements across many metrics of patient outcomes.
Summary: Evaluating the improvements in patient outcome metrics between two surgical technologies will improve decision making and improve the patients healthcare.

At-Home Virtual Reality Guided Imagery Intervention for Chronic Pain

Amairani Santoyo, Iris Yao, Faye Weinstein PhD, Steven Richeimer MD

Introduction: Previous studies have demonstrated that audio-only guided imagery (AO-GI) has been an effective intervention in helping reduce pain levels and improve quality of life in chronic pain patients. This study investigates the efficacy of virtual-reality guided imagery (VR-GI) in reducing pain levels and improving mood and quality of life in patients with CRPS and CBP as compared to traditional AO-GI.
Methods: 36 patients with chronic pain (18 Chronic Back Pain and 18 CRPS) were enrolled and randomized so that 24 (12 CBP and CRPS) received VR-GI and the 12 (6 CBP and 6 CRPS) received AO-GI intervention. Patients were guided through their first day of intervention, completing baseline questionnaires assessing pain level, mood, and quality of life as well as the intervention, and recording pre/post intervention pain ratings. Participants than completed their assigned intervention for 13 days continuing to record their pre and post intervention pain ratings. To measure the study's efficacy, means, variability, and effect sizes for pre- and post-intervention changes in pain intensity, pain medication use, quality of life, and mood were calculated. All data was collected through RedCAP.
Results: From the initial data, the audio-only intervention had a greater feasibility. However, for the VR-GI intervention we expect clinically significant differences in pain reduction (>30%) in both CRPS and CBP patients. Both VR-GI and AO-GI reported mild improvement in quality of life and overall mood post the two-week intervention.
Discussion/Conclusions: VR-GI is a promising new intervention for the management of chronic pain in patients with CRPS and CBP. VR-GI is a potentially feasible intervention that can be completed at home for continued management of chronic pain in conjunction or potentially as an alternative to traditional opioid management.

At-Home Virtual Reality Guided Imagery Intervention for Chronic Pain

Iris Yao, Amairani Santoyo**,** Faye Weinstein PhD, Steven Richeimer MD

Goal: Guided imagery is a cognitive-behavioral technique in which individuals are instructed through guided narration to alter their psychological and bodily states and has been shown to reduce the experience of pain. Because of the added interactive elements of virtual reality, we expect that VR-guided imagery will help reduce chronic pain and improve mood and anxiety more than audio-only guided imagery.

Methods: 36 patients with chronic pain (18 CBP + 18 CRPS) will be enrolled. Of which, 24 (12 CBP + CRPS) will be randomized to receive VR-GI using the Limbix VR-Kit and 12 (6 CBP + 6 CRPS) will be randomized to receive the control of audio-only guided imagery for 14 days. To measure the difference in effect, we will gather the means and variability between daily pre- and post-intervention changes in pain intensity, pain medication use, functional outcomes, quality of life, and mood to assess for efficacy of the device. Feasibility will be measured by intervention compliance and qualitative interviews.

Results: From preliminary data, feasibility is higher for the audio-only control. However, we expect clinically significant differences in reduction in pain ratings (>30%) between VR compared to the audio only intervention with no significant differences between the CBP and CRPS patient groups. For other measures not yet analyzed, clinical significance will be between 0.3-0.5.

Summary/Conclusion: Currently, opioids are the most frequently prescribed treatment for chronic pain with no evidence of long-term efficacy and a high risk for abuse. If found effective, at-home non-pharmacologic alternatives can be commercialized to reduce the economic and health burden of chronic pain.

DENTISTRY

Oral & Maxillofacial Surgery Virtual Externship: Tailoring the Experience

Armen Agahi DDS, Urie Lee DDS, Dr. Nam Cho DDS MD, Dr. Felix Yip DDS MD

Background: During the pandemic, several residency programs have incorporated virtual externships to replace the on-site externship experience through various platforms such as Zoom and pre-recorded videos. Such programs have numerous benefits including lower cost of travel for applicants and attraction of a diverse applicant pool. Currently, there are no official guidelines outlining the format and information covered in such educational platforms. The purpose of this study is to gain a better insight into applicant perspectives regarding online externships and evaluate their feedback on previously conducted sessions. We aim to gain a better understanding of what was beneficial and what could be done better for future virtual events for potential applicants.

Methods: This study design will utilize a retrospective cross-sectional survey design using a 5-point Likert scale. Recruitment will be conducted via an anonymous survey through RedCap. A short ten question questionnaire will be sent to applicants and their answers will be anonymously recorded, resulting in ordinal data from each individual question. Each question will be individually analyzed to determine patterns in applicant preferences, likes and dislikes from such events. The results of each question will be displayed in bar charts, with the mode of each question representing the overall impression of the sample.

Results: Data collection for this research project is still ongoing. However, the expected results are that applicants will strongly agree that each discussed topic of the virtual externship offered valuable information.

Conclusion: If expected results are achieved, this research project will begin to effectively tailor the virtual externship experience to allow for a more valuable method of recruiting a wider range of oral and maxillofacial surgery applicants and set guidelines for other programs to follow for future virtual externships.

DERMATOLOGY

Seborrheic Dermatitis in the United States: An Epidemiologic Study

Allen Chen, Eric Chen, Yasmin Gutierrez, Dr. April Armstrong, MD, MPH, Department of Dermatology, KSOM

Goal: Seborrheic dermatitis is an inflammatory skin condition characterized by scaly and itchy patches, dandruff and red skin. Patients with severe cases may have difficulty managing pruritis which can result in great distress and impact daily life. As there has been a limited number of epidemiologic studies done on seborrheic dermatitis in the last 5 years, our goal is to analyze the utilization of health care resources for treating seborrheic dermatitis, identify comorbidities and list the first line treatments for this condition.
Methods: The National Ambulatory Medical Care Survey (NACMS) database conducted by the Centers for Disease Control and Prevention (CDC) was utilized to compile patients visits for seborrheic dermatitis from 2006 to 2016. Visit weights in NAMCS was applied to produce a nationally representative sample of patient visits in the U.S. Logistical regression analysis will be done through the STATA program to assess the relationship between patient clinical characteristics and type of providers caring for seborrheic dermatitis, adjusting for age, sex, race and ethnicity.
Results: In the 10-year study period from 2006 to 2016 there was 1,233,489 total weighted visits for seborrheic dermatitis. There was a direct relationship for the number of visits to increasing age with individuals aged 41-60 most seen for the condition. Dermatologists saw 70% of seborrheic dermatitis visits compared to primary care physicians (pediatrics, internal medicine, family medicine) who saw 24% of visits. The main treatments for seborrheic dermatitis prescribed were topical corticosteroids (72.7%), antifungals (35.5%) and occlusives (9.4%). Comorbidities examined included acne (6.6%) and depression (3.6%).
Conclusions: Seborrheic dermatitis is a very common condition seen across all age groups. Dermatologists were most likely to treat seborrheic dermatitis with topical corticosteroids being the most prescribed treatment.

Association of Atopic Dermatitis with Social Interactions

Eric Chen, Allen Chen, Sabrina Khan, Dr. April Armstrong, MD, MPH, Department of Dermatology, KSOM

Goal: Atopic dermatitis (AD) is a chronic inflammation of the skin. Many patients who are severely affected by AD are children and young adults, when social interactions contribute substantially to their overall health related quality of life. We hypothesize that children and adults with atopic dermatitis are less satisfied with their social activities and relationships as compared to those without atopic dermatitis.
Methods: Data from the 2010 National Health Interview Survey (NHIS), which was conducted by the National Center for Health Statistics and focused on health for the noninstitutionalized civilian population of the United States, was used. STATA was used to perform logistical regression models among AD and social interaction variables accounting for age, sex, race, educational attainment, and income.
Results: For the independent variables: participate in social interactions (OR=9, P<0.001), get out with friends and family (OR=9, P<0.001), participate in community gatherings (OR=9, P<0.001), activity limitation from fatigue (OR=1.47, P<0.001), and worry or anxiety interferes with life (OR=6.11, P<0.001); there was an odds ratio greater than 1 showing decreased social interactions for individuals who had atopic dermatitis.
Conclusions: These data show that individuals with atopic dermatitis were less satisfied with their social activities and relationships as compared to those without atopic dermatitis.

Seeing is Believing: Efficacy of a Video-Based Intervention in Improving Skin Cancer Risk Awareness and Preventative Strategies Among Solid Organ Transplant Recipients

Jacob Gomez

Background: Despite improvement in the life expectancy of solid organ transplant recipients (SOTRs), these patients remain at elevated risk of developing non-melanoma skin cancers. Patients of color, especially Black and Hispanic patients, tend to have delayed diagnosis and treatment of skin cancer, in part due to lower awareness and rates of screening. It is critical to find better ways to educate diverse populations about skin cancer risk in SOTRs, in order to facilitate lasting behavioral changes and decrease morbidity and mortality in these high-risk patients.

A number of studies have utilized different forms of media to deliver information about sun protection and skin cancer risk to the general population. Video messages, as compared to written materials, resulted in enhanced retention of key information, greater satisfaction with teaching, and were more likely to motivate behavioral changes. We designed a novel video-based intervention to improve awareness of the risk of non-melanoma skin cancers and the importance of sun protective behaviors in SOTRs.

Methods: In this ongoing prospective study, we enrolled SOTRs from our majority Hispanic patient population at Los Angeles County Hospital and Keck Hospital of USC seen by our dermatology department. Participants completed a pre-intervention survey assessing their sun protective behaviors and perceived risk of developing skin cancer. We developed an informational video in English and Spanish highlighting the elevated risk of non-melanoma skin cancers in SOTRs as well as preventive strategies including sunscreen, protective clothing, self-skin checks, and dermatology follow-ups. After viewing our video, patients completed a post-intervention survey to measure changes to their perceptions and practices regarding skin cancer.

Results: A total of 58 SOTRs were enrolled in this study, of whom 54 completed the pre-intervention survey. We analyzed the results of 23 patients who completed both the pre- and post-intervention surveys. As shown in Figure 1, 83.3% of patients reported sunscreen use pre-intervention compared to 91.3% post-intervention. In addition, 42.6% of patients reported a greater understanding of their skin cancer risk pre-intervention compared to 78.3% post-intervention, with self-skin checks being performed in the past month by 48.1% of patients pre-intervention compared to 78.3% post-intervention. The demographics of our pilot study population do not represent the majority Hispanic patients served by Los Angeles County Hospital and Keck Hospital of USC. Of the 58 enrolled participants, 40.7% identified as Hispanic or Latino; however, of the 23 patients who completed the post-intervention survey, only 17.4% identified as Hispanic or Latino. We are currently enrolling more patients in hopes of achieving a more representative demographic breakdown.

Conclusion: Our study builds on prior literature demonstrating the efficacy of video messaging on motivating behavioral changes to reduce skin cancer risk in the general population as well as SOTRs. This is a time- and cost-effective method to increase skin cancer awareness, particularly in high-risk patients. The discrepancy between Hispanic and Latino patient participation in our study pre- and post-intervention highlights the need to address retention of minority patients. Our research team will continue monitoring enrolled patients to measure sustained behavioral changes and better test the efficacy of video-based interventions to deliver key health information. We believe with appropriately designed and implemented video messaging, our target population will be more likely to adhere to safe sun practices and have a greater understanding of their risk of developing skin cancer.

Figure 1: Pre- and Post-Intervention Demographics and Survey Responses

	Pre-Intervention	Post-Intervention
Mean Age	54.8 (23-79)	53.4 (26-71)
Male	63.0% (34/54)	52.2% (12/23)
Female	37.0% (20/54)	47.8% (11/23)
Hispanic or Latino	40.7% (22/54)	17.4% (19/23)
Sunscreen Use	83.3% (45/54)	91.3% (21/23)
Self-Skin Checks	48.1% (26/54)	78.3% (18/23)
Greater Risk Awareness	42.6% (23/54)	78.3% (18/23)

Merkel Cell Carcinoma and Associations of Race/Ethnicity, Insurance Type, and Tumor Anatomic Location with Patient Outcomes

Audrey Hao BS, Jenny C. Hu MD, MPH

Background and purpose: Merkel cell carcinoma (MCC) is a rare form of skin cancer, which despite its low incidence, has a high risk of local recurrence, nodal metastasis, and mortality. We aim to find whether there are associations of race/ethnicity, insurance type, and anatomic location of the primary tumor with patient outcomes.
Methods: We conducted a retrospective study analyzing 74 MCCs treated from 2000 to 2020 at Keck Hospital of USC and Los Angeles County + USC.
Results: There were a total of 74 cases of MCC cases. Mean age at diagnosis was 67.7 (range 44-94) years. There were 47 (63.5%) males and 27 (36.5%) females. Among these patients, 52 (70.3%) were White and 13 (17.6%) were Latino/Hispanic. Insurance coverage of the patients included 23 (31.1%) Medicare, 26 (35.1%) health maintenance organization (HMO), 10 (13.5%) preferred provider organization (PPO), 3 (4.1%) Medi-Cal, 3 (4.1%) self-pay, 9 (12.2%) other. Regarding immunosuppression, 5 (6.8%) patients had leukemia/lymphoma. Anatomic locations of the primary tumor were 16 (21.6%) hip/leg, 13 (17.6%) shoulder/arm, 6 (8.1%) cheek, 6 (8.1%) periorbital including eyelid/canthus, 5 (6.8%) scalp, 5 (6.8%) trunk, 3 (4.1%) ear, 3 (4.1%) neck, 3 (4.1%) hand, 2 (2.7%) forehead, 2 (2.7%) nose, 2 (2.7%) lip, 1 (1.4%) temple, 1 (1.4%) ocular, and 6 (8.1%) unknown primary. Regarding histopathologic features, only 1 (1.4%) MCC showed perineural invasion and 8 (10.8%) showed lymphovascular invasion on the initial biopsy specimen. Regarding metastases, 9 (12.3%) had parotid gland metastasis, 40 (54.1%) had lymph node metastasis, and 4 (5.4%) had distant metastasis. Of the 74 patients with MCCs, 60 (81.1%) were treated with surgical resection, 14 (18.9%) received radiation to the primary tumor site, 22 (29.7%) received radiation to the nodal basin, and 17 (23.0%) had systemic therapy. Two (2.7%) patients had died by the end of our data collection period.
Conclusions: With further statistical multivariate analysis, we aim to examine how race/ethnicity, insurance type, and anatomic location of the primary tumor may influence patient outcomes.

Optimization of Intravenous Gentamicin Treatment to Restore Functional Laminin 332 in JEB Patients with Nonsense Mutations

Daniel Mosallaei; **Brandon Levian**; David T. Woodley, MD; Mei Chen, PhD
Department of Dermatology, KSOM

Goal: Generalized severe junctional epidermolysis bullosa (GS-JEB) is an incurable skin disorder most often caused by nonsense mutations in the genes encoding laminin-332, a protein critical for dermal-epidermal adherence. Our lab has previously demonstrated that

intravenous (IV) gentamicin is capable of promoting readthrough of nonsense mutations to produce new, functional laminin-332. The goal of this proposal is to determine if optimized IV gentamicin with an increased dose and a longer infusion period can suppress premature termination codons, induce more functional laminin 332, and provide more long-term clinical improvement in JEB patients with *LAMA*3 and *LAMB*3 nonsense mutations.
Methods: Two patients received biweekly infusions of 10 mg/kg gentamicin for 3 months. The primary objectives were the detection of new laminin 332 at the patients' dermal-epidermal junction (DEJ) and assessments for safety. The secondary objectives were assessment of wound closure and Epidermolysis Bullosa Disease Activity and Scarring Index (EBDASI) and Skindex-16 scores.
Results: After gentamicin treatment, test sites exhibited newly created, properly localized laminin 332 at the DEJ of the patients' skin. In addition, IV gentamicin promoted wound closure and improved the patients' clinical scores as assessed by EBDASI at the 1- and 3-month follow-ups when compared to baseline. Most interestingly, we also observed improvement of airway symptoms. Lastly, increasing the dosage and duration of infusions resulted in more laminin 332 expression and greater clinical improvement. No adverse effects or anti-laminin 332 antibodies were detected.
Conclusions: IV gentamicin induced readthrough of nonsense mutations in JEB patients and restored functional laminin 332 in their skin and enhanced wound healing. An optimized dose of IV gentamicin may be a readily available, safe and efficacious therapy that reduces disease severity for this population of JEB patients.

Artesunate Inhibits RDEB Fibrosis and Scarring

Daniel Polyakov, Brendon Levian, Mei Chen. Department of Dermatology, Keck School of Medicine of USC, University of Southern California, LA, CA

Goal: Patients with recessive dystrophic epidermolysis bullosa (RDEB) develop skin wounds that heal with extensive scarring, contractures, and deformities. This is due to increased expression of TGF-β signaling, distinct pro-fibrotic gene expression, and elevated expression of pro-inflammatory genes. Among promising anti-fibrotic molecules, artemisinin, which promote anti-fibrotic and anti-inflammatory activity in animal and cell models. We evaluated the ability of artesunate (ART), an artemisinin derivative, in inhibiting RDEB-related fibrosis using fibroblasts isolated from patients.
Methods: We conducted experiments to evaluate ART's ability to mitigate the dysregulation of TGF-β and fibrosis mediators. RDEB fibroblasts were cultured and incubated with varying concentrations of ART. Immunoblot analysis of cell extract was conducted to determine the reduced expression of fibrosis markers. Scaring is also related to a fibroblast's ability to contract collagen lattices. To evaluate this, we performed an *in vitro* collagen lattice contraction assay on fibroblasts.
Results: We found that ART facilitated dose-dependent inhibition of fibrotic expression markers in RDEB fibroblasts derived from patients. ART treatment reduced expression of all the following fibrosis markers: collagen 1, periostin, α-smooth muscle actin, fibronectin, tenascin-C, and connective tissue growth factor, and p-AKT. ELISA of the conditioned media showed a reduction in TGF-β1 levels of treated RDEB fibroblasts compared to the untreated control. Compared to normal fibroblasts in an *in vitro* collagen lattice assay, RDEB fibroblasts showed enhanced contraction. ART-treatment of RDEB fibroblasts decreased contractility compared to that of the untreated control.

Conclusion: ART can decrease the expression of TGF-β1 and several other markers of fibrosis. Not only have we demonstrated ART's ability to reduce pro-fibrogenic markers of RDEB cells, but we have also acquired evidence that these molecular changes lead to phenotypic change.

Investigating the Relationship between Pemphigus and Malignancy in Two Patient Populations, a Retrospective Chart Review

Ivan Rodriguez, BS, Dr. Scott Worswick, MD, Department of Dermatology, Keck School of Medicine of USC, University of Southern California

Background: Pemphigus is a group of rare and severe autoimmune blistering diseases characterized by autoantibodies directed against skin desmosomal attachment proteins, desmoglein 1 and 3. While paraneoplastic pemphigus has been well characterized, given the rarity of this group of conditions there are few studies evaluating whether other subtypes of pemphigus can increase the risk of developing a malignancy. There has been some association noted between pemphigus patients with hematologic malignancies, but no strong data supporting an increase in other types which warrants further evaluation.
Objective: The objective of this study is two-fold. The first being to determine whether there is an increased risk of malignancy for patients with pemphigus subtypes other than paraneoplastic pemphigus. The other is to determine if there is a difference in rates of malignancy between different hospital populations.
Materials and Methods: Patients with the diagnosis of pemphigus from 2000-2021 were identified using 2 clinical warehouse databases for each hospital. We searched for patients diagnosed with pemphigus via icd-10 and icd-9 codes through I2B2 for Los Angeles County/University of Southern California Medical Center (LAC/USC), and TrinetX for patients at Keck Hospital. Inclusion criteria for patients: clinical diagnosis by a dermatologist and a confirmatory immunoassay (DIF, IIF, or ELISA) or positive serum antibodies (dsg1 or dsg3). Patients noted to have malignancies were included if the malignancy occurred greater than 1 year after diagnosis with pemphigus. Exclusion criteria includes patients diagnosed with paraneoplastic pemphigus. Each patient was age and sex matched to a control from their hospital.
Results: Preliminary results from the study has shown malignancies in 9 pemphigus and 14 control patients from a total of 100 patients in each group. Of those with malignancy, 8 were from Keck Hospital and 1 was from LAC/USC.
Conclusions: Thus far we are unable to show a significant difference between rates of malignancy in patients with pemphigus compared to the control group. Furthermore, there has not been a significant difference between the two patient populations in malignancy rates. Once more data is collected and evaluated, we hope to come to a more definitive conclusion.

Rates of Dermatology Follow-Up and New Skin Cancer Diagnosis among Solid Organ Transplant Recipients During the COVID-19 Pandemic

Ritika Saranath B.S., Jacob Gomez B.S., Braulio Fernandez B.S., Iris Ahronowitz, M.D.

Background: Solid organ transplant recipients (SOTRs) are at an elevated risk of developing non-melanoma skin cancers. Regular dermatologic surveillance has been shown to improve skin cancer outcomes in SOTRs. However, the COVID-19 pandemic has had a profound impact on delivery of care. Recent studies have found an increase in teledermatology visits despite an

overall decrease in dermatology visits, a decline in treatment adherence, and a preference for in-person care in the general population.

The impact of the ongoing pandemic on dermatologic care in SOTRs, a high-risk population, remains largely unexplored. We sought to compare utilization of dermatology in-person and telemedicine services by SOTRs as well as rates of new skin cancer diagnoses before and during the COVID-19 pandemic.

Methods: A retrospective study was performed using our database of patients who received solid organ transplants at Keck Hospital of USC between 2013 and 2018. The number of visits to our dermatology department during two 17-month time periods was counted: pre-COVID 19 pandemic, October 2018 to March 2020, vs peri-pandemic, April 2020 to September 2021. Each visit was categorized based on (1) general dermatology vs Mohs surgery or follow-up and (2) in-person vs telemedicine. Lastly, the number of new skin cancer diagnoses during these two time periods was counted.

Results: We expect to find (1) a decrease in number of dermatology visits among SOTRs peri-pandemic as compared to pre-pandemic, and (2) a decrease in rate of diagnosis of new skin cancers among SOTRs during as compared to before the pandemic.

Conclusion: The impact of the COVID-19 pandemic on dermatologic care and outcomes remains poorly characterized, especially in high-risk populations such as SOTRs. By investigating the usage of dermatology services by SOTRs during the pandemic, we hope to address barriers to regular dermatologic surveillance and prevent a rise in skin cancer morbidity and mortality.

References:

1. Bhargava, S., & Sarkar, R. (2020). Impact of COVID-19 Pandemic on Dermatology Practice in India. *Indian dermatology online journal*, *11*(5), 712–719. https://doi.org/10.4103/idoj.IDOJ_240_20
2. Erdem, Y., Polat Ekinci, A., Altunay, I. K., Sivaz, O., Inal, S., Gokalp, M. O., Pehlivan, G., & Özkaya, E. (2021). The impact of COVID-19 pandemic on the management of patients with chronic urticaria: An observational two-center study from Turkey. *Dermatologic therapy*, *34*(1), e14652. https://doi.org/10.1111/dth.14652
3. Lee, M. S., Guo, L. N., Wang, W., & Nambudiri, V. E. (2021). Differences in Utilization of Nonvideo Telemedicine Visits for Dermatologic Concerns in Underserved Populations During the COVID-19 Pandemic. *Telemedicine journal and e-health : the official journal of the American Telemedicine Association*, *27*(8), 827–834. https://doi.org/10.1089/tmj.2021.0128
4. Stadler, P. C., Senner, S., Frey, S., Clanner-Engelshofen, B. M., H Frommherz, L., French, L. E., & Reinholz, M. (2021). Teledermatology in times of COVID-19. *The Journal of dermatology*, *48*(5), 620–624. https://doi.org/10.1111/1346-8138.15812

Contact Dermatitis in The United States: A Population-Based Study on Patient Characteristics and Treatment Patterns

Roy Yu

Background: Contact dermatitis affects more than 20% of the general population and is the fifth highest cause of lost productivity among skin diseases. However, there is a lack of epidemiological studies on the treatment patterns for contact dermatitis.

Objective: We aim to analyze the patient characteristics and prescribing patterns among dermatology and general practitioners for contact dermatitis in the United States.

Methods: This is a population-based study using data from the National Ambulatory Medical Care Survey.

Results: From 2001-2016 and 2018, 29% of the 176 million visits for contact dermatitis were conducted by dermatologists. Dermatologists saw a higher proportion of white and non-Hispanic patients than general practitioners. Regardless of specialty, topical corticosteroids (TCS) were the most frequently prescribed. Dermatologists were more likely to prescribe ultra-high potency TCS compared to family medicine physicians (OR 3.70, 95% CI 2.57-5.33) and internal medicine physicians (OR 2.42, 95% CI 1.46-4.01). Topical calcineurin inhibitors were used most frequently by dermatologists. General practitioners were significantly more likely to prescribe systemic steroids and oral antihistamines than dermatologists.
Conclusions: There is an educational opportunity among family medicine and internal medicine physicians on the optimal use of ultra-high potency topical corticosteroids and topical calcineurin inhibitors for contact dermatitis.

EMERGENCY MEDICINE

Care of Sexual Assault Patients in the ED

Arianne Bexfield (Medical Student), Dr. Elizabeth Burner (MD), Dr. Marissa Wolfe (MD)

Background: In the USA, 1 in 5 women will experience rape in their lifetime and rape-related pregnancy is a significant public health concern. Emergency contraception (EC) is highly effective for the prevention of rape-related pregnancy, and it is the national standard of care that medical providers offer and provide EC upon request to all female sexual assault patients. California and many other states require this by law. Previous research has found that the majority of female patients at risk for rape-related pregnancy are never offered EC in the ED and that EC is prescribed at a significantly lower rate than medications for STI prophylaxis. In this study, we aim to determine the current prescribing rate for EC for sexual assault in a single large-volume ED in California. We hypothesize that medical providers in the ED prescribe EC to sexual assault patients at a lower rate than they prescribe STI post-exposure prophylaxes.
Methods: In this study, we will be conducting a retrospective, cross-sectional chart review of female patients who received medical care for sexual assault in the ED at LAC+USC Hospital from 2015-2021. The primary outcome we aim to examine is the difference between the prescribing rate for EC vs STI prophylaxes. We will also examine length of time elapsed in treatment before patients are prescribed medication(s) (EC vs STI prophylaxes), the type of EC prescribed according to patients' BMI, and the EC prescribing rate when language barriers are present.
Results: We anticipate our results to reveal a lower prescribing rate and longer waiting time for EC vs STI prophylaxes. We also expect to find that patients of all BMIs are prescribed the same type of EC and that language barriers will be associated with a lower EC prescribing rate.
Conclusions: This study aims to provide current feedback about quality of care for sexual assault patients. We hope to inspire and incite positive changes in quality of care by bringing awareness to any discrepancies that may be found between the legal standard of care and the care that our patients receive in-practice.

What's the ACA got to do with it? Effect of Insurance on High Transfer Rate Medical Conditions in the Emergency Department

Carmen Toomer[1]; Sophie Terp, MD[2]; Sarah Axeen, PhD[2]; Michael Menchine, MD[2]
[1] *Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA*
[2] *Department of Emergency Medicine, Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA*

Purpose: Under EMTALA, patients cannot be denied emergency care based on their inability to pay but may still be billed after receiving this care—potentially leaving the patient and provider in major debt. Though the ACA provisions have greatly reduced the number of uninsured patients, uncompensated care remains a significant financial stressor on the trauma system. Interfacility transfer decisions are typically based on patients' clinical needs and the hospitals' existing resources; however, transfers may expose patients and hospital systems to considerable burdens without clear clinical benefit. Concerns about inadequate reimbursement may motivate interhospital transfers based on insurance status rather than medical necessity, potentially undermining the effectiveness of the system. This paper will extend the work by Kindermann et al. to look at transfer vs admission trends based on payer status from 2006 to 2018, particularly pre- and post- 2014 ACA implementation.
Methods: We will perform a retrospective, observational study using the 2006-2018 NEDS data set to gauge the association between patients' insurance status with the likelihood of transfer compared to admission. Using the disease stratification and specialty classification created by Kindermann et al., we will identify diagnoses with ≥5% adult encounters resulting in transfer,

group these high-transfer diagnoses according to predicted specialist need, and assess the association of payer status with the odds of transfer versus admission among these specialist categories, pre- and post- 2014.
Results: Looking at emergency disposition trends based on payer status from 2006 to 2018, I expect the trend to be consistent with the findings from our reference paper, with a lessened effect of insurance status post-2014.
Conclusion: We expect the results to help us better understand the impact the ACA has had on the insurance mix of ED visits, and the degree to which this has influenced provider behavior.

Effectiveness of an "Opt-out" Model on Physician Resident Mental Health Visit Attendance

Vazquez, Jessica (1); Nasrolahi, Shyon (1); Fishel, Pamela Tobi (1, 2); Burner, Elizabeth (1), Tabatabai, Ramin (1, 2)
(1) Keck School of Medicine of USC; (2) LAC+USC Medical Center

Background: Depression in residents has been correlated to poor health, difficulty concentrating at work, and making more medication errors when compared to non-depressed residents [1]. Although some interventions are being offered to improve resident mental health, more research into their efficacy is needed. Our goal is to assess if LAC+USC's transition to a residency "opt out" mental health visit model has improved utilization of mental health services.
Methods: Since 2019, PG1 residents at LAC+USC Medical Center from 9 residency training programs have participated in an institutional mental health "opt out" program. We will gather post-implementation data on the total number of mental health visits completed per academic year, the number of visits per specialty, and the number of residents who attended more than one session. We will also collect demographic information of the residents.
Results: We hope to draw comparisons of utilization rates between different specialties and between the programs who adopted the "opt out" model and those who have not. We expect that those programs that have adopted the model will have a greater number of visits completed. We also expect greater utilization rates in specialties known to have greater rates of depression and burnout.
Conclusion: Physician depression is a well-documented problem, but limited research has been done regarding the efficacy of proposed interventions. Nationally, resident depression and mental health is a high priority issue and our investigation hopes to determine a feasible and accessible solution.
References:

1. Fahrenkopf, A. M., Sectish, T. C., Barger, L. K., Sharek, P. J., Lewin, D., Chiang, V. W., Edwards, S., Wiedermann, B. L., & Landrigan, C. P. (2008). Rates of medication errors among depressed and burnt out residents: prospective cohort study. *BMJ (Clinical research ed.)*, *336*(7642), 488–491.

Rates of Emergency Department visits and patient characteristics of high and low acuity visits for Opioid Use Disorder during Covid-19 in the LA County Public Hospital System.

E. Johnson, C. Lam, S. Axeen, **A. Vosooghi**, T. Schneberk

Background: COVID-19 led to profound healthcare challenges for people with OUD. Evidence points to higher rates of opioid-related overdose deaths. Disruptions to addiction clinics, harm-reduction services, and support groups have been attributed to grim outcomes for patients with OUD. In LA, the Department of Public Health reported a 48% increase in accidental drug OD

deaths in the first five months of the pandemic. In March of 2020, the state of emergency declaration for COVID-19 resulted in a disruption in usual sources of SUD care. EDs thus remained a critical access point for these patients.
Methods: We examined all visits to safety-net hospital EDs in LA County. We considered OUD-related ED visits as those which included: OUD related discharge diagnosis, administration or prescription of buprenorphine or naloxone. We performed an interrupted time series analysis examining such visits from Apr 2019-Feb 2020 compared with Apr 2020-Feb 2021. We also performed logistic regression to compare patient characteristics of OUD related visits in the pre- and post-COVID periods.
Results: There was a 19.6% higher odds of an ED visit being related to OUD when we compared pre- and post- COVID shutdown periods. Rates of high acuity visits related to OUD were increased. Compared to pre-COVID levels, the predicted probability of OUD-related visits increased for Black (18.8%) and Latinx (19.8%) patients. Patients more likely presented for OUD-related visits if they were publicly insured, uninsured or brought in by ambulance. Admitted patients were 4 times more likely to have an OUD related visit.
Conclusion: Rates of OUD-related ED visits increased during the pandemic, particularly among Black, Latinx and Medicaid patients. Admitted patients had higher odds of OUD-related complaints. This demonstrates the role of the ED and public hospitals as the predominant resources for vulnerable patients with OUD during the pandemic.

Effectiveness of Advanced Provider Response Unit in Reducing Requests for EMS Service from High Utilizer Patients

Charles Zhou

Background: The Los Angeles County Fire Department (LACoFD) launched the Advanced Provider Response Unit (APRU) program on November 1, 2019, primarily serving Battalion 11 in the Lancaster area. This unit is staffed with a both a nurse practitioner and a firefighter/paramedic and can perform interventions to divert patients away from emergency departments. The APRU specializes in responding to 911 calls from patients with low acuity chief complaints and follows up with patients who are high utilizers of EMS services. By reducing 911 calls from high utilizer patients and diverting them to facilities other than emergency departments, the APRU enhances LACoFD's ability to respond to emergencies. We hypothesize that the APRU will produce a statistically significant reduction in subsequent 911 calls from patients after intervening and making patient contact.
Methods: Our study is a retrospective descriptive study of LACoFD electronic patient care records from November 2019 to June 2021. Our initial definition of a high utilizer patient is anyone with 2 or more APRU calls within the study period. We then changed the definition to patients with 19 or more 911 calls within Battalion 11 (average of 2 or more a month) and then to 10 or more 911 calls in the entire study period. These changes were made as we did not effectively capture the full breadth of high utilizers in the entirety of Battalion 11. Descriptive statistics of the patient population, reason for 911 activation, transport destination, and APRU intervention were collected retrospectively.
Results: There were 161 patients with 10 or more 911 calls in the entire study period, out of 16,124 identifiable and unique patients in Battalion 11 (1.0% of patients).These 161 patients were responsible for 2744 911 calls out of 38461 911 calls in Battalion 11 (7.1% of all calls). Of these 161 patients, 64 (40%) received AP intervention, while 97 (60%) did not. Patients who received AP intervention made 1341 (49%) of the high utilizer 911 calls, while those who did not receive AP intervention made 1403 (51%) of the high utilizer 911 calls. However, amongst patients who received AP intervention, calls were not reduced after AP intervention. There were 475 calls made by these patients between the beginning of the study period and before the 1st

AP intervention, 399 made during the intervention period, and 534 made between the last AP intervention and the end of the study period. There was an average of 17.21 calls per patient. The average number of calls from patients with AP contact was 21.28, while the average number of calls from patients without AP contact was 14.61.

Conclusion: The APRU program shows limited effectiveness in reducing 911 calls from high utilizer patients. Calls did not decline after AP intervention, although the total number of calls from patients who received AP intervention was lower than the total number of calls from patients who did not receive AP contact. The average number of calls from patients who received AP intervention was also higher than the average number of calls from patients who did not receive AP intervention. This may be because the APRU targets patients who place the highest number of 911 calls and/or who may have the most complex medical complaints in the battalion. Additional AP follow ups may be needed for these patients to reduce 911 calls. However, 60% of high utilizers received no AP intervention. This could be studied further to see if AP intervention in this subset of high utilizers could reduce 911 calls. Further study could also see if AP intervention is more effective for certain medical complaints than others.

FAMILY MEDICINE

Assessing The Socio-Emotional Impact of Tattoo Removal on Formerly Incarcerated and Gang Affiliated Individuals

Priscilla Garza, Eddie Rodriguez, Jo Marie Reilly MD, Jessica Bogner MA

Background: Homeboy Industries is an organization in Los Angeles, CA that helps gang affiliated and formerly incarcerated individuals reintegrate into society through a variety of programs. Tattoo removal through the Ya 'Stuvo Clinic is often a first step. Although there is anecdotal evidence that tattoo removal positively impacts the lives of clients, there is scarce literature on the specific effects of tattoo removal on the interpersonal relationships and self-perception of clients. Given this lack of data, we aim to determine the effects of tattoo removal on the socio-emotional health of clients and to learn more about how it has impacted their lives.
Methods: Our study will sample from the tattoo removal clients in the Ya 'Stuvo Clinic database that have completed or nearly completed the removal of at least one tattoo. Participants will be recruited through email, flyers, and in person by student researchers. Our research will utilize a short Qualtrics survey and a subsequent in-depth phone/in-person interview focusing on employment and educational opportunities, safety, social relationships, and the self-perception of clients before and after their tattoos were removed. Analysis will be conducted using T-tests and frequency analysis, along with qualitative analysis for phone/in-person portions of the interview where participants will be able to speak more freely about their experience.
Results: Data collection is ongoing. We are recruiting participants and conducting surveys/interviews. Preliminary results suggest that tattoo removal brings positive change into clients' lives—improving self-esteem, alleviating feelings of stigmatization and judgement, and helping parents feel like better influences in their children's lives.
Conclusion: Data analysis is incomplete. Results suggest that tattoo removal positively influences the socio-emotional health of clients.

Establishing a Head Start Workshop Curriculum: Focus Groups with the Boyle Heights Community

Melissa Gonzalez Medical Student, Isabel Edge, MD, Advisor, Dept. of Family Medicine, KSOM

Goal: Programs like Head Start can help address disparities in mental health and education experienced by Hispanic/Latino children due to factors like discrimination and poverty (Smith, 2020). Establishing a partnership between Head Start and the Keck School of Medicine (KSOM) of USC will benefit children and families in the community by allowing community members to voice their interests and concerns and play a role in creating an educational curriculum for the new Boyle Heights Head Start location.
Methods: We conducted focus groups in English and Spanish via Zoom. Participants (n=4) were asked about the needs of their community, what topics they were interested in learning about, and what barriers they faced to accessing health-related resources.
Results: Participants cited support groups, nutrition education, diabetes care, mental health care, and dental care as resources needed in their community. Two participants mentioned the need for more affordable low-income clinics. Suggested workshop topics (and number of times mentioned) included: dental care (1), mental health (3), first aid (3), maternal health (4), nutrition (5), and parenting (7). Some of the barriers that participants reported facing in accessing resources included disorganized clinics, inability to make appointments, and financial costs.
Conclusions: Common concerns among participants were parenting skills, mental health care, and nutrition education. Next steps for the Head Start-KSOM collaboration include creating workshops based on these suggestions and surveying participants before and after workshops to gauge the effectiveness of the curriculum.

Diabetes Day at LAC+USC: An Analysis of Satisfaction, Improvement, and Attendance Scores

German Lavenant

Objective: To determine the utility and effectiveness of Diabetes Education Classes and Healthy Cooking Classes in regards to inducing self-reported habit changes and attendance patterns.
Method: The data collected was from self-reported survey results administered by the Wellness Center from the LAC+USC Hospital in Los Angeles, California between 2017-2020 upon completion of the DM/Cooking Class. The categories of self reported changes/learned lessons that were quantified were frequency of: Cooking Methods, Health knowledge, Nutritional knowledge, and Exercise practices. Satisfaction scores were also calculated relative to attendance rates.
Results: There was no statistical significance in type of category learned/changed between individuals in low-satisfaction (satisfaction scores of 3 and below out of 5) and high satisfaction groups (satisfaction score of 4 and 5 out of 5). There was also no statistical significance in learned categories found between individuals who reported significant, small, and no improvement in knowledge post Diabetes Day attendance. There was a statistical significance found with class satisfaction between individuals who make multiple appearances to these health education classes compared to individuals who are first time and individuals who have made few (2-3 appearances) appearances.
Discussion: The overall results demonstrated that DM Diabetes and Cooking classes do not exhibit a difference in the quantity of things learned between individuals who expressed low and high satisfaction, nor in individuals who reported learning more or less in these classes. There is however a significant correlation with individuals who report high class satisfaction scores with a more frequent attendance to multiple diabetes classes. This study demonstrates the importance of having an engaging and satisfactory class in order to increase attendance to these educational classes.

Elder Abuse Education in Medical Residency: Survey

Shirley Li (Medical Student), Lori Mars, JD (Advisor), Dr. Bonnie Olsen, PhD, Carmen van den Heever, BS; Department of Family Medicine-Geriatrics, KSOM

Background: Elder abuse (mistreatment) is an intentional act or failure to act by a caregiver or another person in a trust relationship involving an expectation of trust that causes or creates a risk of harm to an older adult.[1] Elder abuse is a public health concern affecting millions of older adults. One in ten US adults aged 60 years and older experience abuse each year.[2] Between one in fourteen and one in forty-four cases of elder mistreatment come to the attention of authorities.[3] Medical residents and fellows in family, internal, emergency, and psychiatry, and geriatric medicine are not adequately trained or sufficiently confident and competent in caring for elder abuse patients. Curriculum structured into their programs with the goal of prevention, detection, and intervention in cases of elder abuse may help. As such, once curriculum has been designed and implemented, there needs to be a metric for evaluation of residents' competency in caring for elder abuse patients and curriculum effectiveness.
Methods: A post-retrospective survey was designed with reference to ongoing development of medical resident curriculum. The goals of the survey are: (1) does the implemented elder abuse curriculum improve resident confidence and competence in caring for elder abuse patients, (2) what are areas for improvement in the curriculum. Qualtrics will be utilized for survey dissemination before and after curriculum implementation and survey interpretations will be

drawn from changes in confidence and competence. Exact statistical analysis plan will be determined in the future.
Results: At the time of this writing, the survey has not been disseminated. I expect to observe improved confidence and competence in prevention, detection, and intervention in cases of elder abuse.
Conclusions: The survey results will be important in further improving confidence and competency in response to elder abuse. If the curriculum is beneficial, it should continue to be incorporated into resident programs. Adjustments can be considered and made to address gaps in knowledge and/or additional concerns in residents' confidence and competency. If curriculum is not beneficial, another mode of improving competency should be considered.
References:

1. Hall JE, Karch DL, Crosby AE. *Elder Abuse Surveillance: Uniform Definitions and Recommended Core Data Elements for Use in Elder Abuse Surveillance, Version 1.0.* Atlanta (GA): National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2016. https://stacks.cdc.gov/view/cdc/37909
2. Acierno R, Hernandez MA, Amstadter AB, et al. Prevalence and correlates of emotional, physical, sexual, and financial abuse and potential neglect in the United States: The National Elder Mistreatment Study. *Am J Public Health.* 2010;100:292–297. https://pubmed.ncbi.nlm.nih.gov/20019303/
3. *Under the Radar: New York State Elder Abuse Prevalence Study.* Lifespan of Greater Rochester, Inc., Weill Cornell Medical Center of Cornell University, New York City Department for the Aging. New York State Coalition on Elder Abuse (online); [Accessed February 12, 2016]. https://ncvc.dspacedirect.org/handle/20.500.11990/299

Cognitive impairment negatively impacts orthopedic perioperative outcomes

Reanna Liaw, Justyne Decker, Cristin Malekyan, Tatyana Gurvich, Carolyn Kaloostian

Background: The most common postoperative complication affecting older adults is perioperative neurocognitive disorder and delirium. Up to 40% of in-patient delirium events may be preventable. Patients with preoperative cognitive impairment have the highest risk for cognitive and non-cognitive complications, length of stay, and discharge not to home. The interprofessional USC Perioperative Brain Health Initiative (BHI) implemented routine preoperative cognitive screening to identify those at highest risk of cognitive complications and established an interprofessional perioperative care pathway aimed at age-friendly healthcare and risk mitigation.
Methods: A retrospective chart review of a sample of elective arthroplasty surgical patients age 65+ between November 2018 and November 2021 was conducted. All patients had preoperative cognitive screening with Mini-Cog. We noted postoperative length of stay, complications, delirium events, place of discharge and readmission rates. Patients with cognitive impairment were referred to a preoperative interprofessional geriatric care pathway. The outcome metrics were compared between patients with and without cognitive impairment.
Results: Among 185 patients (knee arthroplasty=136 and hip arthroplasty=49) there was 22.2% incidence of preoperative cognitive impairment. 33% vs 8.9% of knee arthroplasties in the impaired had postoperative complications (p=0.004). Together, patients with preoperative impairment had increased length of stay (2.89 vs 2.12 days, p=0.02), postoperative complications (34% vs 9%, p=0.0004), delirium (14.6% vs 1.4%, p= 0.002), discharges not to home (17%. vs 2%, p= 0.001), and readmissions (7% vs 0.7%, p=0.035).

Conclusion: Patients with preoperative cognitive impairment had worse outcomes post-arthroplasty. After an interprofessional care pathway for those at high risk was implemented, preliminary results trended to fewer complications, delirium events, discharges not to home and readmissions.

Nutrition Curriculum for Medical Students: Student Outcomes After Teaching Community-Based Wellness Classes

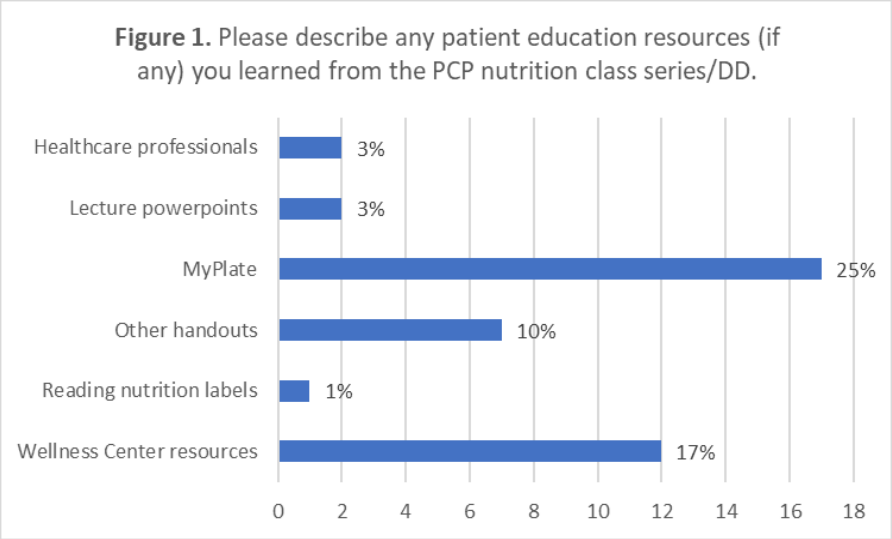
Lindsay Nagatani-Short, BA, Isabel Edge, MD[1], Ilana Greenberg, MPH[1], Jo Marie Reilly, MD, MPH[1]

Keck School of Medicine, [1]Department of Family Medicine, Los Angeles, CA, USA

Goal: A 2015 study found that 71% of US medical schools do not meet the minimum recommendation for nutrition education set forth by the National Research Council. The lack of medical school nutrition education under-prepares students to counsel and manage future patients with chronic disease such as diabetes. Our study evaluates the knowledge and self-efficacy of Keck School of Medicine (KSOM) Primary Care Program (PCP) students after leading community nutrition courses.

Methods: This retrospective study was conducted using two surveys collected at separate times by KSOM PCP regarding the experiences of first year medical students (MS1s). The post-teaching survey was emailed to MS1s (n=86) immediately after "Diabetes Day" (DD) between 2016 and 2020. DD is a day-long nutrition and cooking workshop that students lead for community members at the Los Angeles Wellness Center (LAWC). The follow-up survey was emailed in August 2021 to the same students above (n=60) to look at the longitudinal outcomes of their experience 1-5 years after teaching.

Results: *Post-Teaching Survey Results:* When asked to describe what changes MS1s would make to patient care after participating in DD (n=68), 41% (n=28) respondents wrote about changes they would make to nutrition counseling, including utilizing My Plate (25%) and LAWC resources (17%) (see Figure 1). *Follow-Up Survey Results:* 85% either agreed (n=29) or strongly agreed (n=24) that teaching at LAWC increased their knowledge of nutrition. 85% either agreed (n=26) or strongly agreed (n=25) that teaching increased their confidence in communicating with patients about nutrition. 78% (n=47) students reported more knowledge and confidence in counseling patients regarding nutrition interventions for diabetes control/prevention and 62% (n=37) reported the same for hypertension.



Conclusion: Medical students who participated in a service-learning nutrition class reported improved and sustained knowledge and confidence in counseling patients. Didactic and experiential nutrition teaching and learning in medical school may improve medical students' confidence in counseling patients on nutrition.

Birth Outcomes and Breastfeeding Rates Among Women attending Prenatal and Postpartum Health Support Classes

Annie Odelson, Jo Marie Reilly, MD MPH, Dept. of Family Medicine, KSOM

Background: While the scope of prenatal education classes has expanded to include topics like pain management, birth planning, and breastfeeding information, the effectiveness of these classes on the birth experience and birth and breastfeeding outcomes is less established. The CDC still reports a high level of labor inductions and cesarean surgeries annually[1], while the rate of breastfeeding remains below the Healthy People 2020 target level[2]. In this study, we examine the impact of prenatal and postpartum class attendance on labor and breastfeeding outcomes, and the relationship between birth trauma and breastfeeding outcome and duration.
Methods: Postpartum women who participated in New Familia Health Support Services classes or support groups were contacted and asked to complete an anonymous survey containing questions about their birth (the physical event, emotional response, and confidence and satisfaction) and breastfeeding experience (confidence and duration). Forty individuals responded, and results were analyzed by categorizing responses into time of attendance, and trauma incidence during delivery.
Results: Women who attended classes prenatally had a lower percentage of C-sections and labor interventions compared to those who attended only postpartum classes. In addition, those who attended classes prenatally had a higher average breastfeeding confidence ($p < 0.05$) compared to postpartum attendees. Women who experienced complications during birth did not show significant differences in their breastfeeding confidence and had similar breastfeeding rates compared to those without traumatic deliveries.
Discussion: This pilot study demonstrates a positive relationship between attendance at prenatal education classes and the subsequent labor and maternal experience. Next study steps include recruiting a larger sample size and validating the survey instrument to further strengthen study associations and conclusions.

References:
1. https://www.cdc.gov/nchs/data/nvsr/nvsr70/nvsr70-02-508.pdf. Date Retrieved 06/25/2021.
2. Louis-Jacques A., Stuebe A. Long-term maternal benefits of breastfeeding. (2018). Contemporary OB/GYN. 63(7): 26-29.

Screening for Elder Abuse in Healthcare Settings

Sophia Paik, Jeanine Yonashiro-Cho, Laura Mosqueda, & Zach Gassoumis
Department of Family Medicine, Keck School of Medicine of USC

Background: Healthcare providers gain unique insights into the lives of older adult patients. This access allows for disclosure of sensitive information, including their experience with elder abuse, that may not be shared with other individuals. However, standard approaches to screening do not exist across healthcare settings. Therefore, the purpose of this study is to better understand the current state of elder abuse screening practices healthcare settings.
Methods: A scoping review was conducted to explore prevalence of and barriers to screening for elder abuse in primary care settings. Queries were conducted in PubMed for peer-reviewed articles in August and September 2021 using the search terms “elder abuse/mistreatment screening,” and “barriers.” These findings were then used to develop a national survey of elder abuse screening practices that exist in a range of healthcare settings. The survey will be distributed to healthcare professionals that care for older adults. Answers will be kept anonymous and collected through REDCap. Data analysis will be conducted using software packages that may include Excel and SPSS. Analysis may include descriptive frequencies, cross tabulations, and thematic analysis.
Results: The scoping review revealed that data examining the prevalence of elder abuse screening, particularly in healthcare settings, were extremely limited. This can be attributed to an apparent lack of screening in most healthcare practices. Although results from the survey have not yet been collected, answers from the survey will likely confirm the low prevalence of elder abuse screening in healthcare settings. Additionally, the survey will provide data regarding current elder abuse screening practices including barriers, protocols, and the effects of COVID-19.
Conclusion: Results from the survey can elicit a better understanding of the current state of elder abuse screening in healthcare settings. This data can help inform future development and implementation of screening procedures.

Assessing the Impact of Nutrition Curriculum among Medical Students

Kevin Robinson, Jo Marie Reilly, MD, Dept of Family Medicine, KSOM

Background: Poor dietary choices are one of the strongest risk factors for death and disability in the United States, negatively impacting our health in innumerable ways. Despite the importance of dietary choices for our health, nutrition education in American medical schools is inadequate and decreasing over time. Further, physicians cite lack of knowledge as a barrier to counseling patients on chronic illness and disease prevention. Additional nutrition education for medical students may be important to help change this paradigm. There are few studies in the literature evaluating the impact of nutrition education among medical students.
Methods: A 1-hour nutrition lecture was delivered to 105 first year medical students at Keck. The lecture included interactive case-based examples to illustrate key concepts. Using pre/post surveys, we assessed the following: 1. change in knowledge, 2. confidence in counseling patients, 3. change in their own behaviors, and 4. satisfaction with the program. Knowledge

acquisition was assessed using multiple choice factual recall questions, and the remaining 3 parameters were assessed using Likert scale survey questions. The same survey was given immediately before and after the session, and again at 3 months post-session to evaluate long-term retention. A paired samples t-test was used to compare student responses before vs. after the session.
Results: The students improved their knowledge of the material from an average score of 37% to 82% ($p<0.001$). Their comfort in assessing and counseling patients also improved, from 3.53 to 5.90 on a 1-10 Likert scale ($p<0.001$). Their motivation to change their personal behaviors improved from 8.04 to 8.36 ($p<0.001$). Moreover, students were satisfied with the lecture, with an average rating of 8.58/10.
Conclusions: This study supports the increased use of nutrition curricula at the medical school level, as it significantly increases student comfort with the material and confidence in counseling their future patients.

A Study on the Socio-Economic Impact of Tattoo Removal on Formerly Incarcerated and Gang Affiliated Individuals

Eddie A. Rodriguez, Priscilla Garza, Jo Marie Reilly MD

Background: Though an abundance of research exists on the negative implications of tattoos, little is known about the socioeconomic impact of tattoo removal in formerly incarcerated and gang affiliated individuals. Although tattoos have grown in popularity among the general population, profiling and discrimination persist towards individuals whose tattoos are visible, obtained in prison, or when they have offensive language/gang affiliated symbols. For many formerly incarcerated and gang affiliated individuals, tattoo removal is an important step in separating from their former lives as gang members.

Our study focuses on tattoo removal clients from Homeboy Industries' Ya 'Stuvo tattoo removal clinic. Homeboy Industries is a non-profit organization based in Los Angeles, CA that utilizes a holistic approach to support the reintegration of recently incarcerated and gang affiliated individual into society. We hope that this research offers insight into how tattoo removal can be used as a tool to break the multigenerational incarceration and gang influence in some of the most vulnerable populations in Los Angeles.
Methods: Our study will sample from clients at the Ya 'Stuvo tattoo removal clinic. Clients will be recruited by email, flyers, and in person. The first part of the study is a closed-ended Qualtrics survey consisting of slider scale, yes/no, and multiple choice questions. The second is a more extensive, open-ended interview that allows the participant to more freely explain how the tattoo removal process has impacted their lives. T-test and frequency analysis will be used along with qualitative analysis for the phone/in person interviews.
Results: Data analysis is ongoing.
Conclusion: Preliminary data indicates that clients who have had completed tattoo removals were able to separate themselves from their former lives as gang members, experience less discrimination in public, and felt they had more opportunities for employment.

Implementation of an Addiction Medicine Course and Its Impact on Medical Students' Knowledge on Substance Use Disorders

Alexander Sun, Dr. Jo Marie Reilly, Dr. Randolph Holmes, Ilana Greenberg, KSOM

Goal: Substance use is a public health crisis that requires improved education on substance use disorders (SUDs) in medical school to ensure that the future generation of physicians are

prepared to handle the crisis. This study evaluates how the implementation of an addiction medicine course at the Keck School of Medicine impacted the knowledge of students in caring for patients affected by SUDs.
Methods: 66 medical students participated in a 2 week online or in-person elective course on addiction medicine between August 2019 to July 2021. During the course, students learned about SUDs through: online modules, learning the screening, brief intervention and referral to treatment (SBIRT) approach, medication-assisted treatment (MAT) waiver training, conducting readings on SUD, and attending online addiction support group meetings. To assess the impact of the course on students' knowledge in treating SUDs, a pre and post survey was administered that used Likert scale questions (range: 1=strongly disagree to 5=strongly agree). The pre and post survey responses were analyzed using a paired t test.
Results: After completing the SUD course, students showed significant improvement ($p<0.001$) in knowledge and comfort in treating and caring for patients with SUDs, specifically in the areas of: assessing a patient with SUD, comfort and knowledge in using motivational interviewing to affect behavior change in a patient with a substance use disorder, and knowledge of community resources related to substance use disorders. Students also showed a significant improvement ($p<0.001$) in the number of SUD substances they felt knowledgeable about and in the number and types of treatment modalities.
Conclusions: The implementation of an addiction medicine course in medical school was effective in improving students' knowledge working with patients with SUDs. This course can be used as an example by other schools on how to implement SUD education in both in-person and online settings.

INTERNAL MEDICINE

Multi-Organ Dysfunction and Evaluation for Liver transplantation – MODEL
Richard Garcia

Background: In chronic liver disease, cirrhosis is categorized as compensated or decompensated, with decompensated patients having a higher mortality and greater likelihood of progressing towards liver transplantation. Acute on chronic liver failure (ACLF) is a recently recognized syndrome where acute decompensation of cirrhosis leads to organ system failures, leading to much higher 28-day mortality than decompensated cirrhosis alone. There are multiple definitions and criteria for ACLF, so it is difficult to streamline consistent, systematic treatment options for optimal patient outcomes. Majority of clinical research in ACLF and transplantation either involves single center data or limited public data sets containing inconsistencies. In addition, having different definitions for ACLF can also pose a challenge to determine which patients qualify for liver transplant since MELD scores do not adequately capture the mortality of ACLF patients. Lastly, ACLF patients are sometimes denied transplantation because the post-transplant survival is believed to be below expectations.
Methods: The MODEL study focuses on clinical outcomes for ACLF patients, and those receiving liver transplants, throughout North America with emphasis on outcomes that cannot be evaluated with single center data or a large public registry. The goal of this study is to interpret the efficacy of treatment strategies and their outcomes for patients suffering from ACLF who may receive liver transplantation from North American transplant centers. Patient information is collected retrospectively into the centralized HIPPA-compliant, password protected REDCap database. The USC student will access patient data through KeckCare Power Chart to input necessary information into the REDCap database. The REDCap database will be managed and stored by the research team and site investigator at Cedars-Sinai Medical Center. A risk prediction model for one-year post transplant survival will be developed using modern model prediction techniques following the “transparent reporting of a multivariable prediction model for individual prognosis or diagnosis” (TRIPOD) statement. Then, we will compare our model’s performance with other models using overall performance, discrimination, calibration, and clinical usefulness at cut-off. Currently, the project is in the data collection phase and will proceed with the aforementioned data workup as the data becomes available.

Increasing Access to Integrative Oncology in a Urology Setting:
A Quality Improvement Pilot
Alondra Hurtado, Sima Porten MD, MPH, Sanjay Reddy MD, Maria T. Chao DrPH, MPA

Purpose: Access to complementary and integrative health (CIH) specialists remains a roadblock for oncology patients interested in incorporating integrative medicine into their health management. This study reports on a novel interdisciplinary clinical model where patients were seen by their oncologist and a CIH specialist in a joint appointment to develop a holistic care plan.
Methods: Integrative oncology joint appointments were provided to 63 patients, 32 of whom consented to completing surveys pre- and post-visit. A research coordinator collected data on demographics, patient experience, patient satisfaction, and patient reported outcomes (e.g. anxiety and quality of life). Scores pre- vs post-visit were compared using t-tests.
Results: Patients were primarily diagnosed with muscle invasive (n=12) and non-muscle invasive urothelial carcinoma (n=7). From pre- to post-visit, we observed statistically significant decreases in patients’ anxiety ($p<0.01$) and increases in positive emotions ($p=0.03$). The average ratings for the visit, physicians’ abilities, and likelihood to recommend the clinic to other patients were all a mean of 4.93/5. Patients showed a statistically significant increase in self-reported confidence in their treatment plan ($p=0.04$) and a statistically significant decrease in

feeling fearful ($p<0.01$) and nervous ($p<0.01$). The qualitative data indicate that interactions with physicians and staff, pace of the clinic, comprehensive care received, and efficiency are a few of the clinic elements patients found most helpful.
Conclusions: Based on a small pilot sample, our quality improvement project suggests that patients benefit from an interdisciplinary approach with their oncologist and a CIH specialist. Such a clinic model bypasses limited CIH specialist availability and clinic space, effectively reducing barriers to access and improving patient satisfaction. Exploring sustainability of integrative oncology joint appointments – such as billing practices and insurance coverage – is an important area of future work.

COVID-19 Baseline Characteristics Associated with Severe Disease and Social Vulnerability

Austin Lee, BS; Christina Vu, DO; Brianna Rogan, DO, MPH; Vanya Vojvodic, BS; Scotti Smith, BS; Trevor Pickering, MS; Ryan Chen, BS; Laura Kobashigawa, MD; Paul Holtom, MD; Noah Wald-Dickler, MD; Saahir Khan, MD, PhD, Department of Infectious Disease, KSOM

Background: The SARS-CoV-2 pandemic has challenged hospital capacity, creating the need for prognostic tools to characterize risk of mortality at presentation. The pandemic has also highlighted social inequities; prior studies have shown that higher rates of COVID-19 infection and mortality were associated with individuals who lived in zip codes with a lower median household income, higher percentage of people of color, and higher population and household density. However, few studies have looked at how inpatient mortality has been linked to patients' demographic geography, as well as their relation to key risk factors for SARS-CoV-2 disease and mortality.
Methods: Electronic medical records for COVID-19 patients admitted to LAC+USC Medical Center were manually reviewed to record demographic, clinical, and laboratory variables at presentation and outcome of in-hospital mortality. Patients' zip codes were then correlated to socioeconomic characteristics based on data collected by the United States Postal Service and Census Bureau. We recorded a zip code's median household income, population density, percent white residents, percent residents with no earnings, percent residents who use public transportation, and percent adults over 25 years old without a high school diploma. Significant predictors of mortality were determined using Student's t-test with Bonferroni correction for multiple comparisons, and Pearson's rho to assess for correlation among predictors.
Results: We analyzed 357 COVID-19 patients who were alive at discharge and 166 COVID-19 patients who died during hospitalization. The only variable that was clearly significant was population density ($p=0.003$). Percentage of residents who use public transportation, percentage of white residents, and median household income trended towards significance, but did not meet threshold.
Conclusions: From our analysis, we can conclude that the population density of a patient's zip code is highly correlated with their risk for in-hospital mortality. We theorize that this may be due to increased viral load inoculation which is associated with more severe disease. Percentage of residents who use public transportation, percentage of white residents, and median household income likely have added predictive value but do not meet significance with the sample size collected to date.

Patient Education for Hospitalized Type 2 Diabetes and Heart Failure Patients

Emma Longo, Medical Student, Dr. Alex Rosenberg, Department of Hospital Medicine, LAC+USC

Background: In the US, 60% of adults have at least one chronic condition (such as heart disease, hypertension, and diabetes) and 42% have more than one. Chronic disease is the leading cause of death and disability and accounts for 90% of annual healthcare spending.[1] Studies have shown that patient education interventions can improve outcomes in patients with chronic heart failure (CHF).[2] Additional studies have demonstrated that educational videos are effective at improving patient-reported confidence levels.[3]

Methods: Patients who were admitted to LAC+USC with a complication related to T2DM or CHF were screened for eligibility. 47 patients were randomized to the intervention group (n=25) or control group (n=22). The intervention group watched a video about their chronic condition followed by a comprehension quiz and a survey. The control group completed a comprehension quiz and a survey. Health confidence levels were assessed using two validated tools. Quiz scores, patient satisfaction, and education level were also collected.

Results: The average confidence score was significantly higher in the intervention group as compared to the control group (p=0.009). The difference in reported confidence between control group and intervention group was highest in the group with lowest education level (middle school or lower).

Conclusion: Results from our ongoing study will be used to inform future patient education and quality improvement initiatives at LAC+USC. Opportunities for expansion include hypertension, cirrhosis, and chronic kidney disease.

References:

1. Buttorff, Christine, Teague Ruder, and Melissa Bauman, Multiple Chronic Conditions in the United States. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/tools/TL221.html.
2. Krumholz HM, Amatruda J, Smith GL, et al. Randomized trial of an education and support intervention to prevent readmission of patients with heart failure. Journal of the American College of Cardiology. 2002;39:83–9. 10.1016/S0735-1097(01)01699-0.
3. Gagliano ME. A literature review on the efficacy of video in patient education. J Med Educ. 1988 Oct;63(10):785-92. doi: 10.1097/00001888-198810000-00006. PMID: 3050102.

Human Milk SARS-CoV-2 Antibodies Up To 6 Months After Vaccination

Stephanie E. Perez, BS, **Luis Diego Luna Centeno, BA**, Wesley A. Cheng, BS, Carolyn Jennifer Marentes Ruiz, MD, Yesun Lee, PhD, Zion Congrave-Wilson, MS, Rebecca L. Powell, PhD, Lisa Stellwagen, MD, Pia S. Pannaraj, MD, MPH

Background: SARS-CoV-2–specific antibodies have been detected in human milk up to 6 weeks post-COVID-19 vaccination. We evaluated SARS-CoV-2-specific antibodies, neutralization activity, effect of pasteurization, and persistence through 6 months post-vaccination.

Methods: This prospective longitudinal study enrolled 30 pregnant or lactating women. SARS CoV-2 antibodies and neutralization capacity were analyzed using an enzyme-linked immunosorbent assay compared at pre-vaccination, 1-, 3-, and 6-months post-vaccination, and through Holder pasteurization.

Results: Peaking at 1-month post-vaccination, SARS-CoV-2-specific IgG levels in milk persisted above pre-vaccination levels for at least 6 months (P = .005). 1-month and 3-month post-vaccination SARS-CoV-2-specific IgA levels were similar to baseline (P <.001) but waned by 6 months (P = .07). SARS-CoV-2-specific IgG and IgA in milk correlated with serum IgG (R^2 = 0.37, P < .001 and R^2 = 0.19, P < .001). Neutralization activity was seen in 83.3%, 70.4%, and 25.0% of samples at 1-, 3-, and 6-months post-vaccination. Neutralization correlated with SARS-CoV-2-specific IgM (R^2 = 0.20, P < .001), IgG (R^2 = 0.57, P < .001), and IgA (R^2 = 0.10, P = .008). Pre- and post-pasteurization samples showed similar IgG (0.84 vs 1.07, P = .36) and neutralizing activity (57.7% vs 58.7% inhibition, P = .27), but significantly lower IgM and IgA levels post-pasteurization (0.09 vs 0.06, P = .004 and 0.21 vs 0.18, P = .043).
Conclusions: The data suggest that milk SARS-CoV-2-specific antibodies may be available to milk-fed infants up to 6 months post-maternal vaccination. Additionally, donor milk from vaccinated mothers retain IgG and neutralizing activity.

P Wave Duration as a Marker of Atrial Fibrillation Recurrence Post Catheter Ablation
Matthew Mendoza; Justin Devera, MD; Wilson Kwan, MD; Junaid Zaman, MD, Ph

Background: Abnormal P wave duration (PWD) on surface electrocardiogram (EKG) has been associated with an increased risk of atrial fibrillation (AF) recurrence post catheter ablation (CA). Type of AF, left atrial (LA) size, LA scar, structural heart disease, left ventricular dysfunction, hypertension (HTN), obesity, and obstructive sleep apnea have also been implicated with an increased risk of AF recurrence.
Objective: To assess the association of PWD with AF recurrence post CA, LA scar, LA volume, and clinical factors.
Methods: A retrospective analysis of 117 patients who underwent CA for AF at our institution was performed. A 3 beat average of PWD was calculated using the Cardio Calipers program on pre and post day of CA sinus rhythm 12-lead EKGs in leads II and V1. Patients with AF, paced rhythms, and low voltage were excluded. Low-voltage areas (LVAs) with bipolar amplitudes <0.10mV representing LA scar were independently measured from electroanatomic voltage maps using the CARTO3 system. Association between PWD in lead II of pre-CA EKG (n=53), lead V1 of pre-CA EKG (n=51), lead II of post-CA EKG (n=93), lead V1 of post-CA EKG (n=90) and AF recurrence (defined as AF relapse greater than 3 months post-CA) was evaluated using logistic/linear regression and Chi-squared tests/ANOVA. Associations between PWD in leads II and V1 of pre-CA EKG and clinical factors were determined similarly.
Results: PWD in lead V1 of pre-CA EKG (mean 115 ± 19 ms, p=0.0097) is significantly associated with AF recurrence. PWD in leads II and V1 of pre-CA EKG are correlated with ablation time (p= 0.0044 and 0.0087). PWD in lead V1 of pre-CA EKG is correlated with HTN (p=0.0099) and diabetes mellitus (DM) (p=0.04). PWD in leads II and V1 of pre-CA EKG is not associated with LA scar or LA volume.
Conclusion:
PWD in lead V1 of pre-CA EKG is significantly associated with AF recurrence, HTN, and DM. Whilst PWD is correlated with ablation time, it is not associated with LA scar or LA volume. Further analysis will address interobserver variability.

Transthyretin Amyloid may have a Protective Effect for Rejection after Heart Transplantation

Adriana Shen BS (Medical student), Tahli Singer-Englar BS, Jon Kobashigawa MD

Background: Transthyretin (TTR) amyloid is an infiltrative disease process that can involve the heart, among other organs. Performing heart transplantation (HTx) is the treatment plan of choice for end-stage heart disease, however patients with late-stage amyloid cardiomyopathy have historically had poorer outcomes. Given recent therapeutic advancements in TTR amyloid management, more heart transplants have been performed for TTR patients, which we hypothesize will have comparable outcomes to patients transplanted for other indications in the last few years. Therefore, we sought to assess post-transplant outcomes in TTR amyloid patients in the current era.

Methods: Between 2010 and 2017, we assessed 27 patients with TTR amyloid who underwent HTx. Patients were compared to a contemporaneous control cohort, case-matched by age and gender. 3-year survival, freedom from cardiac allograft vasculopathy (CAV, stenosis ≥30%), and freedom from non-fatal major adverse cardiac event (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke), and 1-year freedom from rejection episodes were assessed.

Results: Recipient age and gender, pre-transplant sensitization, use of ATG induction, prior mechanical circulatory support, crossmatching of donor specific antibodies were similar between the TTR amyloid group and control group. The TTR amyloid group compared to the control group had significantly less antibody-mediated rejection episodes (100% vs 81.5%, p=0.021). 3-year survival, freedom from CAV, and freedom from NF-MACE were no different between the two groups.

Conclusion: TTR amyloid appears to potentially have a protective effect following heart transplantation, reducing the occurrence of antibody-mediated rejection compared to non-TTR amyloid patients. However, larger studies are needed to confirm these findings.

Endpoint	TTR Amyloid (n=27)	Control (n=27)	P-value
3-year survival	85.2%	81.5%	0.737
3-year freedom from CAV	81.5%	88.9%	0.398
3-year freedom from NF-MACE	70.4%	85.2%	0.160
1-year freedom from ATR	100.0%	77.8%	**0.011**
1-year freedom from ACR	100.0%	92.6%	0.161
1-year freedom from AMR	100.0%	81.5%	**0.021**

Parental Perceptions of Anti-Obesity Medication Use in Youth with Obesity Seeking Treatment

Julia Smith, B.A.,[1] Monica Naguib, M.D.,[2] Victoria Goldman, M.D.,[3] Elizabeth Hegedus, B.S.,[2] Lilith Moss, Ph.D.,[4] and Alaina P. Vidmar, M.D.[2]

[1]*Keck School of Medicine University of Southern California*
[2]*Diabetes & Obesity Program, Center for Endocrinology, Diabetes and Metabolism, Department of Pediatrics, Children's Hospital Los Angeles and Keck School of Medicine of USC, Los Angeles, CA.*
[3]*Department of Pediatrics, Children's Hospital Los Angeles and Keck School of Medicine of USC, Los Angeles, CA.*
[4]*Clinical Science Trial Institute Biostatistics Core, Saban Research Institute, Children's Hospital Los Angeles, Los Angeles, CA.*

Background: With the rising prevalence of pediatric obesity, more providers are utilizing medications for obesity treatment alongside lifestyle modifications programs. However, little is known about parental perceptions of pharmacotherapy use in youth with obesity. The current study aims to explore parental views on the medication use for obesity treatment in youth referred to a tertiary care multi-disciplinary weight management program.
Methods: This study sought to examine parental perceptions of medication use for obesity treatment in 115 children and adolescents (mean age = 16 years, 46.8% female, 68.8% Hispanic/Latino) with body mass index (BMI) $\geq 95^{th}$ percentile who attended a tertiary care, multi-disciplinary, weight management program. One parent or guardian completed a 14-item REDCap survey. Demographic, anthropometric, and medical data were extracted from the medical record for all responders.
Results: Results indicate that 74% of parents surveyed had heard of medications to treat obesity, and 48% had heard of the use of medications to treat obesity in children. Three-quarter of parents were open to the possibility of medication use for obesity treatment, although generally viewed nutrition and exercise more favorably than medications to treat obesity; when asked to choose the best ways to help their child achieve a healthy weight, 84% chose nutrition, and 91% chose exercise, compared to 52% who chose medications. Results regarding associations between youths' demographics, severity of obesity, or family history of obesity related co-morbidities are forthcoming.
Conclusion: These results highlight the importance of assessing parental perception of medication use for obesity treatment and educating families about the role of medication in the management of youth living with obesity.

Determinants of COVID-19 Severity: The Impact of Comorbidities on COVID-19 Morbidity and Mortality

Scotti Smith, BS; Christina Vu, DO; Brianna Rogan, DO, MPH; Austin Lee, BS; Vanya Vojvodic, BS; Trevor Pickering, MS; Ryan Chen, BS; Laura Kobashigawa, MD; Paul Holtom, MD; Noah Wald-Dickler, MD; Saahir Khan, MD, PhD, Department of Infectious Disease, KSOM

Goal: COVID-19 has a variety of presentations amongst the population, with some groups having higher rates of disease morbidity and mortality than others. Previous studies looking at comorbidities and COVID have found positive associations with disease severity and outcomes. To better protect our patients and understand the impact that COVID has amongst different subpopulations, it is important to further look at how different comorbidities affect COVID-19 morbidity and mortality.
Methods: Data collection consisted of chart reviews of COVID-19 patients at LAC+USC from March 2020 until present, including mortalities. Data included information on patients' chief complaints, demographics, pre-existing conditions, lab values, medications, and hospital course. A Chi Square test was used to determine significant predictors of morbidity and mortality, and Pearson's rho was used to assess correlation between comorbidities.
Results: Presentation with either diabetes mellitus ($p=.000015$) or hypertension ($p<.00001$) were statistically significant predictors of COVID-19 morbidity and mortality. COVID-19 patients with hypertension experienced higher rates of supplemental oxygen requirements (OR: 2.55) and mortality (OR:1.56). Patient's presenting with diabetes mellitus were also more likely to require oxygen supplementation (OR:1.45) and had a higher chance of mortality (OR:1.68) than those presenting without. Pre-existing coronary artery disease was not statistically significant ($p=.5149$).
Conclusion: Presentation with pre-existing hypertension or diabetes were associated with more severe infection and higher risk of mortality, further supporting past studies that suggest these comorbidities as predictors of disease morbidity and mortality. Future research will continue to

explore the connection between these and other potential predictors of COVID-19 morbidity and mortality within the LAC+USC patient population.

Assessing the Relationship Between Number of Comorbidities and COVID-19 Infection Severity for Liver Transplant Candidates at Keck Hospital of USC

Varsha Srinivasa (Medical Student), Emily Blodget, MD (Advisor)

Goal: The general level of severity of COVID-19 infection in liver transplant waitlist patients remains unclear. I predict that patients with a greater number of comorbidities are more likely to have severe complications from COVID-19 infection (hospitalization, COVID-19 pneumonia on imaging, accelerated decompensation, etc.).
Methods: Chart review was performed to identify the number of comorbidities at the time of COVID-19 infection and the number of serious complications (hospitalization, COVID-19 pneumonia, decompensation of liver disease, death, etc.) for all Keck patients on the liver transplant waitlist who tested positive for COVID-19. Pearson coefficient was calculated to determine the strength of the association between comorbidity number and number of serious COVID-19 complications.
Results: 16 charts were reviewed (N = 16). The Pearson coefficient (r) was ~ 0.356, indicating a weak positive correlation between the two variables (p = 0.176). Given the p-value, however, the r-value is not statistically significant. The most common comorbidities were sequelae of end stage liver disease (e.g. hepatic encephalopathy, bleeding varices) and cardiovascular disease. Further discussion of the comorbidities stratified by patient outcome will be provided.
Conclusions: Although a positive r-value was calculated, there is no statistically significant positive correlation between the number of comorbidities and the number of severe COVID-19 complications in liver transplant waitlist patients who tested positive for COVID-19 (p-value > 0.05). Further studies with additional patients may provide more conclusive evidence on this topic.

Examining the Effect of COVID-19 Infection on Pancreatic Beta Cell Function

Nikolas Victoria

Background: Two years into the COVID-19 pandemic, the SARS-CoV-2 coronavirus has been implicated the development and/or exacerbation of various pathologies throughout the body. Some clinical observations and publications have found an increased incidence of new onset diabetes in patients who suffered from COVID-19 infection. However, the potential role of SARS-CoV-2 in the pancreatic function and disease is still unknown. Studies during the previous coronavirus epidemic found that coronavirus infection was associated with the development of hyperglycemia and diabetes, but the mechanism of this association is not well defined. Since then, new assays have been developed to more specifically detect damage to pancreatic beta cells. One such assay tests blood samples for unmethylated cell-free (ucf-) insulin DNA as a biomarker for beta cell damage.
Methods and Results: In the present study, adult patients from the Keck and Los Angeles County Hospitals at the University of Southern California who were enrolled in the USC COVID-19 biorepository study had blood samples evaluated for the levels of ucf-insulin DNA. Patients were categorized into four cohorts based on glycemia status (euglycemic vs hyperglycemic) during hospitalization and COVID-19 infection status (positive vs negative). We hypothesize that COVID-19 infection causes direct damage to pancreatic beta cells, and thus levels of ucf-insulin DNA in patients who were hyperglycemic and COVID-19 positive would demonstrate the

highest levels of ucf-insulin DNA. The results from this study will help provide evidence as to whether or not observations of increased new onset diabetes in COVID-19 infected patients can be attributed to direct damage to beta cells by SARS-CoV-2.

Baseline Laboratory Predictors of COVID-19 Disease Severity and Mortality at a County Hospital

Vanya Vojvodic, BS; Christina Vu, DO; Brianna Rogan, DO, MPH; Austin Lee, BS; Scotti Smith, BS; Trevor Pickering, MS; Ryan Chen, BS; Laura Kobashigawa, MD; Paul Holtom, MD; Noah Wald-Dickler, MD; Saahir Khan, MD, PhD

Background: Varied COVID-19 patient presentations and disease outcomes have greatly burdened our healthcare system, prompting interest in exploring prognostic indicators for disease severity. Prior studies have explored predictive risk capability for post-ICU admission COVID-19 outcomes. Results have yielded uncertainty over the prognostic value of labs such as patient neutrophil:lymphocyte ratio, WBC, hemoglobin count, and blood clot testing, so continued research is needed, especially within the context of hospital systems that care for broader, underserved patient populations.
Methods: A retrospective chart review was conducted using electronic medical records for COVID-19 patients admitted to LAC+USC starting from March 2020 onward. Records were manually reviewed for lab variables collected within 48 hours of admission, including WBC, hemoglobin count, absolute neutrophil count (ANC), absolute lymphocyte count (ALC), platelet count, INR, and PT values. Disease outcomes regarding need for ICU admission, mechanical ventilation, and patient mortality were reviewed.
Results: Chart reviews were conducted for 395 patients admitted for COVID-19; 253 patients were alive at discharge. Both patient ICU admission and need for mechanical ventilation was predicted by increased WBC, ANC, INR, and PT, as well as by decreased hemoglobin count and ALC ($p < 0.007$). Platelet count was not a significant predictor of ICU admission nor mechanical ventilation. In regards to patient mortality, all variables except platelet count and ALC were significant predictors of mortality ($p < 0.007$).
Conclusions: These results suggest significant prognostic value in presenting COVID-19 patient lab values, specifically WBC, hemoglobin count, ANC, ALC, INR and PT values. This serves to inform clinical decision-making and triaging of limited hospital resources, such as ICU beds and ventilators, during increased periods of hospitalization throughout the pandemic.

Do Educational Videos about Congestive Heart Failure Improve Outcomes for Hospitalized Patients?

Thomas Webb, Alex Rosenberg, MD, Emma Longo, Ketetha Olengue, MD, Carlos Buitrago, MD

Background: Video-based patient education can be an effective means of improving patient knowledge in both high and low health literacy groups. Many patients hospitalized with CHF or Type 2 DM don't fully understand their medications, or when to follow up again with their doctor. Educational videos can bridge some of those gaps in knowledge amongst English and Spanish speaking patients. We aim to determine if showing patients educational videos about their chronic disease will improve their health literacy, and we will gather information about patient technology use for future patient education development.
Methods: This is a single-center, prospective randomized control trial study utilizing educational videos for English and Spanish-speaking patients who are hospitalized for CHF or T2DM at LAC+USC Medical Center. Patients are randomized, half are shown an educational video,

approx. 4-5 minutes long, and then given a multiple choice quiz. The other group of patients are kept as a control group, they are given the quiz without watching the video. Patient charts are monitored for their 30/60/90/180-day hospital readmission rates.
Results: 47 patients are currently enrolled, and patient enrollment is ongoing. As we continue to gather more information on readmission and hospitalization. We will compare test scores between the 2 groups, as well as assess technology use and familiarity. We will look at the readmission rate between the two groups, and the mean number of days between hospitalizations.
Conclusions: Patients have responded positively to the videos, stating that they found them informative and useful. We hope this will translate into a measurable difference in both quiz scores and health outcomes. Next steps are to continue enrolling patients and improve the study's power to see if those changes in outcomes are statistically significant. The technology use survey questions will provide useful information about how to develop the program further, to best serve the patients at LAC+USC.

The Impacts of a High Deductible Health Plan on Healthcare Access for Racial and Ethnic Minorities

Danielle Wishart BA, Cameron Kaplan PhD, Sonali Saluja MD MPH, Danny McCormick MD MPH

Background: High deductible health plans (HDHP) are defined as insurance plans that have a deductible greater than or equal to $1400 for an individual or $2800 for a family. Those with a HDHP are more likely to have delayed or forgone care, greater out of pocket expenditures, and more barriers in access to care. Our objective is to determine if there are disparities in access to care amongst different racial and ethnic minority adults enrolled in a HDHP.
Methods: Data collected from the 2015-2018 National Health Interview Survey (NHIS) was used to identify privately insured adults aged 18 to 64 years of age. Individuals were grouped into cohorts based on if they were enrolled in a HDHP and/or a health savings account (HSA). Descriptive statistics were used to evaluate the association between racial and ethnic minority individuals enrolled in a HDHP and barriers in access to care.
Results: A total of 111,006 individuals met the inclusion criteria for the study. Of that, 59% were enrolled in a non-HDHP (n=65,140), 25% were enrolled in a HDHP alone (n=27,894), and 16% (n=17,972) were enrolled in a HDHP with an HSA. Across all racial and ethnic groups, those enrolled in a HDHP were more likely to avoid care due to cost, not be able to afford specialist care, experience cost-related medication non-adherence, and be very worried about being able to pay future medical cost due to a serious illness or accident when compared to those on a non-HDHP. In addition, of those enrolled in a HDHP, there was a higher percentage of non-Hispanic Black (NHB) and Hispanic individuals when compared to non-Hispanic White (NHW) individuals who avoided care due to cost (6.20%, 6.03%, 5.57% for NHB, Hispanic, and NHW, respectively), could not afford specialist care (5.63%, 5.22%, 4.33% for NHB, Hispanic, and NHW, respectively), experience cost related medication non-adherence (18.50%, 15.00%, 13.30% for NHB, Hispanic, and NHW, respectively), and be worried about paying future medical cost due to serious illness or accident (22.60%, 25.40%, 18.90% for NHB, Hispanic, and NHW, respectively).
Conclusion: Individuals enrolled in a HDHP are more likely to avoid care due to cost, not be able to afford specialist care, experience cost related medication non-adherence, and be worried about being able to pay future medical costs when compared to those on a non-HDHP. Those barriers in access to care are further exacerbated for individuals who are NHB and Hispanic when compared to NHW on the same health care plan.

MEDICAL EDUCATION

The Impact of Socioeconomic Status on Medical Student Perceptions of Success and Satisfaction

Kenton Sakurai B.S., Stephanie Zia M.D.

Goal: Literature has clearly documented the increased risk of poor outcomes in individuals who grew up with low socioeconomic status (SES) backgrounds. This study is focused on assessing factors that combat that increased risk of poor outcomes in low SES medical students and exploring the differences in perceptions of success and satisfaction among students from different SES backgrounds.

Methods: In this prospective cross-sectional study, medical students from Keck School of Medicine (KSOM) will be surveyed to assess their paradigm of success, SES, satisfaction, and factors they believe led to or impeded their success. Paradigms of success will be sorted into categories of success as described by Dr. Laura Nash in the Harvard Business Review. This will also be used as the basis for assessing satisfaction. SES will be measured based on *Best Practices in Conceptualizing and Measuring Social Class in Psychological Research.* Frequencies of each factor perceived to contribute to or detract from success will be compared between groups.

Results: We expect to find that there will be more variability in the factors attributed to success in those from high SES backgrounds. Additionally, I expect this study to reaffirm Dr. Nash's finding that satisfaction is correlated with a holistic view of success rather than a singular focus for success. Lastly, I expect the low SES group to have a lower frequency of holistic views of success than the high SES group.

Conclusions: The data from this study gives qualitative insight into anecdotal evidence from highly successful individuals. Moving forward, studies working to assess this model for conceptualizing guidelines for helping low SES groups in other populations should be explored. Additionally, assessing how different clinical interventions improve satisfaction and rates of higher achievement based on this data will guide clinician recommendations.

NEUROLOGICAL SURGERY

Relationship Between Postoperative Opioid Use on Incidence of Emesis and Cerebrospinal Fluid Leak Following Endoscopic Endonasal Tumor Resection

Justin Chan BS[1], Joshua Lopez BA[1], Dhiraj J Pangal BS[1], Bozena B Wrobel MD[2], Elisabeth H Ference MD[2], Jacob Ruzevick MD[1], Gabriel Zada MD[1]

[1] USC Department of Neurosurgery, Keck School of Medicine of the University of Southern California, Los Angeles, CA
[2] Caruso Department of Otolaryngology-Head and Neck Surgery, Keck School of Medicine of the University of Southern California, Los Angeles, CA

Background: Cerebrospinal fluid (CSF) leaks following endoscopic endonasal approaches (EEA) are not uncommon and can have significant neurologic sequalae in patients. A well-known side effect of opioids is emesis, and increases in intracranial pressure can drive postoperative CSF leak. However, it is unknown whether emesis due to opioid use in the postoperative period is associated with postoperative CSF leak.
Methods: A retrospective chart review of patients from our institution who underwent EEA between 2017 and 2021 was conducted. Data on length of stay, opioid consumption (morphine milligram equivalents of morphine and/or hydrocodone with acetaminophen), emesis frequency, and intraoperative/postoperative CSF leak were collected. Analyses of patients split by the presence (or absence) of emesis or of postoperative CSF leak were conducted. Subgroup analyses were also performed among patients with intraoperative CSF leak and patients whose surgeries were extended approaches.
Results: Our analyses included 285 patients: 66 (23.2%) had emesis, and 16 (5.6%) had postoperative CSF leaks. Patients who experienced any emesis during their hospital stay had a higher daily average opioid consumption than patients without emesis (12.1 mg vs. 7.3 mg, $p < 0.001$). The emesis cohort also had a significantly higher proportion of postoperative CSF leaks (13.6% vs. 3.2%, $p = 0.003$). The relationship between daily maximum opioid consumption and postoperative CSF leak directly was statistically significant (24.3 mg vs. 15.1 mg, $p = 0.022$).
Conclusion: In univariate analysis, we demonstrate a relationship between opioid consumption and increased rates of emesis, and found that those with emesis have greater than expected CSF leak rates. Switching away from opioids as analgesics following EEA in clinical practice may reduce CSF complications, however large, prospective, randomized trials are required to further elucidate this relationship.

Characterizing the molecular and clinical landscape of glioblastoma multiforme

Alexandra Demetriou, BS, MA; Frances Chow, MD; Suhn K. Rhie, PhD; David R. Craig, PhD; Gabriel Zada, MD, MS

Goal: Glioblastoma multiforme (GBM) is the most common and deadly adult primary brain tumor with a median survival of 15 months, and the treatment landscape for GBM has seen little improvement in decades. However, recent advances in genomic & transcriptomic analysis technologies have ushered in a new era of understanding cancer on a molecular level to elucidate novel aspects of tumor dynamics and therapeutic responses. By leveraging previously unanalyzed GBM data from the Oncology Research Information Exchange Network (ORIEN) database, our study aims to further characterize the genomic, transcriptomic & treatment landscapes of GBM to identify trends that may hold therapeutic & prognostic value.
Methods: Assessment of the ORIEN database has revealed 241 GBM tumor samples with corresponding whole-exome sequencing and mRNA expression (RNA Seq V2 RSEM) data from a total of 149 GBM patients, as well as germline DNA sequencing data for 127 of those patients. Data analysis is underway with the goal of identifying molecular signatures that correlate with

characteristics such as age at diagnosis, overall survival, & response to therapeutic modalities including chemotherapy, radiation, and immunotherapy. Statistical significance is evaluated using the one-sided Fisher Exact Test and p-values are corrected for false discovery rate via the Benjamini-Hochberg procedure.
Results: Preliminary analysis has revealed relationships between mutational landscape, gene expression patterns and clinical features such as overall survival that warrant further investigation.
Conclusions: Characterization of the ORIEN GBM cohort represents an opportunity to both identify novel molecular relationships in GBM and further characterize established trends that aid in prognostication and therapeutic stratification of patients. Moreover, the ORIEN dataset is rich with clinical data elements for each patient and therefore holds the potential to bridge gaps between current molecular & clinical understandings of GBM.

Effects of Green Tea Polyphenols on Neuron Axonal Growth Inhibitor Nogo-A

Brandon Ge

Background: Stroke is a major cause of death and disability, and there are limited treatments for improving recovery. Successful chronic stroke therapy requires neural recovery by bypassing axonal growth inhibitors such as Nogo-A. Green tea polyphenols, such as epigallocatechin-3-gallate (EGCG), may signal pathways that internalize Nogo-A receptors. Our hypothesis is that EGCG will mediate the reduction of Nogo-A receptors and promoting axonal recovery. Understanding this mechanism may be beneficial for developing future chronic stroke therapy.
Method: This study used the mouse model of middle cerebral artery occlusion (MCAO) to mimic stroke and involved 60 mice. On post-op day 7, the mice were randomized into four cohorts (1. MCAO w/ water; 2. MCAO w/ EGCG in water; 3. Sham w/ water; 4. Sham w/ EGCG in water). EGCG concentration was controlled at 3 mg/kg. After three treatment days (post-op day 10), mice were euthanized and coronal sections taken for immunofluorescence staining, western blotting, and biochemical assays for target receptors, coreceptors, neural protein markers, and signaling proteins involved in Nogo-A.
Results: The study is ongoing and no findings have been made as of this time. We expect to see a reduction in Nogo-A receptors and their related signaling pathway markers. These findings would indicate EGCG treatment reduces Nogo-A inhibition. In addition, we expect to see an increase in growth-associated proteins and neural synaptic plasticity markers. These would indicate improved axonal growth and possible function neural recovery.
Conclusion: These findings would demonstrate a beneficial mechanism of improving neural recovery in chronic stroke.

Amygdaloid Gamma Power Modulation in the Presence of Response Uncertainty

Zachary D. Gilbert, BS; Roberto Martin Del Campo-Vera, PhD; Jonathan Cavaleri, MD; Austin M. Tang, MPH; Emiliano Tabarsi, BA; Kuang-Hsuan Chen, PhD; Rinu Sebastian, MS; Angad S. Gogia, BS; George Nune, MD; Charles Y. Liu, MD, PhD; Spencer Kellis, PhD; Brian Lee, MD, PhD

Background: Although classically known for its role in emotional processing, the amygdala is also relevant in motor processing. Increases in the gamma frequency band (30-200 Hz) have been observed concurrently with motor activity during simple execution. However, underlying neural mechanisms of amygdaloid motor inhibition are not well-understood. This study aimed to

characterize the amygdaloid gamma frequency band during motor task uncertainty and motor inhibition.
Methods: Patients with refractory epilepsy underwent implantation of depth electrodes for stereo electroencephalographic (SEEG) monitoring in the amygdala. After inclusion and exclusion criteria, seven participants were available for analysis. SEEG data were sampled throughout discrete phases of a Go/No-Go task. The Go/No-Go task requires participants to touch a target or inhibit movement based on a colored cue. Neural modulation over different frequency bands was assessed by observation of non-overlapping 95% confidence intervals for trial-averaged spectral power during the response phase in each condition.
Results: In five out of seven patients, high gamma band power increases were observed for participants performing the Go condition of the task. Spectral power confidence intervals during the Go condition increased compared to baseline, fixation, and No-Go phases of the task. During the No-Go condition, no statistically significant power changes in the gamma frequency band were observed when compared to baseline.
Conclusion: This study reports gamma-band modulation in the human amygdala during voluntary movement in the setting of task uncertainty. This finding confirms prior understanding pairing the amygdala and the gamma band in movement execution. The absence of gamma band modulation in motor inhibition suggests that the amygdala's previously identified role in inhibition is unlikely to be moderated by the gamma band. Further research is required to fully characterize amygdaloid motor control.

Clinical Relevance of Novel lncRNA, LH02236, in Glioblastoma Patients

Jane S. Han MS[1], Kathleen Tsung MS[1], Eddie Loh PhD[2], Li Ding MD MPH[3], Frank J. Attenello MS MD[1,4]

[1]*Department of Neurological Surgery, Keck School of Medicine, USC*
[2]*University of Southern California Libraries Bioinformatics Services, USC*
[3]*Department of Preventive Medicine, Keck School of Medicine, USC*
[4]*Department of Biochemistry and Molecular Medicine, Keck School of Medicine, USC*

Introduction: Glioblastoma (GBM) has a 15-month survival prognosis due to its invasive nature. While prior studies evaluating GBM invasion have evaluated coding genes, we sought to evaluate long noncoding RNAs (lncRNAs), a recently discovered class of genes, for their role in GBM invasion. We previously used a functional CRISPR interference (CRISPRi) screen to identify novel lncRNAs regulating GBM invasion *in vitro*. Knockdown (KD) of our primary lncRNA, LH02236, decreased GBM invasion in multiple cell lines. We hypothesized that high expression of LH02236 would be associated with more aggressive gliomas and decreased patient survival.
Methods: We obtained RNA-seq analysis of patient samples from TCGA's GBM (n=169) and lower grade glioma (LGG) (n=169) datasets and normal human brain cortex (control) from GTEx (n=104). Position coordinates were used to identify LH02236, with expression normalized to standardized genes on the same chromosome, to obtain counts per million (CPM) and differential expression (DE) values. We then performed a Kaplan-Meier (KM) survival analysis of all gliomas.
Results: LH02236 expression were higher in both GBM (3.37±2.79) and LGG (1.14±1.03) than normal brain cortex (0.67±0.60). There was a significant fold change of LH02236 expression in pairwise comparisons of tumors versus (vs) control (GBM vs control: 6.70, $p \leq 0.001$; LGG vs control 6.25, $p \leq 0.001$). For KM survival analysis of gliomas, groups were divided into high and low-risk (high-risk: $\geq$2.5 CPM; low-risk: <2.5 CPM). Survival was significantly increased in the

low-risk group (p<0.0001). When CPM is <2.5, the hazard ratio (HR) is 1.99 per 1 CPM increase.
Conclusion: LH02236 expression was increasingly expressed among tumors with more aggressive behavior and survival significantly decreased with increased expression. As our data also shows LH02236 KD decreases GBM invasion *in vitro*, LH02236 may represent a novel diagnostic and therapeutic clinical target.

Gamma Knife Radiosurgery for Pituitary Adenomas: A Systematic Review and Meta-Analysis

Abdulhaseeb Khan, Shane Sharestani, Gabriel Zada, Dept. of Neurosurgery, KSOM

Goal: Gamma knife radiosurgery is a widely used modality for the treatment of numerous intracranial tumors, including those of the Sella Turcica. The aim of this study is to systematically evaluate the efficacy, outcomes, and complications of gamma knife radiosurgery for pituitary adenomas. We hypothesize that gamma knife radiosurgery is an efficacious primary and secondary method for the treatment of various forms of pituitary adenomas, providing reliable tumor control rates and less postoperative complications.
Methods: We intend to perform a systematic review and meta analysis to examine the clinical outcomes of pituitary adenoma patients who underwent either primary or secondary gamma knife radiosurgery. Our search will be limited to relevant grey literature published in English, between the years 1960 to 2021. Studies reporting treatment of other benign tumors or use of other radiosurgical techniques will be excluded, in order to reduce heterogeneity, with no restriction on patient criteria. Tumor control, regression, and pituitary functionality will be primary outcomes examined via random-effects meta-analysis of proportions.
Results: Currently, our data collection is ongoing. In general, we expect to see better outcomes as a result of less invasive gamma knife radiosurgery as opposed to trans-sphenoidal resection as both a primary and secondary treatment modality. Of note, we strongly believe the use of gamma knife radiosurgery secondary to trans-sphenoidal resection will produce less chance of recurrence.
Summary: We believe this meta-analysis will provide strong evidence as to whether gamma knife radiosurgery truly is an beneficial and safe treatment modality for pituitary adenomas. Ultimately, a follow-up study utilizing randomized control trials may also be indicated to determine if gamma knife radiosurgery truly is a viable alternative to classical skull base tumor surgery.

Systematic Review of Genetic and Epigenetic Markers in Vestibular Schwannoma

Joshua Lopez BA, Jane S. Han MS, Dhiraj J Pangal BS, Mahmoud Hamza BS, Marisa Penn BS, Jacob Ruzevick MD, Ben Strickland, MD, John D Carmichael MD, Steven Giannotta, MD, Gabriel Zada MD MS

Background: Vestibular Schwannomas (VS) are benign tumors arising from Schwann cells surrounding the vestibular branch of the eighth cranial nerve. The goal is to investigate gene expression patterns and epigenetic profiles associated with VS patient characteristics, tumorigenesis, invasion, and recurrence.
Methods: A systematic review of PubMed and EMBASE databases between 1959 and 2019 was performed using PRISMA guidelines to identify genes and epigenetic patterns associated with the formation and/or progression of VS. Articles were included in the analysis if all cases in the series were sporadic VS, regardless of treatment or subtype.

Results: A total of 252 articles were found, of which 44 were included for full-text analysis. NF2 was the most studied gene mutation and was linked to the formation and/or progression of VS in 12 studies comprising 764 patient tumor samples. Two studies distinguished between the subtypes of VS (solid vs. cystic) found that NF2 mutations are more commonly found in solid tumors vs cystic tumors. Two studies found inactivation of the tumor suppressor gene p53 in younger patients with aggressive VS. Other tumor suppressor genes including RB as well as oncogenes such as ERBB2 (Her2/Neu) and proteins such as Osteonectin were implicated in VS pathogenesis. Changes in methylation patterns were identified as potential markers. One study showed that methylation of CASP8 was associated with age and tumor size. In eight studies, alterations in key signaling pathways linked to cancers, such as PI3K/AKT/mTOR were associated with genetic aberrations in tumor samples. Deregulation of several miRNA candidates in patient samples were found to be associated with tumorigenesis in six studies.
Conclusion: NF2 and p53 were the most well studied genetic mutations for VS and likely contribute to tumorigenesis. Epigenetic changes including miRNA, methylation and phosphorylation patterns may influence tumor growth, but evidence is limited, and further exploration is required.

Transcranial Magnetic Stimulation for Treatment Resistant Depression: Stratification of Efficacy and Response

Selam Mulugeta, Alexander T. Chen, Darrin Lee

Objective/Background: Transcranial magnetic stimulation (TMS) is a non-invasive, outpatient-based treatment that uses magnets to stimulate targeted brain regions. TMS has been FDA approved for treatment resistant depression since 2012. Peer-reviewed literature has shown that TMS is efficacious in treating symptoms of depression as an adjunct to antidepressants. However, there has not been robust studies evaluating the timing of the changes in outcome scores relative to the progression in the treatment course. We hypothesize that the adjunctive use of TMS in treatment resistant depression would result in a significant decrease of PHQ-9 scores by the end of treatment and improvements will continue to sustain through the maintenance phase of treatment.
Methods: We performed a retrospective chart review of patients that underwent adjunctive TMS for treatment resistant depression between 2020 and 2021 at the Keck Adult Psychiatry Clinic at HC2.These patients underwent an index treatment phase which consisted of a high frequency rTMS treatment sessions 5 days a week for 6 weeks. Additionally, patients underwent a 3-week maintenance phase post completion of index treatment. Patients' baseline Patient Health Questionnaire-9 (PHQ-9) was determined during week 1 of treatment and at least once more during treatment. Statistical analysis was performed. The outcome measures were change in PHQ-9 scores and responsiveness to treatment.
Results: Compared to baseline, TMS treatment significantly improved PHQ-9 scores (P = 0.0189, 95% CI = 1.648 to 13.227) by the end of the 4^{th} week of treatment and scores continued to improve to the completion of maintenance treatment.
Conclusion: This data demonstrates evidence that the adjunctive use of TMS in treatment resistant depression results in a significant decrease of PHQ-9 scores by the end of the 4^{th} week of treatment and improvements continued throughout the maintenance phase of treatment.

Virtual Delivery of an Occupational Therapy Model in Chronic Headache Management

Lucas Occhino BS, Sandhya Ravikumar MD, Malia Sako OTD, OTR/L

Background: As the second-leading cause of years lived with disability worldwide, chronic headache patients can greatly benefit from occupational therapy's focused approach on improving patient performance and experience of meaningful activities, deemed *occupations*. A previous evaluation of Lifestyle Redesign, USC's outpatient occupational therapy lifestyle and behavioral modification program, demonstrated significant improvements in occupation for chronic headache patients. However, Lifestyle Redesign has recently transitioned from being delivered in-person to virtually. Therefore, this study aims to determine if virtual delivery of Lifestyle Redesign produces significant improvement in occupation for chronic headache patients.

Methods: A retrospective chart review will be conducted amongst patients who began Lifestyle Redesign as part of their usual care for chronic headache, after the program's switch to virtual delivery, and who have completed a minimum of 4 sessions. Multiple validated clinical measures of occupation are tracked as the program progresses. Patients' initial and most recent results for the measures will be analyzed via T-Test (matched pairs). Additional stratification will be performed based on patients' age.

Results: It is expected that all occupational measures will show significant improvement, with no difference based on age stratification.

Conclusions: If results support the efficacy of virtual Lifestyle Redesign for chronic headache patients across age groups, further research could explore other differences between in-person and virtual delivery models of the Lifestyle Redesign such as cost effectiveness, attendance, and compliance. If results are not supportive, further review and/or adjustments to the current virtual delivery model may be warranted.

Transcranial Magnetic Stimulation (TMS) for Schizophrenia

Eduardo Santos (Medical Student), Darrin Lee (Neurological surgery; Principal Investigator)

Abstract: The study proposes using TMS as an adjunct tool in treating schizophrenia in addition to current standard medication treatment options. Using a systemized approach with measured TMS thresholds and primary, secondary and tertiary statistical analysis, negative symptoms of patients with schizophrenia may be improved. I believe that, with adjunct to anti-psychotics, transcranial magnetic stimulation will improve symptoms of patients with schizophrenia over the long-term post-treatment.

Methods: TMS will target dorsal lateral pre-frontal cortex at a pre-determined motor threshold with trains consisting of 40 pulses (10Hz) for 4 seconds, repeated 75 times, totaling 3000 pulses per treatment session. Sessions will be performed five days per week (Monday – Friday) for a total of 6 weeks. Primary outcome will be the change in symptom scale scores of the Positive and Negative Syndrome Scale (PANSS). Secondary and tertiary outcomes will be later described, including several cognitive and functional assessments as well as neurological imaging respective (i.e.. fMRI). Statistical analysis includes repeated measures ANOVA and student paired t-test to compare baseline data with each time point of data collection.

Results: Results still pending. However, the belief is that TMS benefits post treatment will persist during follow up as well as help contribute to elucidating the durability of treatment effects.

Conclusion: Results are pending, but this study is worthwhile because If more work is done to elucidate the validity and efficacy of this treatment option, more availability to TMS could possibly be made s a readily available alternate to classic pharmaceutical treatment of

schizophrenia. This special population could benefit from non-invasive, non-pharmaceutical treatment option that may enhance their results in adjunct with anti-psychotics.

Stereotactic Frame-Based Electrode Insertion: Orthogonal vs. Oblique Approach
Emiliano Tabarsi

Introduction: Stereotactic placement of electrodes is an increasingly popularized neurosurgical method for stimulation of deep brain structures. Clinical indications for this procedure include movement disorders, epileptogenic monitoring, and targeted structural ablation. Trained specialists plan electrode trajectory to avoid extraneous damage using three angular coordinates and insertion depth. However, proper burr hole placement is critical to accurate electrode insertion. Stereotactic electrode insertion can be performed either perpendicular to the tangent line of the cranial surface (i.e., orthogonal approach) or at a non-perpendicular angle (i.e., oblique approach). This study aims to investigate the relationship between the oblique electrode approach angle and the target point localization error (TPLE).
Methods: Stereotactic lead planning and implantation was performed in 13 patients with refractory epilepsy, with a total of 136 electrodes included in analysis. Planned target stereotactic coordinates were determined from pre-operative magnetic resonance imaging (MRI) scans merged with non-contrast computed tomography (CT) images, and implantation was carried out using a stereotactic frame. The achieved angles in the axial, coronal, and sagittal planes were determined from post-operative scans. The actual lead angles were then compared with the planned angles using Bland-Altman plots and logistic regression.
Results: Qualitative assessment of correlation plots between the planned and actual angles demonstrated a linear relationship for axial, coronal, and sagittal planes. No deflection point was found wherein increased angular deflection was noted. On linear regression, planning angle in the axial plane was found to be a statistically significant predictor of angular deflection (beta = 0.092, p = 0.01), as was the coronal planned angle (beta = 0.086, p = 0.001). Sagittal planned angle was not found to be a significant predictor of angular deflection (beta = 0.065, p = 0.10).
Conclusion: Qualitative assessment of measured versus planned angles did not show overt angular deflection for any magnitude of the planned angle, with the important exception that very high angles had scattered angular outliers. Linear regression showed a statistically significant effect that is likely clinically insignificant. As of this investigation, when using a stereotactic frame for deep brain electrode implantation, it is unlikely that accuracy of electrode placement is modulated by magnitude of the planning angle.

Theta-Burst Oscillation Paradigm for Deep Brain Stimulation in the Treatment of Motor and Cognitive Deficits in Idiopathic Parkinson's Disease
Kevin Wu, Wooseong Choi, Kaevon Brasfield, Darrin Lee MD, Department of Neurological Surgery, Keck Hospital of USC

Goal: Idiopathic Parkinson's disease (PD) is the second most common cause of dementia globally. Deep brain stimulation (DBS) offers a functional neurosurgery approach to the treatment of PD. However, much like the more common pharmacologic approaches, gamma-frequency DBS has thus far only been able to address the motor dysfunction seen in PD, but not the subsequent cognitive decline that significantly impacts quality of life in PD patients. Here, we propose a theta-burst DBS oscillation pattern for the treatment of both motor and cognitive deficits in PD.

Methods: We evaluated theta-burst DBS on two timescales: 2 weeks (short-term), and 24 weeks (long-term).
Short-term: 32 PD patients with DBS implants targeting the subthalamic nucleus (STN) bilaterally were recruited, randomized, and divided into two groups for a crossover study. For 5 consecutive days per week for a total of 2 weeks, one group underwent theta-burst DBS while the other underwent gamma DBS with crossover following the first week of treatment.
Long-term: Following the conclusion of the short-term study, randomization occurred once more with patients placed into either a gamma or theta-burst group. Treatment was administered for 3 months, followed by crossover, and the final 3 months of the opposing treatment.
Motor function was assessed using the MDS-UPDRS part 3. Cognitive function was assessed using the battery of Stroop, verbal fluency, trail-making, N-back, weather prediction, multistage adaptive learning, and ARM tests. Both motor and cognitive testing occurred at the conclusion of each treatment stage, with an additional motor testing for baseline motor function.
Results: *[Data collection in process]* Our hypothesis would be supported in the event that motor functions between gamma stimulation and theta-burst groups show no significant difference while cognitive functions show a significantly greater improvement in the theta-burst group over the gamma stimulation group. Additionally, we hope to find no health risks posed by theta-burst DBS; such absence would be consistent with previous studies supporting the safety of unilateral theta-burst in the STN of PD patients.
Conclusion: Should our hypothesis find support in our evidence, this study would endorse a phase 3 multicenter clinical trial for the application of theta-burst DBS in the treatment motor and cognitive decline in PD.

OBSTETRICS AND GYNECOLOGY

Examining the Perceived Diversity, Equity, and Inclusion Throughout Ob/Gyn Residency Programs in the United States Through Program Websites

Chelsea Baker, Sarah Herrman, Jamie Kim, Nicole Mitchell-Chadwick MD, Intira Sriprasert MD, PhD, Brian T. Nguyen MD, MSc, Department of Obstetrics and Gynecology, Keck School of Medicine of USC

Background: Increasing diversity is emerging as a priority for academic institutions as it relates to increasing provider representation, delivering equitable health care, and addressing disparities in medicine. In 2019, the Accreditation Council for Graduate Medical Education (ACGME) added a requirement for all training programs to engage in practices that focus on mission-driven, ongoing, systematic recruitment and retention of a diverse workforce of residents, fellows, and faculty members. Despite these requirements, the percentage of underrepresented in medicine (URiM) residents and attendings remains low and does not appear to be increasing over time.
Objective: Prior studies have shown that the perception of racial diversity is a positive influence on program ranking for URiM students. This study aims to evaluate the perception of diversity, equity and inclusion of each residency program through the eyes of prospective resident applicants and analyze how programs compare across the United States.
Methods: The websites of 296 registered US Ob/Gyn residency programs will be analyzed to assess two major components. The first component will be standard information of Ob/Gyn programs such as surgical numbers, residents per class, and fellowship exposure. The second component will be DEI focused factors, such as perceived gender and racial group, that evaluate the perceived diversity of faculty and residents.
Results: The data will be collected and analyzed to compare the standard and DEI factors across programs.
Conclusions: The expected results collected will show how well programs are implementing the ACGME's requirement of engaging in diversity. When students are searching for residency programs, the website is an important resource to determine if the school would be a good fit based on opportunities available, and perceived diversity.

It is expected that there will be a wide range of diversity within residency programs across the United States. Some residency programs will excel at their diversity and inclusion mission, but most will fall short, contributing to the consistently low percentage of URiM residents and attendings.

It is hoped that by elucidating this information, programs with lower levels of diversity will reevaluate their practices to align with the ACGME's goal to recruit and retain a diverse workforce of residents, fellows, and faculty members. It can also provide data for prospective residents, particularly those who are URiM, to choose an Ob/Gyn residency program where they would be most successful.

Black Men's Attitudes Towards Hormonal Male Contraception

Kayla Blair, Dr. Brian T. Nguyen, Section of Family Planning, Department of Obstetrics & Gynecology, KSOM

Background: Hormonal male contraception (HMC) is an effective, reversible contraceptive option that men can use to prevent an unintended pregnancy. While surveys worldwide generally show men's willingness to use HMC, such willingness may not translate to Black communities in America where contraceptive uptake is relatively low. The full impact of HMCs may not be realized without examining the attitudes of Black American men.
Methods: We partnered with Healthy African American Families Phase II to complete focus group discussions (FGDs) with Black men over the age of 18 from LA who reported being in

a current or past heterosexual relationship. FGDs consisted of open-ended questions about experiences with contraception and the influence of relationships on contraceptive use. The FGDs were audio-recorded and transcribed, with quotes analyzed according to the socioecological framework to characterize the influence of individual, relationship, community, and societal factors on willingness to use HMCs.
Results: Individual: Participants were interested in HMC because it is effective in preventing pregnancy and were disinterested due to potential side effects and concerns over reversibility. Relationship: Participants were interested in HMC to conceal a secondary relationship from a primary partner or to avoid feeling trapped in a casual sexual relationship. They were disinterested due to lack of protection against STDs. Community: Participants were interested in HMC to protect their families' finances and were disinterested due to peer judgement. Society: Participants were interested in HMC to break traditional gender roles and were disinterested due to distrust in medicine.
Conclusions: Factors beyond the individual influence Black men's HMC attitudes. Affecting the uptake of HMCs in the future will require a multidimensional approach that considers Black men's intimate and social relationships.

Attitudes Towards Reproductive Health in Asian Americans
Michelle Chen, Katrina Heyrana, MD/PhD, Clarissa Santiano, Brian Nguyen, MD/MSc
Department of Obstetrics and Gynecology at KSOM

Background: There is a lack of research on Asian-American populations and their experiences accessing and receiving care in reproductive health, and specifically, regarding access to and beliefs towards contraception and abortion services. As such, it is hard to construct evidence-based guidelines for providing culturally competent care or initiatives for targeting any potential health disparities. Given this, we conducted a systematic literature review analyzing factors involved in the utilization of contraception and abortion in Asian American communities, including attitudes regarding sexual and reproductive health, access, knowledge, and religious and/or cultural differences.
Methods: Literature searches were performed using PubMed, Cochrane Library, and Web of Science. Studies involving members of the Asian community assigned female at birth in the United States, aged 13 years old or older, and containing relevant search terms were analyzed further. We then analyzed common themes.
Results: There are key differences between the sexual education received by Caucasian women vs. Asian American women. Asian subjects also differ in approaches to communication about sexual activity and education with their partners, as well as with their parents.
Asian American females typically initiate sexual activity and intercourse at a later age than their peers, but this finding differs amongst Asian subgroups. Additionally, there are lower teen birth rates among Asians than other racial groups, as well as lower rates of STDs. However, Asian American women were less likely to use condoms both at first sexual experience and consistently in general.

Asian women tend to support abortion more than the general population, both as healthcare providers and as patients. They are also more likely to utilize genetic counseling and prenatal testing that could lead to the decision to terminate pregnancies. However, reasons to pursue abortions and beliefs about abortion differed among ethnic subgroups.
Summary/Conclusion: These findings illustrate that Asian American women have significant differences in sexual education, communication, and behaviors, as well as abortion and contraception attitudes and behaviors, when compared to other populations in the US. There was a lack in disaggregated data and research on differences witnessed across ethnic subgroups.

Perceived Diversity, Equity, and Inclusion Efforts Based on U.S. Ob/Gyn Residency Program Websites

Sarah Herrman, Chelsea Baker, Nicole Mitchell-Chadwick MD, Intira Sriprasert, MD, PhD, Brian T. Nguyen, MD, MSc, Dept. of Obstetrics and Gynecology, KSOM

Purpose: Increasing diversity is emerging as a priority for academic institutions as it relates to increasing provider representation, delivering equitable health care, and addressing disparities in medicine. In 2019, the ACGME added a requirement for all training programs to engage in practices that focus on mission-driven, ongoing, systematic recruitment and retention of a diverse workforce of residents, fellows, and faculty. Despite these requirements, the percentage of URiM residents and attendings remains low and does not appear to be increasing. This study aims to evaluate the perceived diversity, equity, and inclusion contribution of all Ob/Gyn residency programs in the United States as displayed through each institution's website. These programs will be evaluated through the eyes of prospective resident applicants and analyzed on how programs compare across the U.S.
Methods: The websites of all 296 registered U.S. Ob/Gyn residency programs will be analyzed for two components. The first will be standard information of Ob/Gyn programs such as surgical numbers, residents per class, and fellowship exposure. The second will be DEI focused factors evaluating the perceived diversity of faculty and residents.
Results: The results will elucidate the contribution of each Ob/Gyn residency program to the ACGME requirement. It is expected that a proportion of programs will lack messaging that aligns with this requirement, while others will show commitment in this area.
Conclusion: Prospective applicants often consider data on residency programs' websites in order to guide their decision-making when applying and ranking their preferred programs. Therefore, it is imperative that residency programs align their website messaging to relay their commitment to DEI efforts. This study can provide institutions with data on how they compare to other programs and can give applicants, particularly those who are URiM, data to consider when choosing an Ob/Gyn residency program.

Placental Isolation Methodology and Comparison Among New Learners

Jamie Kim, Amy Flowers, Margareta Pisarska

Goal: Direct CVS specimens are gathered early in gestation, at 10-13 weeks, and analyzed to determine genetic abnormalities. However, CVS samples may provide an even greater breadth of information, including gene expression and epigenetic changes that occur in trophoblasts during the first trimester, which may play crucial roles in pregnancy outcomes. But due to the small and precious nature of such specimens, their use has been historically limited to single platform testing. In response, the Pisarska Research Lab at Cedars-Sinai has developed an optimized placental isolation protocol that allows CVS and placental samples, as little as 2 mg, to be used for the isolation of DNA and RNA for multiple platform testing, including gene expression microarrays, RNA sequencing, and methylation profiling. This study aims to assess whether the optimization of this methodology has contributed to the ability of new learners to perform the extraction protocol uniformly well.
Methods: New learners (n=5) were asked to perform the placental isolation protocol on unique samples several times. Each learner performed the protocol once (n=1), twice (n=1), three times (n=1), or four times (n=2); on every occasion, each learned performed the protocol on 2 unique placental samples. The quality of the learners' final products was measured via Nanodrop and RNA Integrity Number.
Results: [Pending final results]
Conclusion: [Pending final results]

Bariatric Surgery and Maternal Obesity: A National Study of Cesarean Section Outcomes in the US

Lauren E. McCarthy, BA, BS; Rauvynne N. Sangara, MD; Rachel S. Mandelbaum, MD; Koji Matsuo, MD, PhD

Keck School of Medicine of USC; Department of Obstetrics and Gynecology, USC

Objective: To examine national trends, characteristics and perioperative outcomes related to cesarean section (CS) and body mass index (BMI) in patients with a history of bariatric surgery (BAS) in the United States.

Background: Women of reproductive age account for half of BAS procedures. The relationship between BAS, BMI and CS is unclear.

Methods: A population-based retrospective cohort study using the National Inpatient Sample. Study cohort consisted of women who underwent CS from 10/2015-12/2017 (*N*=2,697,657). Patients grouped by BMI into non-obese (<30 kg/m^2) class I-II obesity (30-39.9 kg/m^2) class III obesity (40-49.9 kg/m^2) and superobese ($\geq$50 kg/m^2). Exposure allocation was known history of BAS prior to CS (*n*=11,640). Main measured outcomes were comparative (*i*) patient demographics (*ii*) pregnancy characteristics and (*iii*) perioperative outcomes.

Results: 11,640 (0.43%) had prior BAS. Most frequent subgroup was non-obese (*n*=2,325,603, 86.2%) then class I-II obesity (*n*=177,945, 6.6%) class III obesity (*n*=146,345, 5.4%) and superobesity (*n*=47,765, 1.8%). In each BMI group <2% had BAS. BAS group mean age was older compared to non-BAS group in all body habitus groups (all, *P*<0.001). (*i*) patient demographics: gestational age, elective admission, comorbidity, tobacco use, race/ethnicity, income and insurance (*ii*) pregnancy characteristics: prior CS, multigestation pregnancy, breech presentation, gestational diabetes mellitus, hypertension and intrauterine growth restriction and (*iii*) perioperative outcomes: postpartum hemorrhage, hysterectomy, wound complication, pyelonephritis, oophorectomy, length of stay and total hospital charge differed across the subgroups based on body habitus and history of BAS (all, P<0.05).

Summary: In a multigroup comparison of women delivering via CS, patient characteristics, pregnancy outcome and surgical morbidity were significantly different based on the interaction between body habitus and known history of BAS.

Challenges in Prenatal Genetic Testing for Male Partners at LAC+USC

Michelle Nguyen, MD; **Andrew Truong**, BS; Genevieve Mazza, MD; Brian Nguyen, MD, MSc

Background: The American College of Obstetrics and Gynecology recommends partner genetic testing when pregnant patients present with positive carrier status for a genetic condition or risk of neonatal alloimmunization on routine prenatal testing. Despite this, literature indicates that less than half of paternal partners advised to obtain genetic testing actually do so, which necessitates invasive procedures such as amniocentesis to fully assess risk for conditions including but not limited to cystic fibrosis, spinal muscular atrophy, and hemolytic disease of the newborn. We seek to determine the proportion of reproductive partners with completion of indicated genetic testing at LAC+USC.

Methods: Retrospective chart review included patient visits to the Prenatal Genetics Clinic at LAC+USC from January 2017 to October 2021. Eligibility criteria were pregnant patients with positive red blood cell antibody screening, positive carrier screening, known genetic condition, or prior pregnancy with chromosomal abnormality. We searched eligible patients' electronic medical records to determine the proportion of partners who completed testing that they were advised to obtain. Age, relationship status, ancestry, primary language, insurance type, gestational age, and parity were noted for X^2 and Fisher's exact tests.

Results: 70 patients met eligibility criteria. Only 27% (n=19 of 70) of partners completed prenatal testing, once recommended. The data fail to establish significant differences between the partners who completed testing and those who did not, based on any of the noted demographic or pregnancy characteristics.
Conclusion: Reproductive partner testing is suboptimal at 27% of partners fulfilling tests recommended at the genetics clinic of LAC+USC from January 2017 to October 2021. More data are required to investigate challenges to paternal testing in order to eliminate obstacles to securing timely partner testing and avoid costly invasive diagnostics whenever possible.

Applicant Assessments of OB/GYN Residency DEI Initiatives on the Interview Trail
Susmitha Varghese BS, Brian T. Nguyen MD, Evelyn Mitchell MD, Savannah Kimball MD

Background: In the wake of the tragic murder of George Floyd, a Black American, by a white police officer, many American institutions began to reflect on the role that systemic racism has played in their work. Diversity, Equity, and Inclusion (DEI) efforts were adopted by many institutions, including hospitals and residency programs, to address existing disparities. Residency programs have increased their efforts to recruit a diverse workforce and advertise the DEI efforts they have put in place. Despite these efforts, little is known about how applicants view these DEI initiatives and what they are seeking regarding DEI.

The purpose of this study is to investigate which specific DEI initiatives residency applicants find valuable and “red flags” they identify throughout the recruitment process.
Methods: This is a qualitative research study based on 15 interviews with applicants to OB/GYN residency programs in the 2020-21 and 2021-22 cycles. Transcription, descriptive coding, and thematic analysis were conducted by three separate coders in an iterative process to determine applicant assessments of DEI along the interview trail.
Results: 15 participants were enrolled and 9 have been interviewed. Data collection is ongoing, but preliminary results suggest applicants highly value diversity in staff/residents, a definition of diversity that is not limited to race, community outreach to alleviate health disparities, and mentorship for underrepresented interviewees and residents. “Red flags” applicants identified were when programs mentioned DEI simply to “check a box”, did not spend enough time discussing DEI, and failed to follow through on stated initiatives.
Conclusion: OB/GYN residency applicants are looking to join programs with diverse residents and leadership, active community engagement, and a comprehensive definition of “diversity.” Applicants are reluctant to join programs that spend a limited amount of time discussing DEI and lack evidence that their initiatives are successful.

ONCOLOGY

Impact Of Sponsor on Advanced Non-Small Cell Lung Cancer Clinical Trial Enrollment Criteria

Ryan Cooper[1], Yan Chai[2], Jorge Nieva[3]

[1]*University of Southern California Keck School of Medicine, Los Angeles, CA, USA.*
[2] *Biostatistics Core, The Saban Research Institute and Southern California Clinical and Translational Science Institute, Children's Hospital Los Angeles, Los Angeles, CA, USA.*
[3]*University of Southern California/Norris Cancer Center, Los Angeles, CA, USA.*

Introduction: Clinical trials use inclusion and exclusion criteria to control for confounding variables in patient populations. Largely inspired by the ASCO-Friends of Cancer Research recommendation documents (2017 and 2021), there has been a recent drive to loosen clinical trial enrollment criteria to improve generalizability in trial outcomes. We sought to determine if the sponsor of a clinical trial impacted the transparency and selection of inclusion and exclusion criteria.
Methods: Using clinicaltrials.gov, phase 2 and 3 non-small cell lung cancer (NSCLC) drug trials were sorted into one of three sponsor categories: Industry, government/cooperative group, and academic. Fisher Exact tests were used to assess variability in strictness of specific criteria and level of transparency in listing organ function requirements. Independent sample t tests were used to analyze differences in total number of criteria.
Results: Industry sponsored NSCLC drug trials more often omit from clinicaltrials.gov complete organ function requirements compared to government/cooperative group ($p = 2.3 \times 10^{-10}$, $\alpha = 0.01$) and academic ($p = 1.8 \times 10^{-4}$, $\alpha = 0.01$) sponsored trials. Industry sponsored trials are also more likely to have stricter performance status requirements compared to government/cooperative group sponsored studies ($p = 5.7 \times 10^{-6}$, $\alpha = 0.01$).
Conclusion: Industry funded NSCLC clinical trials are more rigorous in excluding patients with worse performance status and are less transparent in listing all study requirements on clinicaltrials.gov.

Randomized Phase I/II Trial of Bortezomib and Bevacizumab in Metastatic Renal Cell Cancer

Charlotte Kwok BS[1], David Quinn MBBS PhD[2]
[1]*Keck School of Medicine, University of Southern California, Los Angeles, CA, USA*
[2]*Norris Comprehensive Cancer Center, University of Southern California, Los Angeles, CA, USA*

Background: Targeted therapies for metastatic renal cell carcinoma (RCC) include angiogenesis inhibitors, such as bevacizumab (bmab), a VEGF monoclonal antibody. Bortezomib (bmib) is a proteasome inhibitor that has anti-angiogenic activity. Based on non-overlapping side effect profiles, we hypothesized combination therapy would synergistically treat metastatic RCC. The primary objective was to examine the optimal dosing, safety, and efficacy of two dose schedules of combined bmib and bmab therapy.
Methods: 62 patients with RCC were screened; 48 patients enrolled, of whom 46 were evaluated for safety and efficacy endpoints. For the phase 1 portion, patients were accrued for two dosing schedules. 6 patients were treated in the dose escalation cohort; 20 patients were allocated to each of the phase II dose schedules. The regimens were randomly allocated, stratified by MSKCC risk criteria. Patients were monitored for toxicities and evaluated by RECIST criteria as well as survival outcomes.
Results: Best tolerated doses for Schedule A were bmib 1.3 mg/m^2 on days 1, 4, 8 and 11 q3wks; best doses for Schedule B were bmib 1.8 mg/m^2 on days 1 and 8 q3wks. For Schedules A, B respectively, 13%, 13% had partial response, 52%, 48% had stable disease, and 26%,

35% had progressive disease. Off-therapy reasons were progressive disease (58%, 67%) and toxicity (25%, 17%). Median overall survival was 33.4, 14.7 months; time to progression was 11.2, 9.4 months, and progression-free survival was 7.3, 6.6 months. Grade 3+ toxicities occurred in 14/24 patients in Schedule A and 13/24 for Schedule B.
Conclusions: Response rates were similar for both schedules. Compared to bmab monotherapy in the Yang et al study, response rates were comparable, though toxicities were increased likely due to addition of bmib. Schedule A, with more frequent dosing of bmib, had better overall survival. Further exploration of novel therapies is still needed for metastatic RCC, especially given high rates of toxicity with current treatment options.

OPHTHAMOLOGY

Applying machine learning for the diagnosis of glaucoma using OCT retinal nerve fiber layer images

Kaili Ding, **Benjamin Carvalho**, Grace Richter

Category: Ophthalmology, Imaging/Radiology, Technology
Background: Glaucoma is a leading cause of progressive vision loss and blindness. Optical coherence tomography (OCT), the standard-of-care imaging modality for diagnosing glaucoma, is used to visualize retinal nerve layer thickness (RNFL), whose thinning is a characteristic of glaucoma. While screening for and diagnosing glaucoma is expensive, time-consuming, and labor-intensive, the demonstrated ability for machine learning (ML) and deep learning algorithms to classify images is a prospect for helping reduce the burden of glaucoma diagnosis and care.
Methods: Patients included in the study are age ≥40 years from the USC Roski Eye Clinic who have undergone OCT imaging from 2010-2020. Glaucoma patients were expertly diagnosed using a combination of exams and imaging. Non-glaucoma control patients were selected independent of certain ocular disease including diabetic retinopathy, macular degeneration, other retinal disease, etc. Patients' age, gender, comorbidities, intraocular pressure, visual acuity, and OCT images will be documented and collected using electronic health records EyeMD and PowerChart. OCT images will be supplied to 2 conventional ML algorithms (Support Vector Machine and K-Nearest Neighbor) and 2 convolutional neural networks (ResNet-18 and GlaucomaNet), and each tested with five-fold cross validation.
Results: The area under the curve statistics will be calculated for each of the four ML models based on the probability of glaucoma output from each model. Comparison P values will be obtained according to DeLong's method. All statistical analysis will be performed using SAS 9.4.
Conclusions: The aim of these findings and future work is to improve diagnostic accuracy by adding additional clinical data, as well as longitudinal analysis to help predict outcomes and determine ideal treatment plans for patients with glaucoma. Further ambitions include an artificial intelligence system for population-wide glaucoma screening.

Racial Differences in Visual Outcomes in Patients with NMOSD and MOGAD

Jaklin Gukasyan[1], Lilyana Amezcua[1], Alexander Brandt[2], Kimberly Gokoffski[1]
[1] *Keck School of Medicine, University of Southern California, Los Angeles, California, USA*
[2] *University of California, Irvine, School of Medicine, Irvine, California, USA*

Background: Neuromyelitis optica spectrum disorder (NMOSD), myelin oligodendrocyte glycoprotein antibody disorder (MOGAD), and multiple sclerosis (MS) are central nervous system demyelinating diseases which negatively impact our visual system. Recent studies have shown that African Americans with MS have faster retinal damage, accelerated retinal nerve fiber loss and ganglion cell/inner plexiform layer thinning, and have greater impaired vision at baseline as measured by high contrast visual acuity. While Hispanics/Latinx are reported to have a lower risk for MS, they develop MS at a younger age and more often present with optic neuritis compared to Whites. Whether these health disparities seen in MS by race and ethnicity also exist in NMOSD and MOGAD is unknown. The purpose of this project is to determine if race and ethnicity will independently affect visual outcomes in NMOSD and MOGAD.
Methods: This was a retrospective study done in patients at Keck Hospital and LAC+USC county hospital who have been diagnosed with NMOSD or MOGAD. We collected baseline variables for each patient including age at time of diagnosis, age at first symptom, onset symptom, sex, self-reported race and ethnicity, current treatment, number of optic neuritis episodes since disease onset, and antibody status. Variables describing visual function including the eye exam, color plate testing, and OCT results were collected. Estimated household median income was collected for each patient using zip code tabulation areas from

the 2015-2019 American Community Survey (ACS) 5-year estimates. Social Deprivation Index (SDI), developed by the Robert Graham Center, was collected for each patient using zip code tabulation areas. Results were analyzed using descriptive statistics, bivariate and multivariate linear regression.
Results: We are still analyzing our data, but we anticipate that African American and Hispanic/Latinx patients will have worse visual outcomes compared to White or Asian patients, even when controlling for median income, SDI score, or private versus public hospital affiliation.
Conclusion: This data demonstrates particular populations with NMOSD and MOGAD may have a greater risk of visual impairment. Thus, we need a better understanding about how NMOSD and MOGAD affect these minority populations and if they could benefit from more aggressive treatment.

Venous Tortuosity of the Optic Nerve Head is Diagnostic for Elevated Intracranial Pressure in Patients with Idiopathic Intracranial Hypertension (Pseudotumor Cerebri)

Connie Huang, Ajay Kolluru, Erin Yu, Tamara Sharf, Kimberly Gokoffski MD PhD

Background: Idiopathic intracranial hypertension (IIH) is a condition in which elevated intracranial pressure (ICP) causes symptoms such as severe headaches and vision loss. Vision loss could be transient but could also become permanent as the optic nerve atrophies. Intracranial pressure (ICP) can be measured by the opening pressure in a lumbar puncture or surgically implanting a ventriculoperitoneal shunt. While these methods are both able to measure ICP as well as provide some symptomatic relief, these procedures are not without risks. As retinal veins become tortuous in response to elevations in ICP, venous tortuosity on fundus imaging could provide a non-invasive way to evaluate if a patient has elevated ICP. This study aims to determine if IIH patients with elevated ICP have increased venous tortuosity and how this correlates with disease course.
Methods: This is a retrospective analysis of patients with a diagnosis of IIH who were seen in the neuro-ophthalmology department at the USC Roski Eye Institute. Fundus images from the Zeiss OphthaVision device were analyzed using a MATLAB algorithm to calculate the tortuosity of the retinal veins and compared with a control group.
Results (expected): Patients with IIH were found to have significantly increased venous tortuosity of the optic nerve head compared to age and gender matched controls. Preliminary data suggests that when a patient's ICP returns to baseline, the increased venous tortuosity does not resolve as quickly as papilledema resolves.
Summary: This study demonstrated the utility of the fundus exam and venous tortuosity to serve as a surrogate marker of elevated ICP. As tortuosity measurements could be easily automated during fundoscopic imaging, measuring venous tortuosity may be a non-invasive way to screen patients for elevations in ICP.

Outcomes and Complication Rates of Resident-Performed Cataract Surgeries at LAC+USC

Sara Kang BA, James Gibson BA, Deborah Im BA, Ajay Kolluru BA, John Rodman MPH, Brandon Wong MD

Background: Ophthalmology resident education is shifting towards an outcomes-based approach that allows for data-driven improvement in surgical training. The goal of this study is to assess the outcomes of resident-performed cataract surgeries at LAC+USC Medical Center, a

large urban county hospital serving a diverse patient population with high rates of medical and ocular comorbidities.
Methods: Data on resident-performed cataract surgeries from June 2015 to June 2016 was collected through a retrospective case series and subsequently analyzed using a multivariable logistic regression model. The main outcome measures were preoperative and postoperative best corrected visual acuity (BCVA), which were correlated with patient demographics, comorbidities, and past ocular history, as well as intraoperative and postoperative complications, and resident year.
Results: The study analyzed 830 resident-performed cataract surgeries. 56.5% of surgeries achieved a post-operative visual outcome of 20/40 or better. Intraoperative complication rate and postoperative complication rate were 14.5% and 21.1% respectively. Posterior capsule tear was the most common surgical complication followed by vitreous loss. Poor visual outcomes were associated with past ocular history of proliferative diabetic retinopathy (p=0.001), intravitreal therapy (p=0.010), and vitreous hemorrhage (p=0.007). Postoperative visual acuity and complication rates did not vary by resident year.
Conclusion: The percentage of resident-performed cataract surgeries that achieved a good visual outcome (defined by a postoperative BCVA of 20/40 or better) is lower than those found in literature for other institutions, which may be due to the complexity of disease and high rates of comorbidities found in our patient population. Although specific ocular comorbidities were shown to be associated with poor visual outcome, cataract surgery may still offer significant improvement in visual acuity and quality of life for those patients. Anticipating risk of poor visual outcomes may be useful in counseling patients appropriately.

Comparing the efficacy between 0.09% cyclosporine, 0.05% cyclosporine, and 5% Lifitegrast in patients with dry eye disease at Keck Hospital

Ajay Kolluru B.S., Annie Nguyen M.D., KSOM

Purpose: The prevalence of dry eye disease is estimated to be greater than 30 million adults in the United States. Of these cases, approximately 1.5 million go on to be treated with medication. Three medications that are currently being prescribed in treatment of dry eye disease are 0.09% cyclosporine ophthalmic emulsion (Cequa), 0.05% cyclosporine ophthalmic emulsion (Restasis), and 5% Lifitegrast (Xiidra). The purpose of this study is to compare the efficacy of Cequa, Restasis and Xiidra by analyzing patient outcomes, through a retrospective chart review, following treatment at Keck Hospital over a 3 to 6 month period.
Methods: We analyzed 2 years of patient data for patients with an ICD10 diagnosis of dry eye disease who were prescribed with Restasis, Cequa or Xiidra and had a follow up at a 3 or 6 month interval. The primary outcome was patient reported subjective improvements. Secondary outcomes included Schirmer's test, visual acuity, tear osmolarity and tear break up time**.**
Results: Following data analysis, we expect to see a difference in the 3 month and 6 month follow up outcomes between the three medications. Specifically, Xiidra, should have a larger impact on the outcomes being studies compared to Cequa or Restasis.
Conclusion: Depending on the results, we e Further studies are needed to understand the best course of medication to treat patients with dry eye disease.

Evaluation of Video Glasses for Real-Time Hardware-to-Software Telemedicine Strabismus Consultations Across Multiple Graders

Joy Li, AB[1]; Angeline Nguyen, MD[2,3*]; Talia Kolin, MD[2,3,4*]; Melinda Y. Chang, MD[2,3*]; Mark W. Reid, PhD[2,3]; Thomas C. Lee, MD[2,3]; Sudha Nallasamy, MD[2,3]

[1]Keck School of Medicine, University of Southern California, Los Angeles, California.
[2]The Vision Center at Children's Hospital Los Angeles, Los Angeles, California.
[3]USC Roski Eye Institute, Keck School of Medicine, University of Southern California, Los Angeles, California.
[4]Veterans Affairs Los Angeles Ambulatory Care Center, Los Angeles, California.
**contributed equally*

Introduction: While Pivothead® glasses have been shown to be an effective tool for real-time pediatric strabismus telemedicine consultations[1,2], high cost of the Polycom hardware-to-hardware conferencing system and bandwidth limitations may present barriers to accessibility and widespread adoption. This study evaluates the use of Pivothead® glasses with a more affordable Polycom hardware-to-software system for real-time strabismus consultations across multiple graders.
Methods: A pediatric ophthalmologist (Grader 1) wearing Pivothead® Smart Series glasses simultaneously performed and recorded strabismus examinations in primary gaze, with and without correction, both at distance and near. Recorded parameters included strabismus category, angle measurements, and ocular motility. Three years later, four pediatric ophthalmologists (Graders 1-4) reviewed and graded streamed video feed transmitted at 1 Mbps from a Polycom codec to software. Agreement between streamed and gold standard in-person findings was determined by weighted kappa (κ) for categorical variables, intraclass coefficient (ICC) for continuous variables, and percent agreement.
Results: Eighteen patients aged 4-11 years (median, 7 years) were included. Agreement between in-person and streamed examinations was perfect for both horizontal and vertical deviations (κ=1.0). Almost perfect agreement was found for degree manifest (tropia vs intermittent tropia vs phoria) across graders (κ=0.91, range 0.86-0.97). Agreement for angle measurements was excellent across graders (ICC=0.97, range 0.97-0.98). Extraocular motility agreement was 90% for all graders combined, with Grader 1 having 100% agreement between her in-person and streamed examinations.
Conclusion/Relevance: Video feed from Pivothead® glasses streamed through a Polycom hardware-to-software system at 1 Mbps is a reliable tool for real-time pediatric strabismus telemedicine evaluations.

References:

1. Ho TC, Kolin T, Stewart C, Reid MW, Lee TC, Nallasamy S. Evaluation of high-definition video smart glasses for real-time telemedicine strabismus consultations. *J AAPOS.* 2021;25(2):74.e1-74.e6. doi:10.1016/j.jaapos.2020.11.016
2. Stewart C, Coffey-Sandoval J, Reid MW, Ho TC, Lee TC, Nallasamy S. Reliability of telemedicine for real-time paediatric ophthalmology consultations [published online ahead of print, 2021 Mar 15]. *Br J Ophthalmol*. 2021;bjophthalmol-2020-318385. doi:10.1136/bjophthalmol-2020-318385

Average Scleral Lens Lifespan at a Tertiary Care Hospital

Ethan Pritikin and Gloria Chiu, OD

Background: Scleral lenses (SLs) have become an effective treatment option for patients (pts) with irregular corneas (IC) and ocular surface disease (OSD). While their popularity has increased over the last decade, the average (avg) lifespan of a SL remains unknown.
Methods: A retrospective study was conducted at the USC Department of Ophthalmology to determine the avg lifespan of a SL. SL wearing pts were identified through evaluation of clinical visits from 01/01/2019 to12/12/2019 through electronic medical records (EMR). Inclusion criteria included established SL pts fit at USC who had reordered a SL at least once in at least one eye. SL order histories were evaluated to determine the number of SLs ordered and avg days between orders during the pt's duration of care between 12/2009 and 09/2021.
Results: 251 pts (120 males, 131 females; ages 9-93 yrs) and a total of 445 eyes (IC 199, 44.7%) and OSD (246, 55.3%) were included in the analysis. The avg lifespan for a SL in this pt cohort was 728 days (2.0 years; min 5 days, max 7.2 yrs). There was no statistically significant difference between avg SL lifespan and gender ($p = 0.86$) or primary diagnosis ($p = 0.51$). Pts with greater SL experience had a statistically significant increase in their avg SL lifespan; for every one year of additional experience wearing SLs, the avg lifespan of SLs increased by 1 month (34.6 days) ($p = 0.008$). The exact reason for lens reordering could not be determined but included need for updated fit or prescription and lens breakage/loss.
Conclusion: Many factors affect SL lifetime, including medical indication and individual pt handling and care. The avg SL lifespan in this cohort of IC and OSD pts was 728 days (2.0 yrs) +/- 430.8. There was a statistically significant positive correlation in the avg lifespan of SLs for pts with more experience using SLs.

Single-Cell Somatic Copy Number Alteration Profiling of Vitreous Humor Seeds in Retinoblastoma

Shreya Sirivolu[1,2]; Liya Xu, PhD[1,2,3]; Peter Kuhn[3,4,6,7]; James Hicks[3,4]; Jesse L. Berry, MD[1,2,4,5]

[1]*The Vision Center at Children's Hospital Los Angeles, Los Angeles, CA*
[2]*USC Roski Eye Institute, Keck School of Medicine of the University of Southern California, Los Angeles, CA*
[3]*Department of Biological Sciences, Dornsife College of Letters, Arts, and Sciences, University of Southern California, Los Angeles, CA*
[4]*Norris Comprehensive Cancer Center, Keck School of Medicine, University of Southern California, Los Angeles, CA*
[5]*The Saban Research Institute, Children's Hospital Los Angeles, Los Angeles, CA*
[6]*Department of Aerospace and Mechanical Engineering, Viterbi School of Engineering, University of Southern California, Los Angeles, California*
[7]*Department of Biomedical Engineering, Viterbi School of Engineering, University of Southern California, Los Angeles, California*

Background: Studies of retinoblastoma (RB) aqueous humor (AH) analysis for tumor-derived cell-free DNA (cfDNA) have shown that the somatic copy number alteration (SCNA) profiles derived from the AH are highly concordant to tumor profiles in most but not all cases. In cases showing discordance, it was suggested that these patients had multiple retinal tumors that had developed different subsets of SCNAs. The AH was therefore speculated to be a heterogenous mixture of cfDNA from each tumor clone. Analyzing the SCNA profile of tumor seeds in the vitreous humor (VH) can help us determine the degree of heterogeneity between tumor subclones. As single tumor cells from the VH have not been studied in RB before, this study

demonstrates a technique that could be used to investigate the SCNA profiles of these cells with the aim to further understand the origins of AH cfDNA.
Methods: The subject is a patient diagnosed with unilateral Group D RB and treated with primary enucleation. Isolated live VH single cells were amplified using GenomePlex® Single Cell Whole Genome Amplification Kit and libraries were constructed using NEBNext Ultra II FS Kit. These libraries were sequenced using the Illumina paired-end (2 X 150bp) platform to assess genome-wide SCNAs. SCNAs were also profiled for AH and VH cfDNA as well as tumor DNA. Heatmap with hierarchical clustering was generated with cells clustered by Ward's method with Manhattan distance by their median centered data.
Results: There was high concordance in SCNA profiles across AH cfDNA, VH cfDNA, and tumor DNA. The SCNA profiles of the 30 VH seeds demonstrated the highly recurrent RB SCNAs (gains on 1q, 2p, and 6p) that were consistent with the tumor SCNA signature. The heatmap of the VH single cell SCNA profiles demonstrated low levels of heterogeneity between the seeds.
Conclusion: Our results demonstrate that VH seeds have similar molecular findings as tumor cells. Analyzing genomic material of the VH seeds using single cell SCNA profiling provides a valuable platform to study tumor heterogeneity in RB.

Characterizing the Role of 6p+ SCNAs in Retinoblastoma Tumorigenesis

Claire Stevens

Background: Cancer progression does not exclusively involve changes at individual genes; chromosomal segmental gains and losses, known as somatic copy number alterations (SCNAs), have also been shown to contribute to the progression of aggressive and treatment-resistant cancers, although there is little understanding of their contribution to tumorigenesis. Pediatric cancers that have accrued SCNAs are associated with poor outcomes and are often rendered untreatable by specific gene targeting. A study of pediatric retinoblastomas has uncovered that 6p chromosomal gains (6p+) in retinoblastomas are significantly correlated with poor clinical outcomes, such as eye enucleation. CRISPR interference (CRISPRi) is a highly-efficacious way of repressing genes at promoter sites, and will allow us to investigate the roles of suspected 6p+ driver genes *DEK*, *E2F3,* and *SOX4* in retinoblastoma tumorigenesis. Through systematic evaluation of the 6p+ and its contribution to the tumorigenesis of aggressive malignancies, like pediatric retinoblastoma, targeted genetic therapies can be developed that will improve patient outcomes.
Methods and Results: Individual gRNAs targeted to promoters of *DEK*, *E2F3,* and *SOX4* coupled with an inactive dCas9 fused to a distinct regulatory domain will be introduced to clonal 6p+ retinoblastoma cell lines. In this way, the CRISPRi method will effectively repress expression of these possible 6p+ driver genes, allowing us to investigate the effects of *DEK*, *E2F3,* and *SOX4* downregulation on *in vitro* cell growth. We will infect confirmed 6p+ retinoblastoma cell lines expressing dCAS9-KRAB with a previously-cloned lentivirus corresponding to each target gRNA, as well as a nontargeting control gRNA. Infected cells will be selected for using puromycin and the target gene repression will be quantified with RT-qPCR. Additionally, cultured cells will be examined for proliferation (by cell counting), cell cycle status (by Ki67 staining and PI-staining + cytometry), and apoptosis (by cleaved Caspase-3 and TUNEL), at different time points.
Conclusions: Overall, these experiments will help us better understand SCNAs and their effects on cell growth and tumorigenesis.

Six-Year Rates and Risk Factors of Progression from Anatomical Narrow Angle to Primary Angle Closure Glaucoma in the United States

Kristy Yoo, BA,[1] Galo Apolo, MS,[2] Sarah Zhou, BS,[1] Bruce Burkemper, PhD, MPH,[2] Khristina Lung, MPH,[3] Brian Song, MD, MPH,[2] Brandon Wong, MD,[2] Brian Toy, MD,[2] and Benjamin Xu, MD, PhD[2]

[1]*Keck School of Medicine at the University of Southern California, Los Angeles, California*
[2]*Roski Eye Institute, Department of Ophthalmology, Keck School of Medicine at the University of Southern California, Los Angeles, California*
[3]*Schaeffer Center for Health Policy and Economics, University of Southern California, Los Angeles, California*

Importance: Primary angle closure glaucoma (PACG) is a leading cause of irreversible vision loss worldwide, yet there is sparse real-world data on rates and risk factors of progression from anatomical narrow angle (ANA) to PACG to guide or support current practice patterns.
Objective: To assess rates of detected progression from ANA to PACG in the United States and identify sociodemographic and clinical risk factors for progression.
Design: Retrospective case-control study of patients from the Optum Clinformatics® Data Mart Database.
Setting: National healthcare claims database study.
Participants: The Optum database contained data on 263,422 patients diagnosed with ANA between the years 2007 to 2019. Analyses included only newly diagnosed cases of ANA, defined as: 1) continuous enrollment and observability during a 24-month lookback period and 72-month study period from first date of ANA diagnosis; 2) diagnosis by an ophthalmologist or optometrist with record of gonioscopy; 3) no prior history of intraocular ocular pressure (IOP) lowering drops, laser peripheral iridotomy (LPI), or intraocular surgery.
Main Outcomes and Measures: Detected progression from ANA to PACG within the 6-year study period.
Exposures. Cox proportional hazards (CPH) models of healthcare claims data.
Results: 3,985 patients with newly diagnosed ANA met study inclusion criteria, and 459 (11.52%) patients were detected with progression to PACG during the study period. Almost half of progression (211/459; 45.97%) occurred early (within 6 months of ANA diagnosis) at a rate of 10.59%/year. The late (after 6 months) progression rate was lower at 3.54%/year. In the CPH model, age over 70 years, early LPI, and early IOP-lowering drops conferred higher risk of progression to PACG (HR > 1.59; $p < 0.02$). Early and late cataract surgery and late IOP-lowering drops were protective against PACG (HR < 0.46; $p < 0.004$).
Conclusions and Relevance: Risk of progression from ANA to PACG is low outside of the first 6 months of ANA diagnosis, especially among patients receiving cataract surgery or no treatment. The clinical utility of long-term monitoring of most ANA patients appears low, highlighting the benefit of improved clinical methods to identify patients at high risk for PACG.

ORTHOPAEDIC SURGERY

Is the Use of an Antibiotic Bead Pouch, Negative Pressure Wound Therapy, or Combination Therapy in Initial Debridement of Patients with Type IIIB Open Tibial Shaft Fractures Associated with Adverse Outcomes?

Jacob A. Becerra BS, Michael Brown BS, Idean Roohani BS, Charalampos Zalavras MD, Joseph Carey MD, Joseph T. Patterson MD

Background: Type IIIB open tibial shaft fractures are severe injuries associated with significant morbidity, disability, and cost of care. Treatment involves debridement and temporary wound coverage to prevent infection followed by delayed skeletal and soft tissue reconstruction. The method of temporary wound coverage between initial debridement and definitive surgery may influence outcome. We hypothesize that placement of an antibiotic bead pouch (ABP) versus negative pressure wound therapy (NPWT) or combination therapy (CO) at initial debridement is associated with a lower risk of infection requiring operative intervention.
Methods: A retrospective cohort of 118 patients aged 16-81 with type IIIB open tibial shaft fractures managed with debridement, surgical fixation, and rotational or free flap coverage was identified from prospective institutional registries. Potential confounding variables were collected by chart review. An association between the intervention of ABP, NPWT, or CO applied at initial debridement and a primary outcome of infection requiring amputation, debridement, or other reoperation was investigated by multivariable logistic regression with optimization using Akike information criterion.
Results: Treatment assignment was not associated with age, sex, BMI, substance use, immunosuppression, medical comorbidities, mechanism of injury, fracture laterality or location, number of debridement procedures, days to flap coverage, type of flap coverage, or follow-up duration. 44 patients (39%) received subsequent debridement for surgical site infection, amputation, or other reoperation. Tobacco use ($\beta = 1.33$, 95% CI 0.48 to 2.14, $p = 0.002$) was positively associated with the primary outcome. Application of an ABP ($\beta = -0.81$, 95% CI -1.66 to 0.03, $p = 0.059$) as compared to NPWT or CO was weakly associated with the primary outcome.
Discussion: Local antibiotic delivery via bead pouch in initial debridement of type IIIB open tibia fractures may be associated with lower complication rate compared to NPWT or CO. Prospective, randomized investigation is warranted to explore a potential therapeutic benefit of antibiotic wound pouch in the initial management of severe lower extremity trauma.

Reasons Athletes Fail to Return to Sport After Shoulder Arthroplasty

Brittney Deadwiler, Ryan Haratian, Ioanna Bolia, Seth Gamradt, Department of Orthopaedic Surgery

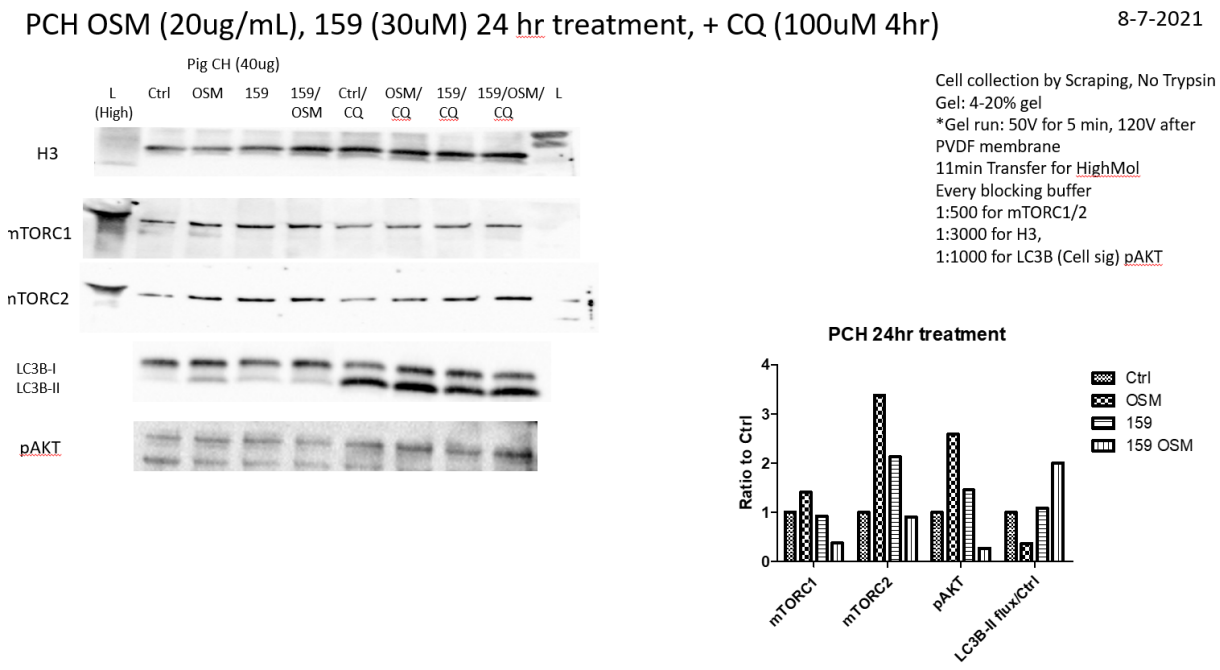
Goal: Ability to return to sport is an important deciding factor for undergoing surgery and satisfaction after surgery. The purpose of this study is to determine reasons patients do not return to sport following shoulder arthroplasty procedures. We hypothesize that a small portion of athletes do not return to sport following shoulder arthroplasty and the most frequently reported reason is shoulder problems.
Methods: PubMed, Scopus, and Web of Science databases were assessed for articles meeting pre-established inclusion and exclusion criteria. Data from 9 selected studies were compiled using Microsoft Excel 2017. All studies included were evaluated using the MINORS (Methodological Index for Non-Randomized Studies) criteria to ensure methodological quality. All statistical analyses were conducted using MedCalc software (version 19.1.3).
Results: Overall, 161/583 (27.6%) of athletes failed to return to sport across all procedures. Reported reasons for not returning to sport included due to surgery, shoulder problems, comorbidities, advanced age, lost interest, pain, and other reasons unrelated to shoulder.

Rates of not returning to sport were significantly higher following hemiarthroplasty (HA) compared to total shoulder arthroplasty (TSA) and reverse total shoulder arthroplasty (RTSA) (47.9% vs. 17.6% and 24.9%, *P<0.0000*, and *P=0.0001* respectively), with significantly more HA patients citing shoulder problems and comorbidities as causes compared to TSA. A greater proportion of athletes failed to return due to non-shoulder related reasons versus reasons independent of the shoulder joint (51.8% vs. 26.1%, *P=0.0001*).
Conclusion: Given that shoulder problems and comorbidities were common reasons for failure to return to sport, surgeons should encourage sport-specific post-operative physical rehabilitation programs to improve shoulder function, address other causes of failing to return to sport, and increase return to sport rates in their patient populations, especially after HA procedures.

GP130 Receptor Modulating Drugs Mitigate Autophagic Inhibition by IL-6 Cytokines *In Vitro*

Andrew Carl Drake, Youngjoo Lee, Denis Evseenko, Orthopaedic Surgery, Stem Cell Research and Regenerative Medicine, KSOM

Background and Hypothesis: Autophagy is an intracellular process that degrades nonessential cytoplasmic contents such as damaged organelles, protein aggregates, and intracellular microorganisms. Autophagy is an essential cellular activity that maintains homeostasis and disturbed autophagic activity is often involved in the pathogenesis of many diseases including arthritis and various cancers. Interleukin-6 (IL-6) is a key pro-inflammatory cytokine in chronic inflammatory diseases. All IL-6 cytokines act via receptor complexes containing the cytokine receptor subunit GP130. We hypothesized that CX-159, a GP130 receptor modulating drug developed in the Evseenko Lab, mitigates autophagic inhibition by IL-6 cytokines and interrogated the possible signaling pathways.
Methods: Primary pig chondrocytes were cultured in pro-inflammatory conditions treated with IL-6 cytokines such as IL-6, Oncostatin-M, and IL-11 (20ug/mL). The effect of CX-159 (30uM), a GP130 receptor modulating drug, was measured by immunoblot of markers related to autophagy and key markers of pro-inflammatory signaling pathways. To measure the autophagic flux, the cells were treated with chloroquine (100uM) for 4 hours to cause LC3B accumulation. The difference of LC3B levels caused by the chloroquine treatment is an indicator of autophagic activity. My role was cell culture, treatment, sample collection, and immunoblot optimization.
Results: IL-6 cytokine treatment increased phosphorylated AKT, which indicates activated pro-inflammatory signaling pathways, and phosphorylated mTORC1/2, which are potent inhibitors of autophagy. Autophagic flux measured by chloroquine treatment showed that inflammatory conditions induced by IL-6 cytokines decrease autophagic activity significantly. 24 hr treatment of CX-159 at 30uM showed reduced activation of pAKT and mTORC1/2. Moreover, autophagic flux measured by chloroquine treatment showed that CX-159 not only prevents inhibition of autophagic activity but also increases autophagic activity in inflammatory conditions induced by IL-6 cytokines.
Conclusion: These data demonstrate CX-159 treatment mitigates the autophagy inhibition by IL-6 cytokines in vitro by reducing the activation of mTORC1/2 and AKT signaling pathways. Moreover, the data suggest CX-159 increases autophagic activity in pig chondrocytes cultured in inflammatory conditions induced by IL-6 cytokines.



Cell Phone Access, Use Patterns, and Attitudes Toward Digital Healthcare Engagement in an Urban Orthopaedic Trauma Population

Andrew Duong, Jacob Becerra, Haley Nakata, Joseph T. Patterson

Goal: Orthopaedic trauma patients are often lost to follow-up, making it difficult to conduct research in person. Mobile devices have been used to coordinate care and assist in research. This study sought to ascertain the rate of cell phone ownership, use habits, and attitudes towards digital communication to inform the use of digital messaging for care and research in an urban orthopaedic trauma population.

Methods: 1,434 unique adults scheduled at an orthopaedic trauma outpatient clinic from December 2019 to February 2020 at an urban Level 1 Trauma Center were identified. Associations between demographic data and clinic attendance, as well as with cell phone ownership were explored by logistic regression. 101 patients attending clinic were prospectively surveyed from June 2021 to August 2021. Patients were surveyed on housing stability, cell phone ownership, communication methods available, device charge frequency, cell service frequency, changes in cell number, and openness to digital communication with the orthopaedic trauma team.

Results: 91% of patients owned a cell phone according to registration data and 90% by prospective survey. 99% had cell service always or most of the time. 93% kept their devices charged always or most of the time. 91% would communicate with their orthopaedic trauma team by text message. 87% would answer research and care questions by phone call, 79% by text message, and 61% by video call. 85% of patients had stable housing. Housing stability was not associated with cell phone ownership, charge frequency, cell service frequency, or attitudes towards digital communication for care or research purposes, but was associated with nonattendance (29% vs 66%, $p<0.01$) and 1 or more cell phone number changes in the past year (28% vs 58%, $p=0.04$).

Summary: 9 of 10 patients at an urban orthopaedic trauma clinic own cell phones, keep them charged, can text, and would communicate digitally for care and research purposes, regardless of housing status.

Single Institution Epidemiology of Concussion Injuries and Time to Return to Play in 12 NCAA Division I Sports

Mertz K., Debellis N., **Fathi A.,** Bolia IK., Hasan LK., Haratian A., Romano R., Omid R., Hatch GF., Petrigliano FA., Tibone JE., Weber AE., Gamradt SC

USC Epstein Center for Sports Medicine, Keck School of Medicine of the University of Southern California

Background: The epidemiology of concussion injury and time to return to sport is critical both for understanding the risk factors for injury and for delayed return to sports in NCAA athletes and to create standards for protection of student-athletes.
Purpose: Our study has two goals. First, we would like to report the number and incidents of concussion events and time to return to play following across 12 different sport teams at single institution competing in the National Collegiate Athletic Association (NCAA) Division I. Secondly, if possible, we would like to identify potential factors associated with prolonged return to sport (> 30 days).
Methods: From 2003 to 2020, the medical records of all athletes who sustained concussion injury were retrieved from an institutional database. Data collected included patient age, gender, sport team, time missed from participation due to concussion injury in days, and whether the injury occurred during practice or game. Data were categorized by sport team and were subsequently used in a variety of statistical analyses such as number of concussions per sport and concussions per 1000 hours of athletic-exposure.
Results: Over a period of 18 years, 398 NCAA Division I athletes experienced a total of 486 concussion injury. The most concussion events occurred in football (220, 45%) followed by women's water polo (45, 9%), men's water polo (42, 9%), and women's volleyball (35, 7%). Men's basketball had the most concussions per 1000 player exposure hours (8.30), followed by men's water polo (8.15), and women's basketball (5.79). Concussions more commonly occurred in practice (341, 70%) than in games (134, 24%). Mean time to return to sport across all sports was 25.5 days. Sustaining an injury in practice was associated with a return to play time of greater than 30 days.
Conclusions: Based on data from a single university, concussion injuries in NCAA Division I athletes more commonly occur during practice as opposed to in game situations. Athletes require approximately one month for a full return-to-sport. Football was the sport with the highest number of total concussion events, while basketball had the highest concussion events per 1000 player exposure hours. Future studies can focus on trends in concussion injuries over time.

Disparate Trends in the Treatment of Cervical Ossification of the Posterior Longitudinal Ligament With or Without Concomitant Myelopathy

Michael S. Kim, BS*; Sagar Telang, BS*; Zoe Fresquez, BA*; Zorica Buser, PhD, MBA*

**USC Spine Center, Keck School of Medicine of the University of Southern California, Los Angeles, CA*

Introduction: Ossification of the posterior longitudinal ligament (OPLL) is a rare but increasing diagnosis in the United States and the standard of care is still in development. This

observational study assessed whether patients having diagnosis of OPLL with or without myelopathy in the cervical spine undergo different treatment modalities.
Methods: Patients diagnosed with OPLL with and without concomitant diagnosis of myelopathy between 2010 and 2019 were identified using a national insurance database. Following the diagnosis, patients were tracked to determine the rate at which they underwent surgical intervention (decompression, anterior fusion, posterior fusion) in comparison to conservative therapy (bracing, epidural steroid injection [ESI], physical therapy [PT]).
Results: This study identified 14,590 patients diagnosed with OPLL between 2010 and 2020, of which 5,340 (36.6%) received a concomitant diagnosis of myelopathy. Patients diagnosed with OPLL without myelopathy underwent an average of 0.016 procedures per person-year while those diagnosed with OPLL with myelopathy underwent an average of 0.050 procedures per person-year. Of the procedures undergone by patients with OPLL without myelopathy, 92.6% were conservative and 7.4% were surgical. In the OPLL with myelopathy group, 62.8% of procedures were conservative and 37.2% of procedures were surgical.
Conclusion: This study identified trends that warrant further investigation such as differences in conservative therapy between the two groups (the OPLL with myelopathy group underwent more bracing and ESI) and differences in surgical intervention between the two groups (the OPLL with myelopathy group underwent more anterior fusion, posterior fusion, and decompression).

Is Intraoperative Dexamethasone Administration Associated with Increased Rates of Periprosthetic Joint Infection?

Nathanael D. Heckmann MD[1], Jennifer C. Wang BS[1], Amit S. Piple MD[1], **Glenda Marshall BS[1]**, Emily S. Mills MD[1], Jay R. Lieberman MD[1], Alexander B. Christ, MD[1]
[1]Department of Orthopaedic Surgery, Keck School of Medicine of USC, Los Angeles, California

Background: Dexamethasone is a highly potent glucocorticoid that has been shown to reduce postoperative pain, nausea, and vomiting when administered intravenously in the perioperative period of total joint arthroplasty (TJA). However, studies investigating the effect of systemic corticosteroid administration on risk of periprosthetic joint infection (PJI) following TJA are limited by small sample sizes. Thus, the purpose of this study was to assess for differences in PJI rates between patients who did and did not receive intraoperative dexamethasone during primary elective TJA.
Methods: A retrospective cohort study of patients from the Premier Health Database who underwent total knee arthroplasty (TKA) or total hip arthroplasty (THA) between January 2015 and December 2020 was conducted. The patients were categorized into two cohorts: those who received intraoperative dexamethasone and those who did not. The primary outcome was the 90-day risk of postoperative infectious complications, including PJI, surgical site infection (SSI), postoperative infection, and sepsis. Secondary outcomes included thromboembolic events, pulmonary complications, myocardial infarction, renal sequelae, and non-infectious wound complications. Univariate analyses and multivariate analyses were performed to compare differences between cohorts and account for potential confounders.
Results: A total of 1,322,025 patients were identified of which 748,702 received intraoperative dexamethasone and 573,323 did not. On multivariate analysis, patients who received intraoperative dexamethasone had lower risk of PJI (OR 0.95, $p<0.001$). They also had lower risk of sepsis (OR 0.80, $p<0.001$) and all secondary outcomes ($p<0.050$), although no significant differences in SSI were found.
Conclusion: Intraoperative dexamethasone use during primary elective TJA was not associated with increased risk of periprosthetic joint infection or other postoperative complications.

Patient Perspectives on THC- and CBD-based Products for the Management of Musculoskeletal Pain

Brian Okonkwo, Daniel R Kim MD, Ioanna K Bolia MD MS PhD, Brandon Levian BS, Timothy Chu BS, Laith K Hasan BBA, Aryan Haratian BS, Frank A Petrigliano MD, Alexander E Weber MD

USC Epstein Family Center for Sports Medicine at Keck Medicine of USC

Purpose: To investigate the perspectives of sports medicine patients regarding the use of THC- and CBD-based products for the management of musculoskeletal pain.

Methods: A short, 2-minute survey was distributed to consenting patients seen in an orthopedic sports medicine clinic. A retrospective chart review was conducted to collect data including diagnosis during the visit, characteristics of pain, demographics (age, gender, BMI), history of musculoskeletal pain, and history of pain medication administration.

Results: Survey responses were received from 80 patients (48% male, 52% female). The average age of participants was 48 (median: 47.5, SD: 17). The most common complaints of pain by location were the knee (32%), shoulder (30%), and hip (22%). Most respondents were either familiar or somewhat familiar with the use of THC-based products for the management of MSK pain (33.3% familiar, 41.0% somewhat familiar), and similarly with CBD-based products (40.2% familiar, 37.6% somewhat familiar). 47.2% of respondents were amenable to receive nonpsychoactive CBD-based products, and 40.1% were amenable to receive THC-based products. A large majority (83%) believed that THC- or CBD-based products would help combat the opioid epidemic. A vast majority (97%) believed that insurance should cover CBD products if provided evidence of efficacy for their health problems. Patients without a history of opioid use in the previous two years had significantly more familiarity with THC-based products (P=0.0239).

Conclusion: Most patients reported familiarity with both THC- and CBD-based products for the management of pain or other orthopedic-related issues. A large percentage of patients also reported being amenable to receive THC- and CBD-based products. THC- and CBD-based products may serve as a viable alternative to opioids in the management of musculoskeletal pain, which may prove useful in the context of the ongoing opioid epidemic.

Significance: Sports medicine patients often suffer from chronic musculoskeletal pain and are likely to use THC- and CBD-based products to treat their pain. These products may serve as a valuable alternative to opioids for the management of musculoskeletal pain.

Acknowledgements: We thank Dr. Alexander E Weber and Dr. Frank A Petrigliano for their mentorship on this project. We thank them and their staff at the USC Epstein Family Center for Sports Medicine at Keck Medicine of USC for accommodating the survey collection during their busy clinics. We thank previous research fellow Dr. Ioanna K Bolia, as well as current research fellows Aryan Haratian and Laith K Hasan for coordinating the efforts that made this project possible.

Figure 1. Patient familiarity with THC and CBD-based products.

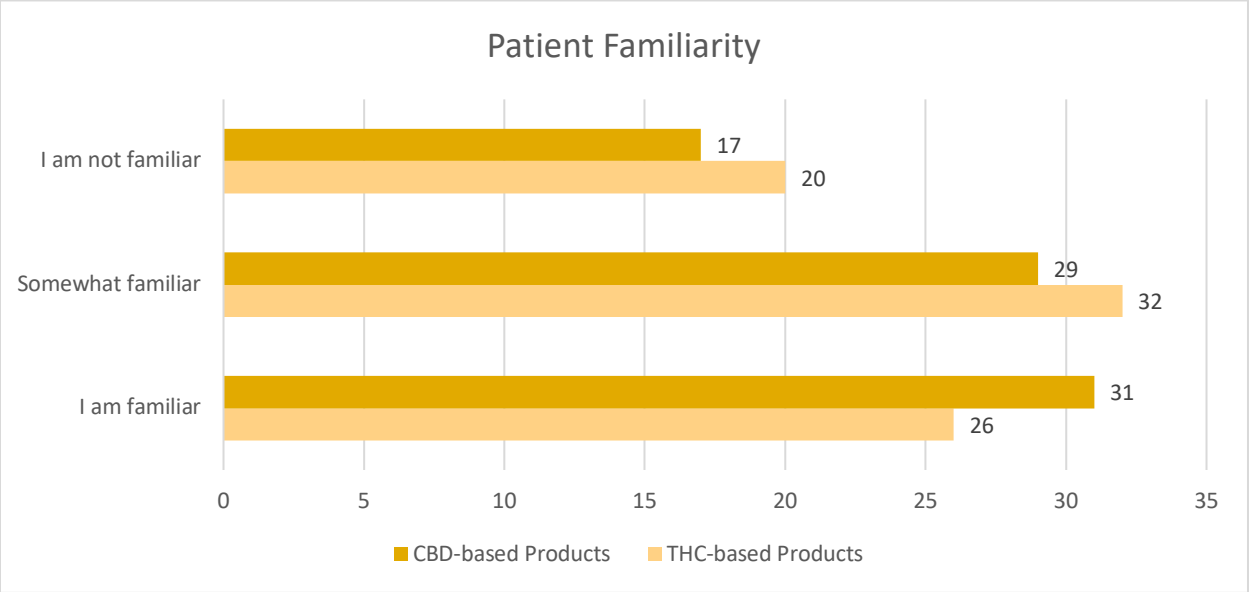
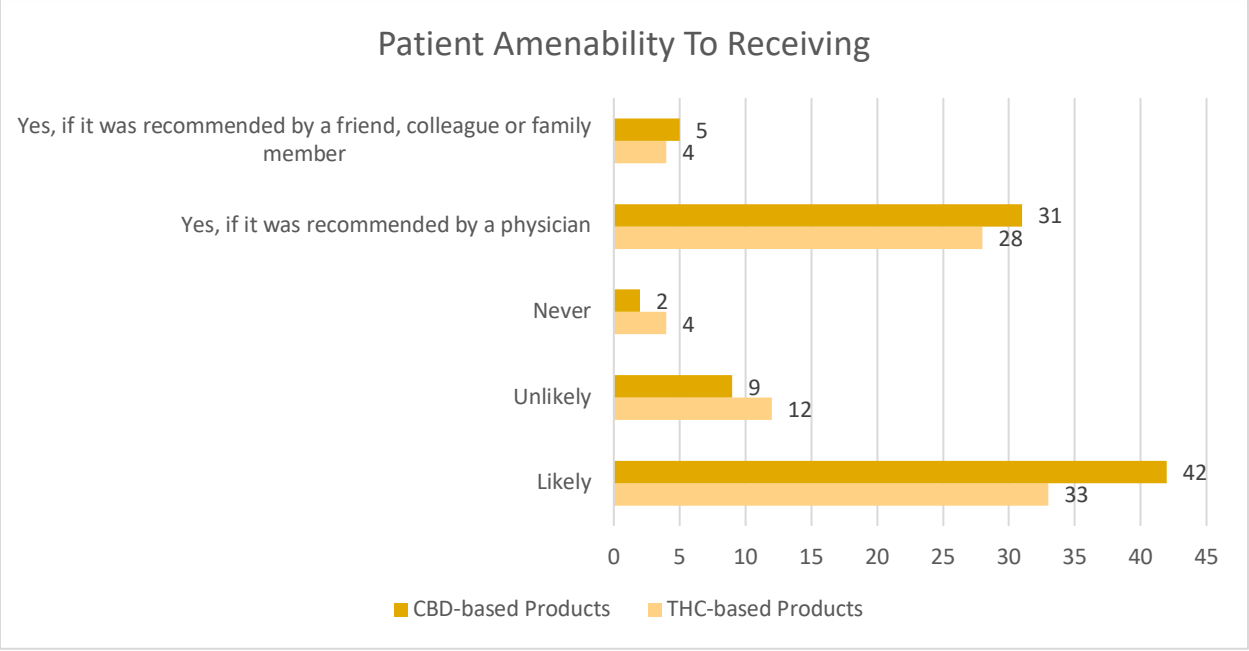


Figure 2. Patient amenability to receiving THC and CBD-based products.



Changing Demographics of Joint Sacrificing Surgery in Ankle Arthritis: A Review of NSQUIP Database

Ryan Palmer, Ryan Haratian, Eric Tan, MD

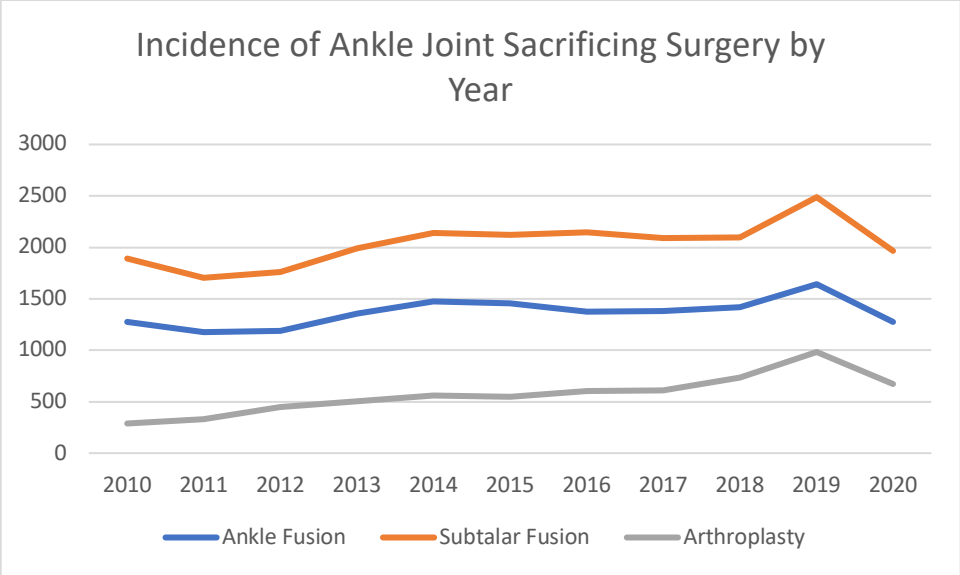
Background/Purpose/Goal/Hypothesis: In recent years, the treatment of ankle arthritis has changed significantly. While arthrodesis has historically been the standard of surgical management, recent advances in arthroplasty design and joint-sparing procedures have altered this paradigm. While both ankle arthrodesis and arthroplasty have inherent complications, recent 5–10-year studies of ankle arthroplasty demonstrate "up to a 90% good to excellent clinical results," indicating the promise of this therapeutic approach. Furthermore, compared to arthrodesis, arthroplasty preserves ankle range of motion potentially making this procedure more appealing to patients. For this reason, it is predicted that the incidence of total ankle arthroplasty between 2010-2020 will show a year-over-year increase, while ankle fusion/subtalar arthrodesis will decline. Additionally, as the average age of the U.S. population continues to increase, it is predicted that the total number of joint sacrificing surgeries will similarly increase.

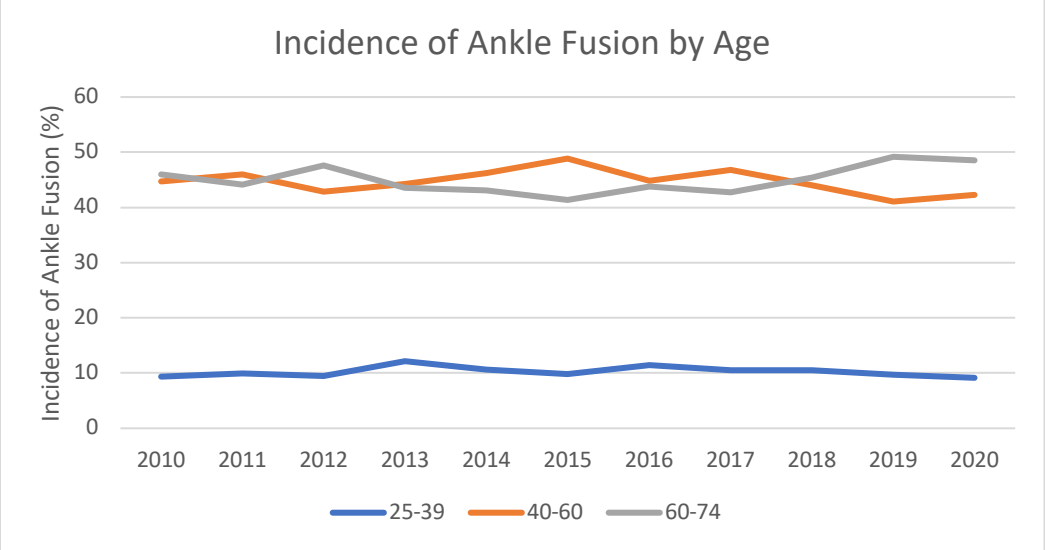
Methods: The Pearl diver database, a national database covering all U.S. states and territories, was queried from 2010-2020 based on three CPT codes: 27870, 28725, and 27702. These CPT codes correspond to ankle fusion, subtalar fusion, and ankle replacement, respectively. Further stratification was done by combining CPT codes to identify patients who had multiple procedures in succession. Data was exported and analyzed in Microsoft Excel. Chart and graph data was similarly generated in Microsoft Excel.

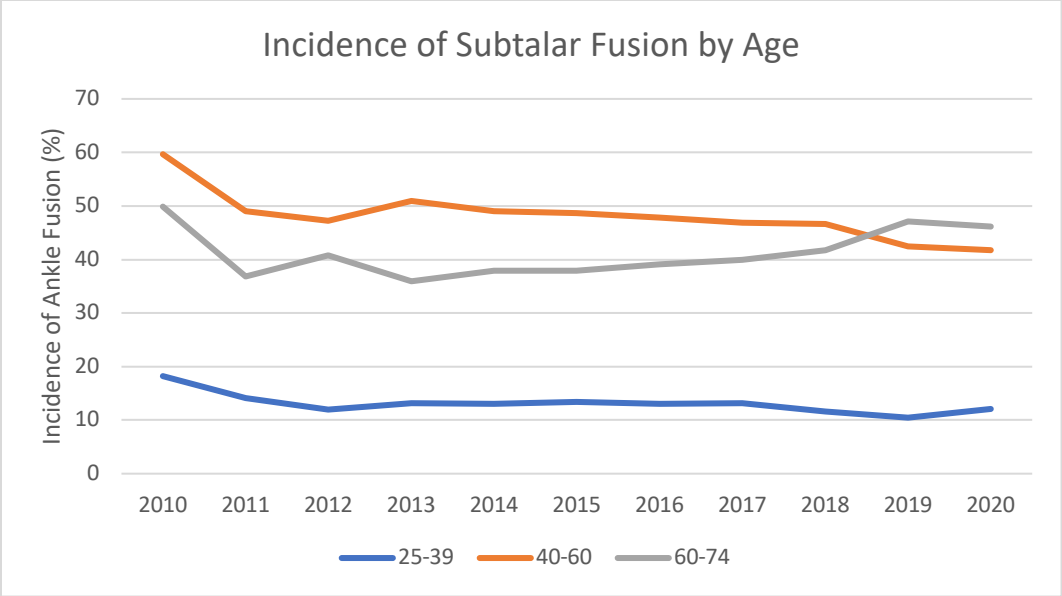
Results: Incidence of total ankle replacement continues to rise. Fall in 2020 is likely attributable to COVID-19, but the data demonstrates the increasing appeal of Total Ankle Arthroplasty compared to arthrodesis.

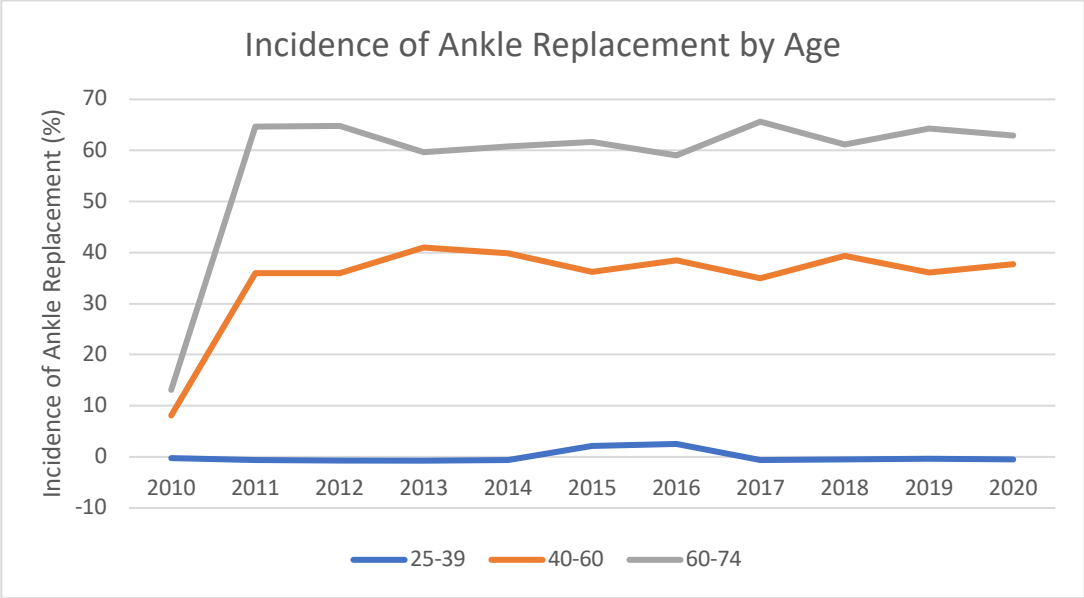
Procedure (2010-2020)	Total Patients	Total Male	Total Female
Ankle Fusion	15018	7669, 51.06%	7349, 48.93%
Subtalar Fusion	22397	9717, 43.38%	12680, 56.61%
Ankle Replacement	6282	3187, 50.73%	3095, 49.26%

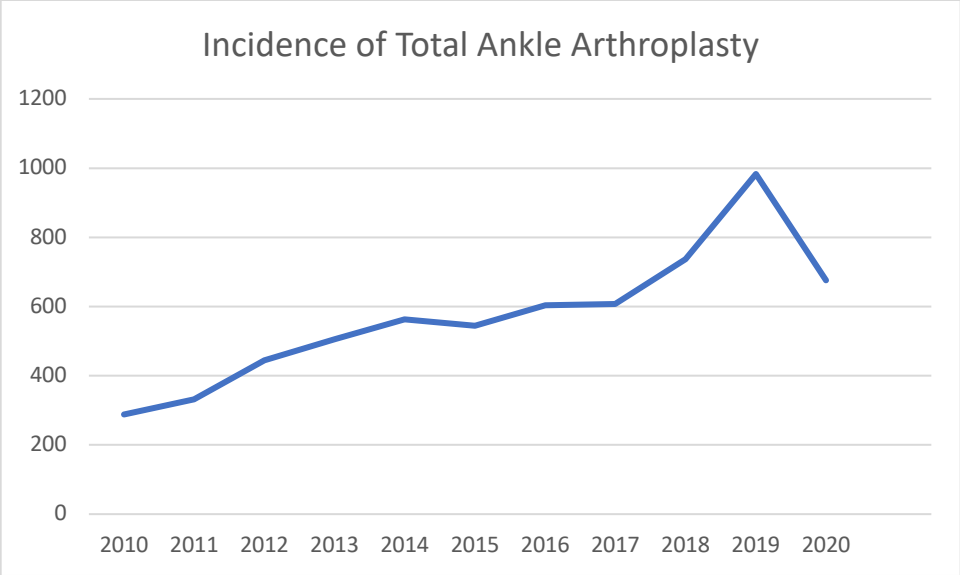
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ankle Fusion (# procedures performed)	1278	1176	1186	1354	1474	1453	1378	1380	1420	1642	1277
Subtalar Fusion (# procedures performed)	1894	1704	1762	1988	2142	2121	2148	2089	2096	2488	1965
Arthroplasty (# procedures performed)	288	331	445	506	562	545	603	608	736	983	675


Incidence of Ankle Joint Sacrificing Surgery by Year
3000
2500
2000
1500
1000
500
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Ankle Fusion
Subtalar Fusion
Arthroplasty


Incidence of Ankle Fusion by Age
Incidence of Ankle Fusion (%)
60
50
40
30
20
10
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
25-39
40-60
60-74


Incidence of Subtalar Fusion by Age
Incidence of Ankle Fusion (%)
70
60
50
40
30
20
10
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
25-39
40-60
60-74


Incidence of Ankle Replacement by Age
Incidence of Ankle Replacement (%)
70
60
50
40
30
20
10
0
-10
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
25-39
40-60
60-74



Conclusion: The year-over-year incidence of ankle arthrodesis, subtalar arthrodesis, and total ankle arthroplasty have remained relatively constant amongst all age groups. Arthroplasty did not outpace arthrodesis and men undergo ankle fusion and arthroplasty at higher rates than women.

The Impact of Frailty on Postoperative Complications in Geriatric Patients Undergoing Multi-Level Lumbar Fusion Surgery

*Andy Ton, BS[1], *Shane Shahrestani, PhD[1], **Nima Saboori, BS[1]**, Alexander M. Ballatori, BA[1], Xiao T. Chen, BA[1], Jeffrey C. Wang, MD[1], Zorica Buser, PhD[1]

[1]Department of Orthopaedic Surgery, Keck School of Medicine of USC, Los Angeles, California

**=These authors contributed equally.*

Purpose: This study evaluates the impact of patient frailty status on postoperative complications in those undergoing multi-level lumbar fusion surgery.

Methods: The Nationwide Readmission Database (NRD) was retrospectively queried between 2016 and 2017 for patients receiving multi-level lumbar fusion surgery. Demographics, frailty status, and relevant complications were queried at index admission and readmission intervals. Primary outcome measures included perioperative complications and 30-, 90-, and 180-day complication and readmission rates. Perioperative complications of interest were infection, urinary tract infection (UTI), and posthemorrhagic anemia. Secondary outcome measures included inpatient length of stay (LOS), adjusted all-payer costs, and discharge disposition. Nearest-neighbor propensity score matching for demographics was implemented and a Mann-Whitney U test with odds ratios was used in the analysis.

Results: Frail patients encountered higher rates of perioperative complications including posthemorrhagic anemia (OR: 1.73, 95%CI: 1.50-2.00, p<0.0001), infection (OR: 2.94, 95%CI: 2.04-4.36, p<0.0001), UTI (OR: 2.57, 95%CI: 2.04-3.26, p<0.0001), and higher rates of non-routine discharge (OR: 2.07, 95%CI: 1.80-2.38, p<0.0001). Frail patients also had significantly greater LOS and total all-payer inpatient costs compared to non-frail patients with comparable demographics and comorbidities (p<0.0001). Frailty was associated with significantly higher rates of 90-day (OR: 1.43, 95%CI: 1.18-1.74, p=0.0003) and 180-day (OR: 1.28, 95%CI: 1.03-

1.60, p=0.02) readmissions. Lastly, frail patients had higher rates of wound dehiscence (OR: 2.21, 95%CI: 1.17-4.44, p=0.02) at 90 days.
Conclusions: Patient frailty status functions as a meaningful, independent predictor of postoperative outcomes in patients undergoing multi-level lumbar fusion surgery.

Risk Factors Increase Urinary Tract Infection Incidence Following Posterior Arthrodesis for Spinal Deformity Regardless of Number of Operated Levels

Tara Shelby, Zoe Fresquez, Zorica Buser, Jeffrey Wang

Introduction: While studies have identified urinary tract infection (UTI) as a complication after spine fusion, UTI is understudied in the context of fusion for spinal deformity. This study set to determine both UTI incidence after multi-level posterior fusion for spinal deformity and whether pooled risk factors increased UTI risk.
Methods: Patients who had posterior fusion for spinal deformities from 2010-2019 were queried from the PearlDiver database, separated by number of levels operated on (<7, 7-12, >12), matched for age/gender and analyzed for UTI incidence within 1 week, 1, 2, and 3 months. Diabetes, obesity, rheumatoid arthritis, or coronary artery disease within one-year prior surgery was noted in patients that contracted UTI within 1-month after fusion. Patients of each level span with the risk factors (RF) were compared to those without (noRF). Chi-2 was used for statistical analysis.
Results: 20893 patients underwent posterior fusion for spinal deformities from 2010-2019. Post-matching, each level set had 2239 patients. At 1, 2 and 3 months, the >12 subgroup showed statistically higher UTI incidence than 7-12 and <7. At 3 months, UTI was similar between <7 and 7-12, with 3.8% and 3.9%, respectively (p=0.41), and statistically higher in the >12 subgroup, with 4.6% (<7 versus 7-12: p=0.005; <7 versus >12: p<0.001). For each level group, RF had significantly higher UTI rates at 1, 2 and 3 months. Odds ratios were significantly greater than 1 for RF across all time points (<7 = OR: 2.8, p<0.001; 7-12 = OR: 2.1, p<0.001; >12 = OR: 2.3, p<0.001).
Conclusions: Risk factors of diabetes, obesity, rheumatoid arthritis, and coronary artery disease were associated with higher risk of UTI after posterior fusion for spinal deformity for all level sets. Procedures on greater than 12 levels had the highest rate of UTI. This is the first study to analyze and compare UTI incidence following arthrodesis on different level lengths for spinal deformity.

Does Fusion of Ankle Joints Increase Risk of OA in an Adjacent Joint

Eric Tan, Ryan Haratian, **Justin Sheppard**

Background/ Purpose/ Goal/ Hypothesis: While ankle fusion is considered a standard for treating ankle arthritis, it's also speculated to be a cause of osteoarthritis in adjacent ankle joints post-operatively. The subtalar joint in particular is proposed to be commonly affected by this ankle fusion induced osteoarthritis. Subtalar fusion patients may be predisposed to osteoarthritis needing ankle fusion as well. A clear consensus on this connection is not established; we set out to measure how frequently ankle surgery patients will have to undergo a subsequent ankle fusion or ankle replacement. In doing so, we can better characterize the benefits and risks of undergoing these procedures.
Methods: The Pearl diver database is a nationwide database covering all U.S. states and territories. Data from here was queried from 2010-2020 based on three CPT codes: 27870, 28725, and 27702. These CPT codes correspond to ankle fusion, subtalar fusion, and ankle

replacement, respectively. Further stratification was done by combining CPT codes to identify patients who had multiple procedures in succession. Data was exported and analyzed in Microsoft Excel. Chart and graph data was similarly generated in Microsoft Excel.

Results:

Table 1: Ankle Surgery Incidence (2010-2020)

Procedure Numbers and Incidence Rates	Total Patients
Number of Ankle Fusions	15018
Number of Subtalar Fusions	22397
Number of Ankle Replacements	6282
Incidence Rate of Subtalar Fusion after Ankle Fusion	2.92%
Incidence Rate of Ankle Fusion after Subtalar Fusion	1.12%

Table 2. Demographics of Patients undergoing various procedures (2010-2020)

Procedure	Total Patients	Male	Female
Ankle Fusion	15018	7669 (51.1%)	7349 (48.9%)
Subtalar Fusion	22397	9717 (43.4%)	12680 (56.6%)
Ankle Replacement	6282	3187 (50.7%)	3095 (49.3%)

Figure 1: Yearly Incidence of Ankle Fusion by Gender

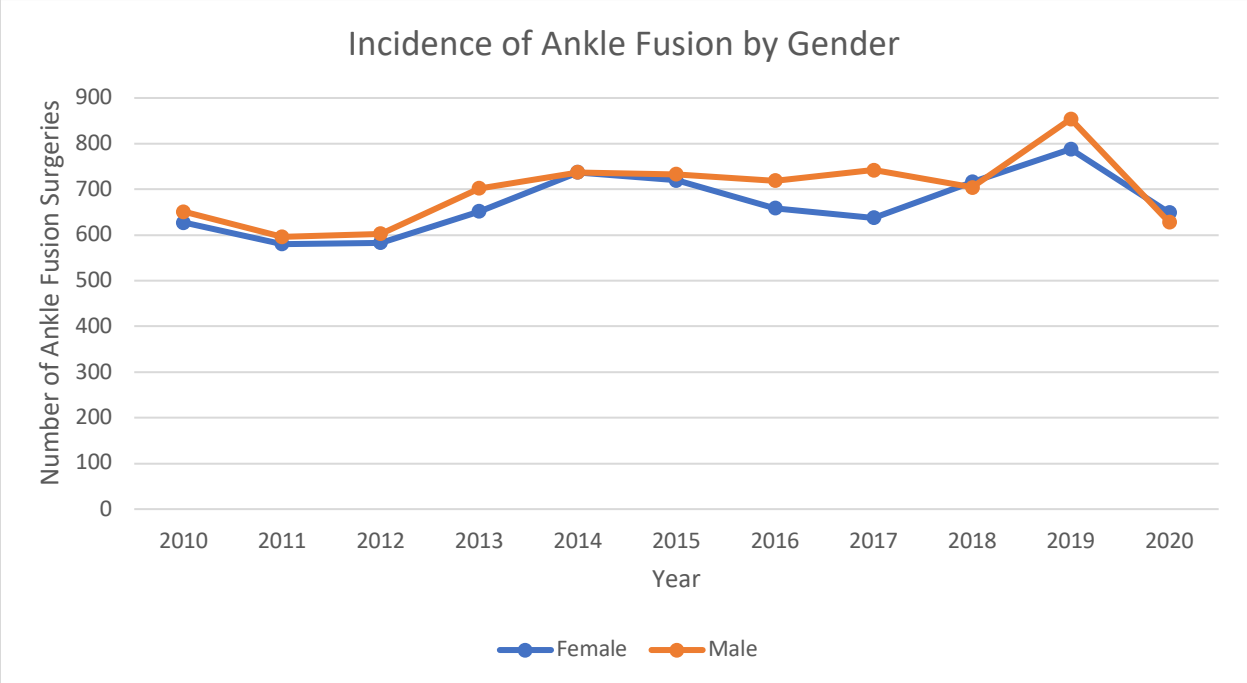


Figure 2: Yearly Incidence of Subtalar Fusion by Gender

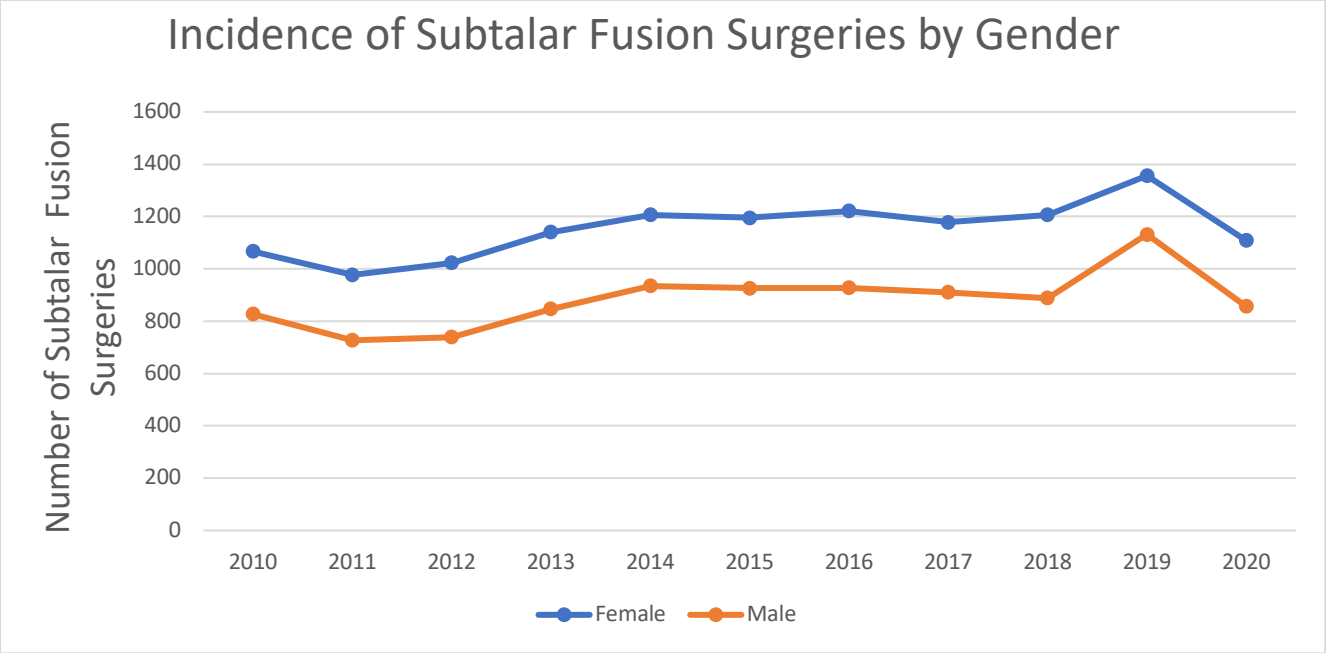
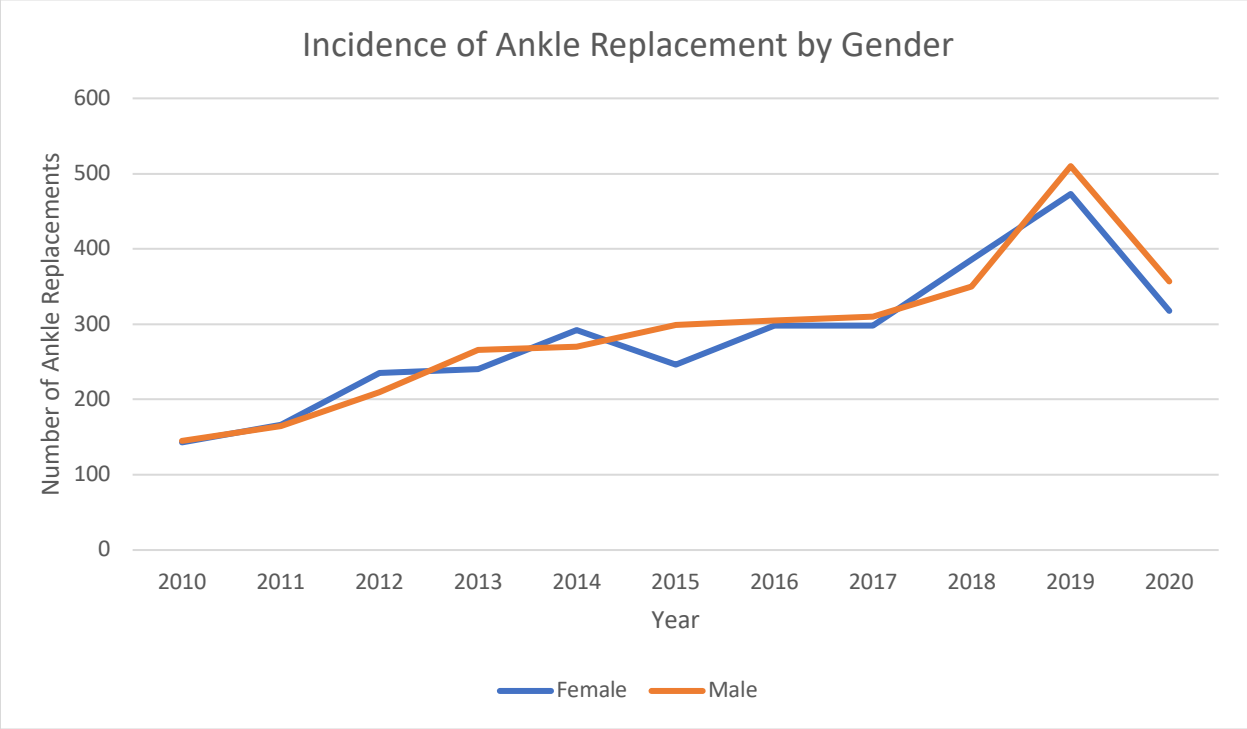


Figure 3: Figure 2: Yearly Incidence of Ankle Replacement by Gender



Conclusion: Ankle and subtalar fusions were more common than ankle replacements. A possible reason is that ankle fusions can sometimes be done arthroscopically whereas ankle replacement is a larger open surgery. Amongst patients receiving a subtalar fusion, 2.92% went on to receive a subsequent ankle fusion. Similarly, 1.12% of patients undergoing ankle fusion went on to receive a subtalar fusion. These numbers indicate that while osteoarthritis from the first surgery can be a factor, there are other reasons for a patient to require a second ankle

surgery. One possibility is pre-existing conditions or a more sedentary lifestyle prior to their first surgery which may predispose certain patients to osteoarthritis.

Ankle Arthrodesis' Impact on Ankle Replacement

Sagar Telang, Ryan Haratian, Eric Tan, Dept. of Orthopaedic Surgery, KSOM

Goal: Ankle arthrodesis and ankle replacement are the two most common surgical procedures used to help patients with end stage ankle arthritis. We are looking to see if patients' who have undergone ankle arthrodesis in the past have a higher likelihood of requiring ankle replacement in the future.

Methods: The Pearl diver database, a national database covering all U.S. states and territories, was queried from 2010-2020 based on three CPT codes: 27870, 28725, and 27702. These CPT codes correspond to ankle fusion, subtalar fusion, and ankle replacement, respectively. Further stratification was done by combining CPT codes to identify patients who had multiple procedures in succession. Data was exported and analyzed in Microsoft Excel.

Results: Preliminary Data shows that between 2010-2020 the incidence of ankle replacement surgery performed on patients who had a previous subtalar fusion is greater than the rate of ankle replacement surgery performed post ankle fusion. Additionally, while males have greater incidence of ankle fusion and ankle replacement procedures, females have a greater incidence of subtalar fusion procedures.

Table 1. Procedure Count and Incidence

Procedure Numbers and Incidence Rate	2010-2020
Number of Ankle Fusions	15018
Number of Subtalar Fusions	22397
Number of Ankle Replacements	6282
Incidence Rate of Ankle Replacement after Subtalar Fusion	0.88%
Incidence Rate of Ankle Replacement after Ankle Fusion	0.34%

Table 2. Demographics of Patients undergoing various procedures (2010-2020)

Procedure	Total Patients	Total Male	Total Female
Ankle Fusion	15018	7669, 51.1%	7349, 48.9%
Subtalar Fusion	22397	9717, 43.4%	12680, 56.6%
Ankle Replacement	6282	3187, 50.7%	3095, 49.3%

Conclusion: This initial database search helps lay the groundwork for our future Pearl Diver queries which will help elucidate which procedure, ankle fusion or ankle replacement, will provide the best outcomes for patients.

Outcomes of Cemented Distal Femur Replacements with All-Polyethylene Tibial Components for Oncologic Indications

Alexander B. Christ MD[1], Brian C. Chung BS[2], **Matthew Urness BA[2]**, Lucas Mayer MD[1], Nathanael D. Heckmann MD[1], Lawrence Menendez, MD[1]

[1]Department of Orthopaedic Surgery, Keck School of Medicine of USC, Los Angeles, California
[2]Keck School of Medicine of the University of Southern California, Los Angeles, California.

Background: Distal femoral replacement (DFR) the standard of care for limb salvage treatment following resection of neoplasms affecting the distal femur. Improvements in all-polyethylene tibial (APT) components make them a potential alternative to their more popular metal-backed counterparts, but outcomes using these implants have not been well-established. This study aims to examine the rate of survival, reoperation, and revision of APT implants and most common mechanisms of failure in oncologic indications.

Methods: A single-institution retrospective review of patients undergoing DFR for oncologic indications from 2006-2020 was conducted. Inclusion criteria required that patients be >18 years old who underwent a DFR procedure using a GMRS® Stryker cemented distal femoral endoprosthesis and APT component. Data collected from the patient medical records included: patient demographic information, body mass index, surgical history, surgical indication, type of neoplasm resected, implants utilized, and post-surgical complications. Henderson's classification of limb salvage after reconstructive surgery for bone tumors was used to classify implant failures. A competing risk analysis was conducted with all-cause reoperation, revision total knee arthroplasty as primary outcomes.

Results: Data was collected from the medical records of 55 patients who matched this study's inclusion criteria. 20 patients (36.4%) required reoperation and 12 patients (21.8%) required revision of their implant. Competing risk analysis revealed that the cumulative incidence of all-cause reoperation was 26.1% (95% CI 14.2%-39.7%) at one year and 47.2% (95% CI 27.5%-64.5%) at three years. Cumulative incidence of implant revision was 14.6% (95% CI 5.7%-27.4%) at one year and 24.0% (95% CI 9.9%-41.4%), at three years following the index procedure.

Conclusion: Approximately 1 in 3 patients required reoperation following DFR using an APT component with the most common indications for reoperation being soft tissue failure and endoprosthetic infection.

OTOLARYNGOLOGY - HEAD AND NECK SURGERY

Evaluation of Telehealth for Otolaryngology within an Incarcerated Population

Tyler Gallagher, BS, BA; Janet Choi, MD; Tamara Chambers, MD; Elisabeth Ference, MD, MPH
USC Caruso Department of Otolaryngology - Head and Neck Surgery
Keck School of Medicine of the University of Southern California
Los Angeles, CA

Background: Incarcerated individuals within the United States are guaranteed healthcare, but the quality and access of that healthcare is limited by cost, safety of transportation, and availability of providers. Telehealth has been proposed to reduce these barriers to care. This study investigated patient and physician satisfaction with telehealth in an outpatient otolaryngology clinic for the incarcerated population of a large public hospital.
Methods: This project employed a prospective cross-sectional design. Patients suitable for telehealth were invited to participate. Patients were transported to the hospital where they received healthcare via phone and subsequently completed the Telehealth Satisfaction Questionnaire (TSQ) while physicians simultaneously completed a telehealth satisfaction survey. Statistical tests, including the Kruskal-Wallis H test, were used to analyze survey results.
Results: Preliminary results showed that 16 of 17 patients reported that they were at least satisfied (4 or greater on five-point Likert scale) with telehealth with no responses stating being unsatisfied with care (Mean 4.29 ± 0.50 SD). Physicians were also at least satisfied with telehealth in 16 of 17 encounters, also with no unsatisfied responses (Mean 4.59 ± 0.62SD). Provider satisfaction with telehealth was not significantly altered based on patient chief complaint ($p=0.83$), and patient satisfaction with telehealth was not significantly altered based on chief complaint ($p=0.17$), education ($p=0.61$), income ($p=0.42$), language spoken ($p=0.47$), ethnicity ($p=0.83$), or gender ($p=0.22$).
Conclusions: In nearly all cases, both patients and providers have been satisfied with the use of telemedicine delivered via phone within an outpatient otolaryngology clinic serving an incarcerated population. This satisfaction did not significantly deviate when important demographic factors were considered, showing remote health care may be an option for this chronically underserved population.

Risk Factors Associated with Loss to Follow-Up among Otolaryngology Patients

Kevin Herrera, BS; Ian Kim, MFA/MS; Harrison Ma, BA; Christine Raj, BA; Francis Reyes Orozco, BA; Kevin Hur, MD, Caruso Department of Otolaryngology - Head and Neck Surgery
Keck School of Medicine of University of Southern California, Los Angeles, California, USA

Educational Objective: By the end of this presentation the viewer will have a better understanding the factors associated with loss to follow-up in an otolaryngology clinic.
Objectives: Loss to follow-up (LTFU) has been shown to have detrimental effects on patient care, but risk factors specific to otolaryngology patients have not been sufficiently explored. This study investigates factors associated with LTFU in an otolaryngology clinic.
Study Design: Retrospective cohort
Methods: Ten months of retrospective data of all adult patients seen at a general otolaryngology clinic were extracted from patient medical records, with variables regarding patient demographics, health complaints, care plan, and previous visits. Six dimensions of health-related quality of life—physical functioning, role functioning, social functioning, pain, mental health, energy—were examined using SF6D scores. Multivariable logistic regression analysis was performed to identify factors associated with LTFU status.

Results: Of the 486 patients included, 139 (28.6%) were LTFU and 347 (71.4%) returned for all scheduled visits. Higher energy (OR:1.52, 95%CI:1.16-2.10, p less than .01) and improved role functioning (OR:1.42, 95%CI:1.05-1.92, p less than .05) were associated with significantly higher LTFU risk. Patients requiring a referral to another provider for their care plan (OR:0.66, 95%CI:0.48-0.89, p less than .01) and more frequent previous clinic visits (OR:0.54, 95%CI:0.40-0.69, p less than .001) were less likely to be LTFU. Hispanics/Latinos compared to non-Hispanics/Latinos (OR:3.02, 95%CI:1.16-2.20, p less than .01) and Asians compared to non-Hispanic Whites (OR:2.23, 95%CI:1.23-4.16, p less than .01) had significantly higher risk of LTFU.
Conclusion: Higher energy, improved role functioning, Hispanic/Latino ethnicity, and Asian race are risk factors for LTFU, while established patients and patients requiring a more complex treatment plan are less likely to be LTFU.

Quantifying Particle Aerosolization Risk During Routine Outpatient Pediatric Otolaryngology Exams in COVID-19 Era

Heewon Lee BS[1], Beth Osterbauer MPH[2], Wihan Kim, PhD[3], Jeffrey Koempel, MD[2], Kevin Hur, MD[3], Elisabeth Ference, MD[2,3]

[1]Keck School of Medicine of the University of Southern California, Los Angeles, CA
[2]Department of Otolaryngology-Head and Neck Surgery, Children's Hospital Los Angeles, Los Angeles, CA
[3]Caruso Department of Otolaryngology-Head and Neck Surgery, Keck School of Medicine of the University of Southern California, Los Angeles, CA

Introduction: Aerosol generating otolaryngology procedures (AGPs) pose a risk of viral transmission to otolaryngologists and other health care workers in the COVID-19 era. Pediatric otolaryngologists are faced with a unique set of challenges given the behavioral and emotional aspects of caring for patients who may cry or vocalize during clinic exams. Our objective is to quantify the particle aerosolization during routine pediatric otolaryngology office exams.
Methods: We prospectively sampled aerosolized particles from 0.3 to 10 microns in diameter using two Particle Plus 7301 AQM detector between June and October 2021 in an pediatric otolaryngology clinic. As COVID-19 safety protocols were still in place, patients over 2 years of age were required to wear a face mask while in clinic. Detectors were placed at the head and the foot of the exam table, and data was collected during routine ear exams under the microscope. Time points documented during the procedure included crying/vocalizing and coughing. Baseline aerosol data was collected 1 minute prior/after the procedure.
Results: Twenty masked and twenty unmasked crying or vocalizing pediatric patients were included. Pediatric patients who were not crying/vocalizing and unmasked were included for comparison. Pediatric patients who were unmasked and crying or vocalizing produced aerosol particles substantially above baseline. Reduced aerosolization was found in crying or vocalizing patients with cotton or surgical masks undergoing routine exams.
Discussion: Our findings indicate that routine clinic pediatric otolaryngology exams are associated with increased risk of aerosol generation, thereby putting pediatric otolaryngology staff at risk of airborne disease transmission in the COVID-19 era. Surgical or cotton mask coverage was associated with decreased aerosolization. Future research should focus on interventions that may further reduce the risk of viral transmission to health care workers in otolaryngology.

The Effect of Gender and Ethnicity on Health-Related Quality of Life Among Otolaryngology Patients with Hearing Loss

Harrison Ma, BA; Ian Kim, MFA/MS; Christine Raj, BA; Kevin Herrera, BS; Francis Reyes Orozco, BA; Kevin Hur, MD, Caruso Department of Otolaryngology - Head and Neck Surgery
Keck School of Medicine of University of Southern California, Los Angeles, California, USA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how gender and ethnicity affect health-related quality of life in patients with hearing loss.

Objectives: Hearing loss is associated with decreased health-related quality of life (HRQoL), but the effect of gender and ethnicity on this relationship is unknown. This study aimed to investigate how gender and ethnicity affect the association between hearing loss and HRQoL among otolaryngology patients.
Study Design: Cross-Sectional Study.
Methods: Cross-sectional analyses of demographics, medical records and HRQoL data were performed on adult patients seen at a general otolaryngology clinic with hearing loss confirmed on audiogram. HRQoL was measured using SF-6D scores. Multivariable linear regression analyses were conducted with HRQoL as the primary outcome. Gender and ethnicity differences were estimated with adjustment for age, race, hearing loss laterality and number of otolaryngology complaints.
Results: The study included 155 patients (mean age 56 years; 54% female; 21% Hispanic/Latino). Bilateral hearing loss was associated with significantly lower HRQoL (p less than .05) while there was no significant difference between unilateral hearing loss and normal hearing. Women generally reported higher HRQoL than men. However, women reported significantly decreased HRQoL than men with increasing age (p less than .05). Increased complaint count in both women and men was associated with significantly lower HRQoL (p less than .01). Younger patients with increased complaint count reported significantly lower HRQoL than older patients with increased complaint count (p less than .05). Hispanic/Latino patients reported significantly lower HRQoL compared to non-Hispanic/Latino patients (p less than .05).
Conclusion: Among otolaryngology patients with hearing loss, women with increasing age had lower HRQoL than men. Hispanic/Latino patients had significantly lower HRQoL regardless of their laterality of hearing loss.

Gauging Stakeholder Reception to the Use of Artificial Intelligence in Gender-Affirming Voice Care

Noah Millman, Lauren Timmons-Sund, Michael Johns, Ayana Elliott, Yael Bensoussan, Caruso Department of Otolaryngology - Head and Neck Surgery
Keck School of Medicine of University of Southern California, Los Angeles, California, U.S.A.

Background: As the main objective outcome measure used in gender-affirming voice care (GAVC), fundamental frequency (f_0) often fails to accurately reflect patient perceptions of their voice. Our team developed an artificial intelligence (AI) program that provides an alternative objective outcome measure, which has potential to more accurately align with patient perceptions. The objective was to gauge stakeholder receptivity to the use of AI in GAVC before employing a novel outcome measure in transgender and nonbinary communities.
Methods: This prospective qualitative study used online focus groups composed of speech language pathologists (SLPs), transgender men (TGM), transgender women (TGW), and nonbinary individuals (NB). Participant age, race, gender, and geographic location were recorded. Each cohort participated in a series of two focus group sessions. The first session focused on participant experiences in GAVC while the second ascertained participant

perspectives on the use of AI in GAVC. Transcripts of each discussion were coded using NVivo to perform inductive thematic analysis.
Results: 7 SLPs, 7 TGW, 3 TGM, and 2 NB individuals (mean[range] age, 35.5[26-48] years) participated. Transgender and nonbinary participants were generally amenable to the technology, while SLPs were more hesitant of its use. Common positive findings included appreciation for the AI as an objective outcome measure and enthusiasm for its potential to longitudinally track progress. Hesitations concerned actionability of using the AI and unease about the black box nature of the AI's analysis.
Conclusion: Transgender and nonbinary individuals were receptive to the use of AI technology in GAVC while SLPs were more apprehensive about using the AI in their practice.

DCS and Balance Confidence

Maria Oljaca, BS, Alaina Bassett, AuD., PhD., CCC-A, Department of Otolaryngology Head and Neck Surgery, KSOM

Background: A patient is at increased risk of future falls with symptoms of dizziness and unsteadiness. Catastrophizing thoughts about the action of a fall can lead to a fear of falling and mobility restrictions. The Dizziness Catastrophizing Scale (DCS) quantifies dizziness catastrophizing, but data on its use as a metric to assess perception of fall risk remains unexplored.
Methods: A retrospective chart review of adult patients (n=61) who were evaluated at the USC Balance Center from 09/01/20 - 01/08/21. Patient demographics and intake responses to the DCS, Dizziness Handicap Inventory (DHI), and ABC Scale questionnaires were analyzed using descriptive statistics and multiple independent samples t-tests.
Results: Participants averaged 72.76 [SD=23.35] on the ABC Scale and 22.98 [SD=15.21] on the DCS. A weak negative relationship existed between the ABC Scale and DCS ($r = -0.35$, $P < 0.01$). Among participants with and without a self-reported history of falls, there was a significant difference in DCS total scores (19.36 vs 25.50; $P = .05$) and ABC Scale total scores (64.32 vs 78.63; $P = .009$). Among participants identified at risk of falling on the DHI, there was a significant difference in DCS total scores (25.38 vs 9.11; $P = .001$) and ABC Scale total scores (69.55 vs 91.33; $P < .001$). There was no significant difference in DCS total score between participants identified at risk of falling by the ABC Scale.
Conclusions: Participants with higher perceived levels of balance confidence on the ABC Scale demonstrate lower DCS scores. DCS scores were higher in participants without a self-reported history of falls. Identification of the appropropriate intervention is required to prevent these participants from falling in the future due to self-limiting behavior. Further investigation is required to determine if the DCS score fluctuates with medical management versus rehabilitation.

Interaction Between Age and Gender on Quality of Life in ENT Patients

Christine Raj, BA; Ian Kim, MFA/MS; Kevin Herrera, BS; Harrison Ma, BA; Francis Reyes Orozco, BA; Kevin Hur, MD, Caruso Department of Otolaryngology - Head and Neck Surgery
Keck School of Medicine, University of Southern California, Los Angeles, California, USA

Objectives: Despite the fact that age and gender are important markers for individual differences in health-related quality of life (HRQoL), no published studies have thus far examined the combined effects of age and gender on HRQoL in otolaryngology patients. This study tested the hypothesis that the effect of age on HRQoL differs by gender in otolaryngology patients.

Study Design: Cross-sectional
Methods: Patients seen in a general otolaryngology clinic participated in this study. HRQoL was measured by the SF-6D score. Patient characteristics including demographics and category of chief otolaryngology complaint were extracted from medical records. A multivariable linear regression analysis was used to analyze the combined effect of age and gender on HRQoL. The model was adjusted for race, ethnicity, and category of chief otolaryngology complaint.
Results: The study included 407 patients (mean age 51.5 with sd of 18.4; 46% male). Multivariable linear regression models demonstrated that aging had a greater effect on HRQoL in women compared to men (p-value of .031). For younger patients, female gender was protective; however, at ages greater than 48 years, female gender was a risk factor for decreased HRQoL. Hispanic or Latino compared to non-Hispanic or Latino (p-value of .020) and African American or Black compared to non-Hispanic White (p-value of .007) patients reported significantly lower HRQoL.
Conclusion: Age affects HRQoL differently in men than in women. Among otolaryngology patients, women experience a greater decrease in HRQoL as they age.

Risk Factors for Discharge to Skilled Nursing Facility in Patients Undergoing Head and Neck Reconstruction with Free Flap

Rasika Sudharshan

Introduction: The existing literature on whether post-operative patients recover better at home versus skilled nursing facility (SNF) is mixed. In our subjective experience, patients who undergo head and neck reconstruction following oncologic ablation typically have improved recovery when discharged home with appropriate support compared to a SNF. However, no study to date has investigated differences in recovery outcomes based on post-discharge care location in this patient population. The aim of this study is to investigate differences in post-op recovery in patients discharged to home versus SNF following head and neck reconstruction with a free flap and identify any modifiable risk factors for discharge to SNF.
Methods: This is an ongoing retrospective cohort study that includes all patients age > 18 who underwent head and neck reconstruction with any free flap following oncologic ablation at a tertiary medical center from June 2014 – June 2021. Minimum follow up is set to 6 months post-operation. Relevant CPT codes were used to obtain a study cohort. The primary outcome is discharge location (home or SNF). The following secondary outcomes are being used to capture post-operative recovery: rate of readmission and both surgical and medical complications, time to tracheostomy decannulation and gastrostomy tube removal, and time to return to pre-operative swallow function, mobility, and diet. Relevant demographic, diagnostic, operative and post-operative data are being collected. Data is being analyzed using STATA 16.1. Statistical significance is set to $p \leq 0.05$.
Results: Our current study cohort is 20 patients. We anticipate a final cohort of 200 patients. Demographic data include age, gender, ethnicity, health insurance status, history of tobacco or alcohol use, prior head and neck surgery, neoadjuvant radiation and/or chemotherapy, BMI, comorbidities as assessed by the Charlson Comorbidity index (CCI), and the following pre-operative functional assessments: swallow status based on the functional outcome swallowing scale (FOSS), functional status based on the Karnofsky performance scale (KPS), diet, and mobility. Diagnostic variables include primary tumor site, staging, histology. Operative variables include defect location and size, type of free flap and donor site size. Post-operative variables include hospital readmission within 30 days, peri-operative and post-operative surgical and medical complications, length of hospitalization, discharge location (home or SNF) and reasoning for discharge to SNF, adjuvant radiation and/or chemotherapy, follow up time.

Variables used to assess recovery include time to trach decannulation and gastrostomy tube removal, time to return to pre-operative FOSS and KPS scale, diet and mobility.
Conclusions: Our study will provide further insight into recovery outcomes based on discharge location in patients undergoing head and neck reconstruction with a free flap following oncologic ablation and identify risk factors for discharge to a SNF. We anticipate that when patients are discharged home they will have superior recovery outcomes and lower rates of both readmission and complications, a finding that will emphasize the importance of optimizing a patient both pre- and post-operatively for discharge home when possible.

Effects of Music-Induced Arousal on Performance in the Iowa Gambling Task in Cochlear Implant Users

Shivani Sundaram, Helena Gan, Samantha O'Connell, Ray Goldsworthy, Dept. of Otolaryngology, KSOM

Goal: Cochlear-implant (CI) users have reported less emotional engagement when listening to music with complex melodies and rhythms when compared to normal listeners (NL). In addition, emotional engagement has been shown by many studies to enhance motivated decision-making. In light of these findings, we undertook the current study to investigate whether dampened emotional engagement upon musical stimulation in cochlear-implant users significantly affects cognitive task performance compared to non-CI users.
Methods: CL users and NL subjects are instructed to listen to musical clips representing different emotional valences (happy, sad, peaceful, fearful) and then rank their mood and emotional arousal. They then complete a modified version of the Iowa Gambling Task (IGT), a complex emotion-based learning and decision-making task in which participants must pick from 4 "gambling" decks that have different frequencies of losses and gains. Differences in performance on the IGT between CI and NL subjects will be assessed to investigate the effects of diminished auditory processing in CI users on executive function.
Expected Results: We hypothesize that CI users who listen to happy and peaceful music will perform worse than NL subjects in those same musical categories (measured by the frequency of cards picked from decks with negative expected values); similarly, we anticipate that CI users who listen to sad and fearful music will perform better than their corresponding NL subjects. In addition, we anticipate more risk-aversion behavior in NL subjects than CI users (measured by the frequency of frequent loss decks selected) for the happy and peaceful music and less risk-aversion behavior in NL subjects versus CI users for the sad and fearful musical groups.
Summary: This study will demonstrate whether the effects of dampened emotional engagement as a result of poorer musical transmission through a cochlear implant affects cognition and decision making in CI users.

Sub-clinical Cochlear Damage Detected by Otoacoustic Emissions

Jane Yang

Background: Otoacoustic Emissions (OAE) testing is widely used as a non-behavioral measurement of hearing, allowing clinicians to objectively assess patients without the need for a response. However, the utility of the test is currently limited to screening for the presence or absence of hearing loss. OAEs are low level sounds produced by hair cell motility in the healthy cochlea. They can provide detailed information about the integrity of these hair cells at specific locations along the cochlea. We hypothesize that OAEs are more sensitive to sub-clinical changes in cochlear function not always detected by the standard audiogram.

Methods: In order to compare the sensitivity of OAEs to auditory dysfunction with that of audiometry, we identified 24 individuals with mild-moderate hearing loss at some frequencies and audiometrically normal hearing (threshold of 15 dB or less) at one or more frequencies. A group of 16 entirely normal hearing individuals comprised our second group. Audiometric thresholds and two classes of OAEs, Stimulus Frequency OAEs (SFOAEs) and Distortion Product OAEs (DPOAEs), were measured for all subjects. Targeting frequencies that were audiometrically normal in our subjects with hearing loss, we compared their OAE amplitudes a) at fixed stimulus levels and b) across levels at fixed frequencies with the data of fully normal-hearing subjects. The two groups were roughly matched for age (mean within 7 yrs) and audiometric threshold (mean within 5 dB) at the target frequencies.
Results: Both types of emissions, DPOAEs and SFOAEs, show significant differences between normal hearing and hearing-impaired subjects at frequencies where audiometric results are comparable and within the normal range. Specifically, emission levels in the hearing-impaired group are significantly reduced across most frequencies at two fixed stimulus levels; 40 dB and 65 dB SPL. Another metric characterizing the strength of the emission, Source Strength, was also reduced in the ears with hearing loss. DPOAEs showed atypical compression features in the hearing-impaired group; the stimulus level at which DPOAE amplitude compressed (Compression Knee) is higher than that in the normal hearing group. Examining associated factors that contribute to these differences, our data suggest that extended high frequency hearing (> 8 kHz) could be significant, as well as age (for high-frequencies only).
Conclusions: OAEs are more sensitive to changes in cochlear function than the traditional audiogram. What is considered "normal" by audiometric evaluation may not translate to normal cochlear function. Hence, it is important to consider the limits of audiometric testing when assessing normalcy of the auditory system. Detecting these sub-clinical changes in cochlear function as early as possible may be crucial for preventing the progression of hearing loss or providing patients with key resources.

Comorbidity and Polypharmacy as Predictors of Resilience in Otology Patients
Ashley H Yi, BS; Frances R Orozco, BS; Christine K Raj, BA; Harrison J Ma, BA; Brandon Yeshoua, BS; Kevin Hur, MD

Background: Although the number of home medications and comorbidity severity are commonly associated with health outcomes, there is limited research on how these factors affect resilience among otology patients. As the ability to adapt to difficult situations, resilience has been highlighted as a protective characteristic in medical literature and is linked to lower mortality rates. Understanding which specific factors contribute to resilience may help identify patients who need greater guidance in disease management to prevent worse health outcomes. The objective of this study was to investigate how the Charlson Comorbidity Index and number of home medications impact the self-reported resilience of otology patients.
Methods: Sociodemographic and resilience surveys were administered to patients with otologic complaints at three otolaryngology clinics in Los Angeles. Resilience was calculated using the Brief Resilience Scale (BRS) and medical records were reviewed to determine the number of home medications. The Charlson Comorbidity Index (CCI) assessed comorbidity level by considering both the patient's age and severity of pre-defined comorbid conditions. Multivariate linear regression analysis was performed to investigate the association between home medication use and CCI with resilience, adjusting for gender, race and ethnicity, and foreign-born status.
Results: Of the 304 otology patients (mean age 51 years old, 38% male) who completed the surveys, 86% (n=261) had 1 or more home medications and 63 percent (n=192) had a CCI score equal to or greater than 1. Upon multivariate analysis, resilience scores in otology patients

decreased with higher number of home medications (β=-0.03, P-value<0.001) and increased with higher CCI scores (β=0.08, P-value<0.005). Additionally, male otology patients were more likely to report higher resilience scores than female patients (β=0.21, P-value<0.05).
Conclusion: Comorbidities and male gender were associated with increased resilience while polypharmacy was associated with a decreased resilience among otology patients.

PATHOLOGY

Bone Histomorphometry and Remodeling in Pleistocene and Pliocene Fossil Hominin Humeri

Gilberto Luna Bojalil[1], Song Xing[2], David B. Burr[3], Kevin D. Hunt[4], Innocent Byiringiro[3], Paul Tafforeau[5], Kristian J. Carlson[6]

[1]*Keck School of Medicine of University of Southern California, Los Angeles CA, USA*
[2]*Key Laboratory of Vertebrate Evolution and Human Origins, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China*
[3]*Department of Anatomy and Cell Biology, Indiana School of Medicine, Indiana University, Indianapolis, IN, USA*
[4]*Department of Anthropology, Indiana University, Bloomington, IN, USA*
[5]*European Synchrotron Radiation Facility, Grenoble, France*
[6]*Department of Integrative Anatomical Sciences, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA*

Background: Current literature suggests that bone microstructure has been stable throughout human evolution, and that bone remodeling rates in ancestral humans did not differ from the rates observed in modern humans. These conclusions are largely based on histological studies on osteon population density in Late Pleistocene hominid fossils and on studies drawing similarities between human and chimpanzee morphometry. This study's analysis on extant human and chimpanzee bone samples is showing significant morphometrical differences between human and chimpanzee humeri. These differences raise the question of when human and chimpanzee humeral morphology diverged. This study analyzes *Homo erectus* and *Australopithecus africanus* fossils to investigate when humeral morphometric differences between humans and chimps may have emerged.
Methods: Osteon population density, osteon perimeter, osteon area, and haversian canal area are being compared in modern chimpanzees, modern humans, and X-ray images from 700 ka B.P. *H. erectus* and 3000 ka B.P *A. africanus* fossilized midshaft humeri. Multiple cross-sections from different sections of humeri are being analyzed, and morphometric variables are being assessed at endosteal, intracortical, and periosteal levels. Osteon properties are being measured using ImageJ, and statistical differences and interactions are being tested using ANOVA.
Results: Preliminary data indicate that humans have larger osteons and higher osteon population density than chimpanzees, and that human and chimpanzee morphometries differ at different bone depths. X-ray images from *H. erectus* and *A. africanus* are in the process of being measured.
Conclusion: Human and chimpanzee morphometry differs significantly in informative ways. These morphometric patterns will be compared with *H. erectus* and *A. africanus* samples to investigate when these morphometric differences between humans and chimpanzees may have emerged, and to inform considerations about the functionality of ancestral human skeletal morphology.

Personalized Modeling of Pediatric Ependymoma

Cole Urnes, Sara Sabet, Dr. Anat Erdreich-Epstein, Dr. Joshua Breunig Regenerative Medicine Institute of Cedars-Sinai

Goal: There is currently no immune competent mouse model of posterior fossa type A ependymoma (PFA EPN), limiting the progress of preclinical development related to this disease. In most cases, PFA EPNs are driven by aberrant expression of the EZHIP protein that leads to an H3K27me3 phenotype. This current study aims to generate autochthonous tumors

that recapitulate the morphology and progression of this disease by single copy insertion of EZHIP in vivo using mosaic analysis by dual recombinase-mediated cassette exchange (MADR).
Methods: Donor plasmid for the MADR technique was cloned containing the EZHIP gene as well as an SMFP-myc gene to allow for visualization. Mouse MTMG neural stem cells were then electroporated with the EZHIP plasmids and verified for transgene insertion. The EZHIP plasmids were subsequently electroporated into the lateral ventricles of P0 MTMG mouse pups. 10 days post-procedure the brains of these pups were collected, sectioned, and stained for EZHIP and SMFP-myc.
Results: We have demonstrated expression of EZHIP in P10 mouse MTMG olfactory bulb sections following P0 treatment with MADR. This expression currently occurs in <1% of neurons within each section.
Conclusions: Expression of EZHIP following MADR treatment *in vivo* was demonstrated by this work, a critical step in the generation of a PFA EPN mouse model. Further assessment and optimization of tumor growth in treated animals will inform the ways in which this technology can be used to enable preclinical drug development for this disease.

The Role of Bronchoalveolar Lavage in COVID-19 Diagnoses and Management
Edie Zhang, Rosemary She, M.D. Advisor, Department of Pathology, KSOM

Background: In the diagnosis and management of SARS-COV-2, polymerase chain reaction (PCR) of nasopharyngeal swabs (NPS) is considered the gold standard. Even though the virus can cause severe lower airway disease, the lower airway is not considered a primary sample site. This study aims to evaluate the clinical and diagnostic role of bronchoalveolar lavage (BAL) in managing COVID-19.
Methods: This was a retrospective chart review of patients admitted to Keck Hospital from March 1st, 2020, to May 1st, 2021, who had both NPS and BAL samples collected and tested for SARS-CoV-2. Patients were grouped A, those who were NPS+BAL+, B, NPS+BAL-, C, NPS-BAL+, and D, NPS -BAL-. Additional data analysis also considered admission reason and BAL indication, date of collection and reporting of sample results, date of symptom onset, cycle threshold (Ct) values for positive BAL samples, and patient status upon discharge. Due to study size, statistical analysis was mostly descriptive but also included the use of the student t-test, one-way ANOVA, and Tukey HSD.
Results: 154 hospitalized patients provided NPS and BAL samples for SARS-CoV-2 RNA testing (mean age 55.1, 93 (59.6%) male. 29 patients were in Group A, 24 in B, 7 in C, and 94 in D. 65 were admitted to the hospital for respiratory reasons and 43 BALs were ordered due to abnormal respiratory function. Turnaround time (TAT) for BAL was 0.17 (0.34±0.5) days. 28 Ct values were reported for 36 of the SARS-CoV-2 BAL+ samples, and ranged from 16.2 to 36.3, with a mean of 28.8 cycles. Those who died had a mean Ct value of 28.8 (n=17) and those who did not, 28.6 (n=11). Group comparisons in mortality revealed 43.5% of the total sample size, 58.6% of Group A, 54.2% of Group B, 57.1% of Group C and 35.1% of Group D, died. Among those who died, the mean time between NPS and BAL collection was 11.5 days and 8.3 in those who survived. The mean time difference between symptom onset and NPS collection in days was 10.8 in Group A, 20.6 in Group B, 8.9 in Group C, and 20.9 in Group D. The mean time difference between symptom onset and BAL collection was 24.0 days in Group A, 34.1 in Group B, 13.4 in Group C, and 14.7 in Group D.
Conclusion: Group mortality comparisons revealed that Groups A-D were not statistically different and the time it took to obtain BAL results did not impact patient mortality. Though Ct values allow for understanding of viral load, they are not good predictors of patient mortality. Further exploration into Ct values for both NPS and BAL samples needed. The time difference

between symptom onset and NPS collection was not significantly different; however, when analyzing the time difference between symptom onset and BAL1 collection dates (n=108), patients in Group B obtained BALs significantly later than patients in Group D ($p<0.01$). Group B patients also obtained BALs significantly later than patients in Group D ($p<0.05$). This is likely due to attributing a patient's respiratory symptoms to COVID-19 given a positive NPS sample, decreasing the urgency for a BAL, whereas further workup is more quickly warranted when swabs for the virus return negative. Further studies into the relationship between ordering a BAL early in patient management and patient survival is needed. Additional studies into the effect of patient comorbidities should also be considered.

PEDIATRICS

Single Photon Emission Computerized Tomography (SPECT) Analysis of Regional Cerebral Blood Flow Differences in Bipolar Disorder

Pooja Belur, Manuel Trujillo, Ravi Bansal, Siddhant Sawardekar, Daniel Amen, Bradley S. Peterson

Background: Our project used SPECT imaging to further elucidate regional cerebral blood flow (rCBF) differences in bipolar adults.
Methods: The study spanned 8 Amen clinics and included 143 adults with a primary clinical diagnosis of bipolar disorder (34.1 ± 13.6 years) and 103 healthy adults (39.4 ± 12.8 years). Patients completed comprehensive psychiatric evaluations, a mental status exam, symptom severity questionnaires, and a Beck Depression Inventory. Patients also underwent SPECT imaging while performing the Conner's Continuous Performance Test ("concentration" scan) and while resting ("baseline" scan). We ran voxelwise analyses comparing rCBF across diagnostic groups, moderating the effects of age, sex, mood state at the time of scan, and concurrent psychotropic use. We also investigated correlations with patients' relative symptom severity during scan.
Results: Bipolar adults had globally increased levels of rCBF at both baseline and concentration, particularly in the basal ganglia, anterior cingulate cortex, frontal lobe, and posterior white matter regions. Age differences were also seen at concentration and baseline. As age increased, there were global increases in rCBF in bipolar adults compared with healthy adults, though these effects disappeared when varying for whole brain perfusion. Within groups, bipolar adults also showed increases in rCBF with age in the thalamus and occipital gyri.
We are in the process of completing remaining analyses. Within bipolar patients, we expect rCBF changes will correlate with symptom severity, especially in regions with main effects of diagnosis. We also anticipate rCBF will vary based on the patient's mood state at scan. Finally, we expect concurrent psychotropic use will have negligible effects on our findings.
Conclusion: Consistent with previous literature, our results suggest altered blood flow among adults with bipolar disorder, particularly in frontal-subcortical regions.

Rise in Accidental Overdose During COVID-19: Lingering Effects of Opioid Distribution?

Raymond Cho, Dr. Eugene Kim (faculty mentor)

Goal: LA County accidental drug overdose deaths have increased by 52% during the COVID-19 pandemic. This increase widely varied based on location within LA County – with some service planning areas (SPAs) seeing up to an 82.3% relative increase. Our objective was to evaluate if this relative increase corelated with past opioid distribution.
Methods: Detailed information on opioid distribution was made available for the first time in 2018 after Judge Polster removed the protective order on the DEA Automation of Reports and Consolidated Orders System (ARCOS). Using ARCOS, we obtained the morphine milligram equivalent (MME) of prescription opioids that were distributed in LA County between 2006-2014. The (1) MME per SPA and (2) MME per capita in each SPA was then calculated (Table 1). This data was compared with the reported increase in accidental overdose deaths during COVID-19.
Results: Analysis of the ARCOS data showed SPA 2 and SPA 7 with the highest overall opioid distribution and SPA 1 and 7 with the highest dosage unit per capita.

Table 1: Opioid MME Dosage Unit and Relative Change in Deaths During COVID-19 per SPA.

Service Planning Area		Relative Change in Deaths During COVID-19	Total Dosage Unit (2006-2014)	Dosage Unit Per Capita
SPA 1	Antelope Valley	62.90%	124,119,026	317.5
SPA 2	SFV	48.40%	445,027,599	204.7
SPA 3	SGV	82.30%	286,682,753	161.3
SPA 4	Metro LA	51.30%	262,933,481	230.5
SPA 5	West	67.30%	90,409,025	139.8
SPA 6	South	51.90%	19,264,363	18.70
SPA 7	East	70.40%	390,708,146	298.4
SPA 8	South Bay	42.10%	304,052,159	196.1

Conclusion: A causal relationship between opioid distribution per SPA and relative change in deaths during the COVID-19 pandemic was not established. This may suggest confounding factors such as pharmacy deserts, area poverty, lag in publishing ARCOS data, or other factors. More detailed information on community drug misuse and perceptions may be needed to establish a better understanding of differences in relative increase of accidental drug overdose deaths by SPA.

Neuro-Developmental Outcomes in Very Low Birth Weight Infants Fed with Exclusive Human Milk vs Bovine Milk Fortified Human Milk

Erica Duran Medical Student, Manas Tetarbe DO, Rowena Cayabyab MD, MPH

Background: Exclusive human milk (EHM) and breast feeding has been recommended by AAP for infants due to immunity benefits, energy, nutrients and better neurodevelopmental outcomes compared to infants fed bovine milk containing diet. Very low birth weight (VLBW) infants fed human milk need fortification with human milk based vs. bovine milk-based fortifier (HMF) to increase nutrient and caloric intake to improve their growth and development. The goal of the study is to compare neurodevelopmental scores at 18-24 months corrected age of VLBW infants fed exclusive human milk vs. bovine milk fortified human milk.
Methods: Retrospective chart review of VLBW infants admitted to LAC+ USC Medical Center neonatal intensive care unit from 2016-2020 who received exclusive human breast milk and human milk fortified with bovine milk-based fortifier. Neonatal demographics and neurodevelopmental outcomes with the use of Bayley Scales of Infants Development at 18-24 months were collected from electronic medical records. Data was analyzed with Wilcoxon Rank Sum and Fischer Exact Test as appropriate.
Results: There were 67 VLBW infants enrolled, 18 in the EHM group and 49 in the HMF group, however there were only 16 babies with neurodevelopmental outcomes. There was no significant difference in the median gestational age; EHM 27 weeks (25, 28) vs. HMF 26 weeks (25,) p=.26 median birth weight EHM; 854 grams, (710, 1020), vs. HMF; 850 grams (708, 1000) p=.67 between the two groups. Median composite scores of cognitive, EHM 97.5, (90,105) vs. HMF 83 (65,90) p=.11. language; EHM 66.5, (62, 71) vs. HMF 83 (68, 86) p=.26 and motor; EHM 101 (91, 110) vs. HMF 91, (79, 101) p=.26 were not significantly different between groups.
Conclusion: This preliminary data on VLBW infants showed no significant difference in cognitive, language and motor scores at 18-24 moths corrected age between infants fed exclusive human milk and infants fed bovine milk fortified human milk. A larger sample is needed to verify these results.

Utilization of Telehealth Associated with Reduced Diabetes Distress in Young Adults with Type 1 Diabetes

Ethan Faye[1], Mark W. Reid[2], Jaquelin Flores Garcia[2], Elizabeth Pyatak[1], Jennifer Raymond[1,2]
[1]University of Southern California; [2]Children's Hospital Los Angeles, Los Angeles, CA

Background: Due to the COVID-19 pandemic, many Adolescents and Young Adults (AYA) living with type 1 diabetes (T1D) have received care via telehealth. The impact of this transition on psychosocial health and glycemic control may inform future approaches to diabetes care delivery.
Objective: To assess the impact of telehealth on diabetes distress and glycemic control in AYA living with T1D.
Methods: In a fifteen-month randomized controlled trial conducted before and during the COVID-19 pandemic, 62 AYA ages 16-25 received either quarterly usual T1D care (in-person or via telehealth), or CoYoT1 Care, which included bimonthly T1D group sessions via telehealth and quarterly patient-centered care provider visits (in-person or via telehealth).
Patients completed the Diabetes Distress Scale (DDS) at baseline and at study completion. Changes in DDS total and subscale scores were examined using constrained linear mixed models controlling for age, sex, baseline DDS scores, and total number of clinic visits (by any method) during the study.
Results: Patients who attended at least half of their clinic visits via telehealth reported minimal change in DDS scores at study end, while those who attended less than half of their clinic visits via telehealth reported increases in diabetes distress ($p=0.01$). The relative benefit of attending clinic via telehealth was shown for diabetes-related emotional problems ($p=0.007$), physician-related distress ($p=0.003$), and regimen-related distress ($p<0.05$). Notably, attending sessions via telehealth was not associated with any variations in A1c change at study end ($p=0.60$).
Conclusion: Receiving diabetes care via telehealth before and during the COVID-19 pandemic had a protective effect on diabetes distress and did not have a negative impact on glycemic control. This finding further supports the continued integration of telehealth as an option in standard diabetes care, specifically for the AYA population.

Investigating the Relationship Between Serum Alkaline Phosphatase Levels and Growth Velocity in Pediatric Patients with Short Stature

Alfredo Hernandez, MS, Priyanka Bakhtiani, MD, Division of Pediatric Endocrinology, CHLA

Goal: Growth velocity (GV) is one of the key factors that determine index of suspicion and decision to start recombinant growth hormone therapy in a child with short stature. Serum Alkaline Phosphatase (ALP) level is typically obtained as part of the initial screening, although its relationship with growth velocity is not well-established. A handful of previous studies with relatively small sample sizes have hinted at a possible correlation between bone-specific ALP and growth velocity, especially in children with growth hormone deficiency. This study aims to further investigate the relationship between serum alkaline phosphatase levels and the height velocity of a large sample size of children with short stature associated with various etiologies.
Methods: Retrospective chart review of prepubertal children aged 2 years and above, who were seen between 1/1/2014 to 1/1/2021 at CHLA endocrinology clinics at main campus or satellite locations with concern for short stature or growth deceleration. Descriptive variables/data points such as age, height SDS at presentation, bone age at presentation, IGF-1 levels, ALP levels, tanner stage, diagnosis, and annualized growth velocity will be analyzed and correlation analysis will be used to identify a relationship between ALP and growth velocity.
Results: Our hypothesis states that low serum alkaline phosphatase level at presentation predicts a low growth velocity in the upcoming year, irrespective of etiology of short stature.

Conclusions: The establishment of an easily measured biomarker, such as ALP, which can be correlated with growth velocity will allow an increase in access of growth hormone therapy to pediatric patients with short stature during the periods of development when they are able to receive the most benefit.

Obstructive Sleep Apnea in Congenital Central Hypoventilation Syndrome

Odeya Kagan[a], Thomas G. Keens[a,b], Sally L. Davidson Ward[a,b], Iris A. Perez[a,b]
[a] *Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA*
[b] *Division of Pediatric Pulmonology and Sleep Medicine, Children's Hospital Los Angeles, Los Angeles, CA, USA*

Background/Objectives: Congenital Central Hypoventilation Syndrome is a rare disorder due to the PHOX2B gene mutation critical in neural crest cell development. It's characterized by failure in autonomic control of breathing with a diminished/absent physiologic response to hypoxia and hypercapnia that is greatest during sleep. Most patients present with apnea/cyanosis from birth, or apneas triggered by exposure to anesthesia, viral illness, stress, and/or consequences of hypoventilation/hypoxemia. While profound hypoventilation and central apneas are the hallmarks of CCHS, we have observed some patients with obstructive sleep apnea, not yet reported as presentation in current literature. A newly published study by Madani et al. demonstrated a predisposition to obstructive apneas in mice with the Phox2b27Ala/+ mutation likely due to hypoglossal dysgenesis (Madani et al., 2021). The purpose of this study is to describe the presence and frequency of obstructive sleep apnea in patients with CCHS, the frequency of OSA in initial presentation, and identify the role of genotype for OSA.
Methods: This will be a retrospective chart review of patients with a confirmed diagnosis of CCHS seen at Children's Hospital Los Angeles from 2004 to 2022. Data will be collected from the medical records and will include demographics, PHOX2B genotype, age at diagnosis, clinical presentation, type and duration of ventilatory support, age of initiation of ventilatory support, and sleep study results. This is a descriptive study. Statistical analysis will involve an unpaired T-Test comparing the results between those groups. The study has been granted IRB approval and investigators are set to collect data.
Expected Results: We expect that OSA will be an early clinical presentation in patients with CCHS.
Summary/Conclusion: CCHS patients have a predisposition to obstructive apneas and OSA will be present in those with PHOX2B genotypes associated with more severe phenotypes.

Impact of Prenatal Exposure to Environmental Toxins on Brain Development using fMRI

Silpa Karipineni, Ravi Bansal PhD, Chaitanya Gupte MS, Frederica Perera DrPH PhD, Virginia Rauh ScD, Bradley Peterson MD, Dept. of Research, KSOM, CHLA

Background: Pollution affects health outcomes as prior research has associated exposure with increasing rates of attention-deficit hyperactivity disorder, autism, and other neurodevelopmental delays. However, the mechanisms by which pollutants alters brain development remain largely unknown. We used resting state fMRI data to examine how prenatal exposure to environmental toxins impacts brain development by age 6 years.
Methods: We recruited 727 African-American or Dominican pregnant women from local clinics in northern Manhattan, New York. Exposure to environmental toxins was collected for fine particulate matter (PM2.5) as well as polycyclic aromatic hydrocarbons (PAH). Resting-state functional Magnetic Resonance Imaging (fMRI) data were collected in 332 children once they

reached at least 6 years of age. After excluding scans with motion artifacts, fMRI data in 239 participants were available for final analysis. We computed resting connectivity measures for paired regions in a template brain and performed linear regression analyses to identify how connectivity between regions varied with exposure.
Results: Greater exposure to PM2.5 was associated with shorter path length and greater edge density, global efficiency, transitivity, and clustering coefficient (p-values < 0.05). Females relative to males had decreased path length and increased connectivity in all other measures. There were no statistically significant age or PAH exposure effects on graph theoretic measures of brain connectivity. Secondary analysis regressing PM2.5 exposure on pairwise connectivity measures showed that exposure disrupted connectivity of the thalamus to many regions of the brain.
Conclusion: This study demonstrates that prenatal exposure to fine particulate matter increased brain connectivity. Further research to collect fMRI series over time and in a broader population may help explore why certain areas of the brain, such as the thalamus, are more likely to be affected.

Understanding Characteristics of Adolescents and Young Adults Accessing Pre-Exposure Prophylaxis Services and Engagement Over Time at CHLA's Division of Adolescent and Young Adult Medicine

Tyler Kristensen, BA; Jonathan Warus, MD

Background: 21% of new HIV diagnoses in the US in 2018 were among adolescents and young adults (AYAs), ages 13-24 (CDC). Pre-exposure Prophylaxis (PrEP) for HIV is a safe and effective method of preventing HIV infection and was approved for use in AYAs by the FDA in 2018. This study seeks to provide descriptive data on AYAs accessing PrEP services through CHLA's PrEP Center of Excellence to better understand characteristics of youth accessing PrEP services in the Los Angeles area.
Methods: A retrospective chart review was performed to obtain descriptive data on all AYA patients accessing PrEP services at CHLA's PrEP Center of Excellence from December 2016 through September 2021. Demographic data and values of engagement in services were obtained from electronic medical records and univariate and bivariate analyses were used to examine relationships within these variables.
Results: Of the 109 patients who accessed PrEP services (mean age 20.1 years), 76% identified as cisgender male, 13% transfeminine, and 11% transmasculine. Race/ethnicity appear reflective of the general population of the surrounding county with 46% Latinx, 32% White, 14% Black, and 8% Asian. At the end of the study period, only 28% of patients were still in active care with 31% transferring services to other centers (aged out of services, moved, etc.), 24% declining to continue PrEP, 12% lost to follow-up, and 2% linked to HIV care. Initial analysis suggests that rates of engagement in PrEP care were similar across racial/ethnic groups.
Conclusions: Preliminary results demonstrate that AYA use of PrEP services is reflective of local demographics. However, the highest rates of new AYA HIV infections are among communities of color, with Black and Latinx youth making up 51% and 27%, respectively (CDC). Thus, future goals of HIV prevention for AYAs must include increasing access to PrEP services to those at highest risk of HIV infection.

The Effect of High Altitude in Patients with Congenital Central Hypoventilation Syndrome

Ashley Kwon[a], Thomas G. Keens[a, b], Iris A. Perez[a, b]

[a] *Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA*
[b] *Division of Pediatric Pulmonology and Sleep Medicine, Children's Hospital Los Angeles, Los Angeles, CA, USA*

Background: Congenital central hypoventilation syndrome (CCHS) is a rare disorder of respiratory control and autonomic nervous system dysfunction caused by a *PHOX2B* gene mutation. This leads to lifelong absent or reduced ventilatory response to hypoxemia and/or hypercapnia. At high altitudes, there are lower levels of oxygen than at sea-level. The purpose of this study is to systematically investigate the effect of high altitude on the ventilatory responses of patients with CCHS and to compare these responses to healthy controls. We hypothesize that CCHS patients will have lower oxygen and higher carbon dioxide levels at high altitudes compared to healthy controls.
Methods: 10 patients with CCHS, who breathe spontaneously while awake and are ventilator-dependent only during sleep, and 10 healthy controls, aged 2 years and older, will undergo high altitude simulation testing. Participants will use a tight-fitting mask to breathe a mixture of room air and nitrogen gas to simulate inspired air at sea level, 6000 feet, and 8000 feet (F_IO_2 0.21, 0.17, and 0.16 respectively). The respiratory rate, heart rate, oxygen saturation, carbon dioxide data, and symptoms of dyspnea of each participant will be recorded and compared between their sea level and simulated higher altitude level data. Data from CCHS patients will also be compared with data from healthy controls using the unpaired Student's t-test.
Expected Results: We have enrolled 5 patients with CCHS, average age 16.8 years ± 7.05 years, 60% females. We expect to see that patients with CCHS will not increase their respiratory rate and/or heart rate while healthy controls will increase their respiratory rate and/or heart rate in response to low levels of inspired oxygen.
Summary: Exposure to high altitude will lead to lower oxygen and higher carbon dioxide levels in patients with CCHS because of the lack of proper compensatory mechanisms. Findings in this study will aid in clinical decisions for patients travelling to or living at places of high altitude.

Auditory Arousal from Sleep in Patients with Congenital Central Hypoventilation Syndrome

Eric Laifman, Daniel Quevedo, Victoria Mena, Thomas G. Keens, Sally Ward, Iris A. Perez

Background: Congenital central hypoventilation syndrome (CCHS) is a rare genetic disorder characterized by mutation of the *PHOX2B* gene; patients require life-long ventilatory support during sleep. We recently reported that CCHS do not awake to ventilator alarms. Therefore, we set out to further investigate hearing in patients with CCHS as well as arousal response to ventilator alarms. We hypothesized that patients with CCHS have abnormal auditory arousal responses to ventilator alarms and do not sufficiently awaken to auditory stimuli.
Methods: We are conducting a prospective cohort study of patients with CCHS and those with neuromuscular disease requiring ventilatory support during sleep will be used as controls. To assess whether CCHS patients awaken to alarms, we plan to measure the volume of these alarms using an SLM-25 Professional Sound Level Meter for one night and monitoring the patients' responses to these alarms (wake up or sleep through). Data to be collected will include demographics, *PHOX2B* gene mutation, results of latest audiology test, type, and brand of ventilatory support and monitoring devices, presence of nursing at night, and the patient's and caregiver's responses to the alarm.

Results: We currently have four patients enrolled in the study; one subject completed the study. The patient was nine years old with NPARM *PHOX2B* gene mutation and is ventilator dependent during sleep only using non-invasive positive pressure ventilation by nasal mask. The patients most recent audiology test was in April of 2019 and indicated hearing loss. During the study period, six alarms rang, and the patient arose to one of these alarms. The mean alarm volume was 47.5 +/- 7.7 decibels with a maximum volume of 63.7 to which the patient did not wake up.
Conclusions: Patients with CCHS do not respond adequately to monitoring alarms of soft to moderate noise level. The etiology of this deficit may be due to abnormal hearing and highlights the importance of hearing loss screening.

A Pilot Study: Comparing a Novel Noninvasive Measure of Cerebrovascular Stability Index with an Invasive Technique in Neonates with Congenital Heart Disease
Carlin A. Merkel, B.S., Jodie K. Votava-Smith, MD, Nhu Tran, PhD, RN

Background and Goal: Congenital heart disease (CHD) affects nearly 1% of all live births. Infants born with CHD show evidence of brain dysmaturation that may be a result of impaired cerebral autoregulation (CA). Impaired CA is associated with greater cerebral fractional oxygen tissue oxygen extraction (FTOE). FTOE can be used to assess the risk of brain dysmaturation and consequently poor developmental outcomes in infants with CHD. This pilot study aims to validate a novel noninvasive measure of CA, termed *cerebrovascular stability index* (CSI), by comparing it to a more traditional invasive technique of measuring CA.
Methods: We conducted a pilot study in nine neonates with CHD. CA was calculated in these infants using waveform coherence of mean arterial pressure (MAP) via an invasive indwelling arterial line and cerebral regional oxygen saturation ($rcSO_2$) via near infrared spectroscopy (NIRS). In the same infants, CSI was also calculated using the average change in $rcSO_2$ through three tilts (moving the infant from a supine to a sitting posture). FTOE was calculated using arterial oxygen saturation (SaO_2) via pulse oximetry. A paired t-test analyzed the statistical difference between CSI and CA. A linear regression model analyzed the correlation between CSI and FTOE.
Results: We found no statistically significant difference between CSI and CA. CSI and FTOE significantly correlated with each other.
Conclusions: This pilot study provides evidence of validity of CSI, a novel noninvasive measure of CA, in neonates with CHD. The use of CSI will allow for measures of CA to be performed in an out-patient setting or in infants without arterial lines. Larger trials are indicated.

Food Choices in Youth with Type 2 Diabetes Mellitus
Nare Minaeian, KSOM Medical Student; Mentor: Mimi S. Kim, MD

Goal: There has been a significant increase in the prevalence of Type 2 Diabetes in youth and adolescents in the U.S., coinciding with the epidemic of obesity. The goal of this study is to examine food preferences and perceptions, along with the processing of key food attributes in youth with Type 2 Diabetes.
Methods: This is a cross-sectional study that consists of one study visit performed at Children's Hospital Los Angeles (CHLA). Patients aged 8 to 23 years old with Type 2 Diabetes (Hemoglobin A1c > 6.5%) are being recruited from the Type 2 Diabetes clinic at CHLA. At the study visit, patients have their fasting glucose, waist and hip circumference, and BMI measured. Participants perform a 20-minute neurobehavioral task on a computer that examines aspects of

dietary decision-making. In the task, they first rate 60 food items (30 low-calorie and 30 high-calorie) in terms of tastiness, healthiness, and overall liking of the food item using a five-point scale. Then, subjects make 100 binary food choices amongst pairs selected by the Matlab software based on their own individual ratings of the food items. Food pairs include one item that is more tasty and less healthy than the other item, with foods rated as neutral on both taste and health excluded. The computer mouse cursor's x,y position is tracked using Psychophysics Toolbox and Matlab software, and dynamics can be analyzed for trajectory and time. Patients and their guardians (if patient is under 18 years of age) also complete several surveys including the Child Eating Behavior Questionnaire (CEBQ), Diabetes Eating Problem Survey (DEPS-R), Yale Food Addiction Scale for Children (YFAS), Yale Adolescent Activity Questionnaire (YAAQ), and a COVID questionnaire. They also complete the ASA24 dietary recall. Our laboratory group has already performed the cross-sectional study visit in 137 control youth and young adults for comparison.
Results: Data collection is ongoing, with recruitment from multiple Type 2 Diabetes clinics per week, and a recruitment goal of 20 participants by the end of the academic spring semester. Although our overall recruitment goal is an n of 30, we can perform preliminary analyses on an n of 20 in the summer of 2022. We will analyze the ratings (perceptions) and preferences for food items between individuals with and without Type 2 diabetes. We will also use linear regression modeling to analyze the processing of food attributes (taste, health) in the final food choices, and shape analyses to study the computer mouse trajectory (AUC, maximum deviation) during food decision-making. We hypothesize that patients with Type 2 diabetes will differ in their perceptions and preferences for food items, in particular foods higher in carbohydrates, and will exhibit larger AUC for their choice trajectories signifying cognitive dissonance compared to controls.
Conclusions: Youth with Type 2 diabetes have a complex chronic condition that can increase risk for cardiovascular disease and other long-term diabetes-related complications. By studying the food choice behaviors in these patients, we hope to better understand their decision-making processes and thereby improve prevention and treatment efforts to improve health outcomes overall.

Investigating the Relationship between Growth Hormone Therapy and Serum Alkaline Phosphatase Levels in Pediatric Patients with Short Stature

Katrina Ninh, Alfredo Hernandez, Amy Chai, PhD, Anna Ryabets-Lienhard, DO, Priyanka Bakhtiani, MD

Background: Growth hormone (GH) plays an important role in longitudinal bone growth, as well as in maintaining normal liver function. Alkaline Phosphatase (ALP) is an enzyme that liberates phosphate under alkaline conditions and is made primarily in the bone and liver. Thus, typically, it is used as a marker for bone formation and liver disease. Limited small-sized studies hint towards improvement in bone-specific ALP with growth hormone therapy in children with short stature. Serum total ALP is cheaper, with quicker laboratory turnaround-time, and often done as part of routine work-up for pediatric short stature
Methods: Pediatric patients greater than 2 years of age, diagnosed with short stature (Height < -2 SDS for age), and seen at CHLA's endocrinology clinics between January 1, 2014 to January 1, 2021 were included in the present retrospective study. Statistical analysis was performed to determine the trend of serum ALP level after treatment with growth hormone or other interventions directed at improving growth velocity.
Results: A paired t-test analysis on 18 prepubertal pediatric patients with short stature suggests that there is a statistically significant increase ($t(17)=-2.25$, $p<0.05$) in ALP levels before

(M=185.8, SD=53.4) and after GH (M=229.6, SD=87.5) therapy in pediatric patients with short stature.
Conclusion: Our pilot data demonstrates the positive impact of growth hormone on serum ALP levels. Further large-scale studies are required to establish ALP as a biomarker for response to growth hormone therapy in pediatric patients of various age-groups and ethnicities, with short stature due to various etiologies. A large patient database is available at CHLA for such analyses.

Impact of Outpatient Inhaled Corticosteroid Use on Bacterial Tracheostomy-Associated Respiratory Tract Infection

Ogechi Obed, Christopher Russell

Goal: Inhaled corticosteroids (ICS) use can change respiratory tract microbiota via increased expression of receptors that bacteria use to attach to epithelial cells. Given this potential connection, we explored whether outpatient ICS use is associated with bacterial respiratory tract growth in children with tracheostomy.
Methods: Through a prospective cohort study of children with tracheostomy admitted for suspected respiratory infection at Children's Hospital Los Angeles, we collected demographic and clinical data (e.g., culture results), medical comorbidities, and key outcomes. Unadjusted analysis was conducted to assess the association between the primary exposure, outpatient ICS use, and the primary outcome, presence of bacteria in respiratory culture.
Results: Of the 197 encounters that met study criteria, the median age was 7 years old. The majority were male (n= 117, 59.4%), Hispanic/Latino (n= 132, 67%) and used public insurance (n=177, 89.8%). Chronic lung disease and bronchopulmonary dysplasia (n= 130, 66%) were significant comorbidities in this population. Outpatient gastrointestinal (GI) acid suppression was used in 58% (n=115) of encounters and outpatient ICS was used in 72% (n=142) of encounters. Common bacteria identified were *P. aeruginosa* (n= 61, 31%), *S. aureus* (n= 34, 17.3%), and *S. marcescens* (n= 24, 12.2%). ICS use was associated with increased odds of *S. marcescens* growth (OR = 4.9; 95% CI 1.1- 21.4) but not associated with growth of *P. aeruginosa* (OR = 1.5; 95%. CI 0.72 -2.92) or *S. aureus* (OR= 0.6; 95% CI 0.26-1.22).
Conclusion: Preliminary results suggest an association between outpatient ICS use and increased *S. marcescens* growth. Further evaluation would include adjustment for confounders such as age, chronic lung disease and GI acid suppression use.

Short and Long Term Outcomes in Late Preterm Infants Exposed to Delayed Cord Clamping Compared to Immediate Cord Clamping

O Okolo BS, J Massoumi DO, K Tedesco MD, M Chu BS, S Sakhamuru DO, L Barton MD, MPH, R Ramanathan MD, R Cayabyab MD, MPH
Division of Neonatology, Department of Pediatrics, LAC + USC Medical Center, Keck School of Medicine of USC, Los Angeles, CA

Purpose of the study: AAP, ACOG, and NRP have recommended delayed cord clamping (DCC) for term and preterm deliveries for at least 30-60 seconds after birth. It has been established that DCC provides short term and long-term benefits. In preterm infants, DCC is associated with improved transitional circulation, higher hemoglobin, decreased need for blood transfusion, and lower incidence of necrotizing enterocolitis. The purpose of this study is to compare short-term and long-term outcomes in late preterm infants (LPT) exposed to delayed cord clamping vs. immediate cord clamping (ICC)

Methods: Retrospective study of preterm infants born at 34 $^{0/7}$ – 36 $^{6/7}$ weeks of gestation and admitted to the neonatal intensive care unit (NICU) between 2018-2020. Demographics, cord clamping information, laboratory values, clinical and neurodevelopmental data were extracted from electronic medical records and the neonatal database. Age and Stages Questionnaire was used to evaluate neurodevelopment at 18 months chronologic age (CA). Data was analyzed with Chi-Square or Fisher Exact Test and Wilcoxon Rank Sum test where appropriate.
Results: There were 156 infants admitted to the NICU during the study period. Preliminary analysis included 50 infants exposed to ICC and 50 infants exposed to DCC. There were 19/100 (19%) infants followed up for neurodevelopment at 18 months. Infants exposed to DCC were significantly smaller, immature and with lower APGAR scores at 1 and 5 minutes compared to infants in the ICC group. Infants exposed to DCC had significantly lower median temperature on admission to the NICU and a higher rate of hypothermia defined as temperature less than 36.5 °C. One infant in the DCC group had a temperature less than 36°C. Median hemoglobin levels at 18-36 hours of life and rate of phototherapy were not significantly different between groups. No infant exposed to DCC compared to 3 (6%) infants in ICC received packed red blood cell transfusion within the first 24 hours of life. Median hemoglobin values at 12 months CA and median ASQ scores at 18 months of CA were similar in both groups.
Conclusion: Our preliminary data showed that DCC compared to ICC in LPT infants did not result in a higher hemoglobin at birth and at 1 year of age, and neurodevelopmental outcomes at 18 months CA was similar. DCC in immature and smaller infants can be a risk factor for hypothermia, therefore, it is important to follow recommendations by NRP to prevent this adverse effect. Data collection is continuing to increase sample size and verify these findings.

Time to Endocrine Diagnosis in Pediatric Medulloblastoma Patients

L. Nate Overholtzer[1], Ashley Margol[2,3], Kaaren Waters[2,3], Clement Cheung[3,4]

[1]*Keck School of Medicine of University of Southern California, Los Angeles, CA*
[2]*Children's Hospital Los Angeles and The Saban Research Institute, Los Angeles, California*
[3]*Department of Pediatrics, Keck School of Medicine of University of Southern California, Los Angeles, California*
[4]*Center for Endocrinology, Diabetes and Metabolism, Children's Hospital Los Angeles, Los Angeles, CA*

Purpose: Medulloblastoma is the most common malignant brain tumor affecting children and is treated with a combination of resection, radiation therapy, and chemotherapy. Endocrine sequelae often develop as a result of radiation or chemotherapy affecting the hypothalamic-pituitary-adrenal, -thyroid, -gonadal function. At CHLA, medulloblastoma survivors are seen under two approaches: (1) a traditional approach via the normal referral process and (2) a neuroendocrinologist embedded in the brain tumor clinic. We hypothesized that endocrine problems will be diagnosed sooner in patients seen under the embedded model.
Methods: This is a retrospective cohort study on 48 pediatric patients diagnosed with medulloblastoma between January 1st, 2005 and June 1st, 2021, who experienced late endocrine effects as a result of their treatment. Kaplan-Meier survival analysis was used to compare time from brain tumor diagnosis to first endocrine diagnosis in the two study arms: patients seen through the traditional referral model and patients seen through the embedded model.
Results: There was a trend towards a significant difference in time to first endocrine diagnosis ($\chi 2(1) = 3.667$, $p = 0.055$) between patients seen under the embedded model ($n = 28$) and patients seen under the traditional referral model ($n = 20$). For the subset of patients diagnosed with growth hormone deficiency (GHD), there was a significant difference in time to GHD

diagnosis ($\chi 2(1) = 7.699$, $p < 0.01$) between patients seen under the embedded model (n = 18) and patients seen under the traditional referral model (n = 17).
Conclusion: Patients seen under the embedded neuroendocrinology service model received an earlier endocrine diagnosis. GHD was diagnosed significantly earlier in patients seen under the embedded model. Regular monitoring by an endocrinologist early after treatment may be beneficial to medulloblastoma survivors.

Effect of Maternal Preeclampsia on the Risk of Multi-system Compromise on Pre-term and Term Neonates

Hannah Pavlov Medical Student, Rowena Cayabyab M.D Advisor, Dept. of Neonatology
LAC+USC

Goal: Preeclampsia is a complicating factor of 2-8% of all pregnancies. Few studies have been done looking into the increased risk for poor fetal cardiac function. The primary aims of the study are to compare the cardiovascular outcomes of neonates born to mothers with and without pre-eclampsia admitted to the NICU and examine the effects of maternal preeclampsia on the respiratory, GI, and hematologic systems of neonates admitted to the NICU. Maternal preeclampsia will lead to an increased risk of neonatal morbidities and cardiovascular compromise in neonates.
Methods: This is a retrospective study of preterm and term neonates born at LAC+USC Medical center between the years 2015-2020. Infants admitted to the NICU over 1500 grams with and without maternal preeclampsia will be included. Infants with congenital heart defects and congenital anomalies with be excluded. 539 patients were excluded for being out born. 44 patients were excluded as delivery room deaths. 173 patients were excluded due to congenital anomalies. 227 patients were included in the pre-eclampsia group and 227 patients were included in the non-pre-eclampsia group. Chi square and T test will be used to analyze statistical significance between pre-eclampsia (N=227) and non-pre-eclampsia (N=227) groups. Logistic regression to determine association between maternal preeclampsia and hypotension.
Results: It is expected to see clinically significant higher rates of hypotension in the first 24 hours of life in addition to higher rate of blood pressure intervention for patients in the pre-eclampsia group. It is expected that the pre-eclampsia group will have clinical significantly higher rates of respiratory, gastrointestinal, and hematologic complications compared to the non-pre-eclampsia group.
Summary: This study is essential as maternal pre-eclampsia is a complicating factor in many pregnancies and has a high rate of both maternal and feal morbidity and mortality in the inflicted population.

Short Chain Fatty Acid Levels in Hispanic and Non-Hispanic Ulcerative Colitis Pediatric Patients Prior to and After Fecal Microbiota Transplantation

Joshua Perez, Sonia Michail, Ramon Durazo-Arivizu

Goal: In a recent study we published, we found that Hispanic pediatric patients with ulcerative colitis (UC) have lower levels of short chain fatty acids (SCFAs) compared to age and gender matched non-Hispanic patients with ulcerative colitis that are independent of disease activity and dietary fiber intake. Given this difference we observed in Hispanic children, we hope to determine the efficacy of fecal microbiota transplantation (FMT) in this population and compare it to its efficacy in non-Hispanic children. In this longitudinal study, we followed a cohort of Hispanic and non-Hispanic UC pediatric patients and identified the levels of various SCFAs in their feces at baseline and status-post FMT at 1, 3, 6, and 12 months.

Methods: In this longitudinal study conducted at the CHLA, stool was collected from 19 Hispanic and 19 non-Hispanic children with UC at 5 different time points over the course of 12 months (baseline and 1,3,6, and 12 months after FMT). SCFAs in the stool were quantified using mass spectrometry.
Results: Acetic, butyric, isovaleric, and propionic acid levels for Hispanic children were found to be much lower at baseline than those of non-Hispanic children despite both populations having similar disease activity. 1 month after FMT, both Hispanic and non-Hispanic pediatric UC patients had large increases in their SCFA levels compared to their respective baselines. This increase in their SCFA levels compared to baseline was observed even 12 months after the FMT.
Conclusion: We found Hispanic UC patients to have lower levels of SCFAs at baseline when compared to non-Hispanics with similar disease activity. Despite these initial differences, by the end of month 12, the concentrations of the fecal SCFAs in these two populations were found to be very similar. Moving forward we want to determine if these sustained increases in SCFA levels after FMT correlate with decreased disease activity and improved health outcomes.

Asthma Clinical Score Validation in Risk-Stratifying Asthma Pediatric Intensive Care Unit Admissions

Raul Soto Jr.; Caryssa Lim, MPH; Masrur Khan, MD; Juan Espinoza, MD, FAAP

Background: Although patients with asthma can often manage their conditions at home, they occasionally require visits to the emergency department for significant acute respiratory distress and may require inpatient admission. There is much data discussing risk factors for admission to the hospital and guidelines for inpatient management. However, there is little data discussing risk factors for admission directly to the Pediatric Intensive Care Unit (PICU). We hope to establish which clinical and social/environmental factors significantly increase the risk of admission directly to the PICU. An Asthma Clinical Score will be created to use as a prediction tool for pediatric asthma related PICU admissions.
Methods: This is a retrospective chart review. We look at patients admitted to the PICU from 1/1/2010-12/16/2020. Using ICD-10 diagnosis codes for asthma-related diagnoses, we identified the most recent 200 patients that meet diagnostic and admission criteria. REDCap data collection will look at various clinical factors. The data will be used to risk-stratify patients, validate clinical variables, and create an Asthma Clinical Score to use as a prediction tool for asthma-related PICU admissions.
Results: Once data is collected, statistical analysis will be run to identify correlations between clinical/social variables and PICU admissions. T-test and ANOVA or Mann-Whitney U test and Kruskall-Wallis H test will be used to identify associations. We will use relative risk and odds ratios to create an Asthma Clinical Score model with validated clinical variables to create a prediction tool for risk-stratification for asthma PICU admissions.
Conclusion: The results of this study will help guide clinicians regarding clinical and social variables and risk factors of patients with asthma for admission to the PICU. This will serve an important role in generating an Asthma Clinical Score risk-stratification system to guide management and patient triage in the future.

White Matter Injury Characterization by MR Spectroscopy and Outcome in Neonatal Hypoxic-Ischemic Encephalopathy

April Sun, BS, Abigail Leathe, MD, Tai-Wei Wu, MD

Background: Hypoxic ischemic encephalopathy (HIE) is brain injury caused by lack of oxygen and/or blood flow to the newborn brain. Typically, acute anoxic brain injury is well defined on magnetic resonance imaging (MRI) as restricted diffusion or decreased mean diffusivity, and on MR spectroscopy (MRS) with increased lactate levels and decreased N-acetyl-aspartate (NAA) levels. These markers are well established. However, some newborns with HIE display isolated white matter (WM) hyper-diffusivity. The cause and implication of increased WM diffusivity is unclear.

Methods: Newborns with HIE undergoing therapeutic hypothermia were enrolled into the study. We excluded infants without MRI studies, MRI studies after 10 days of life, or if there was intracranial hemorrhage or injury in the gray matter. The study cohort was categorized further into reduced, normal, or increased WM diffusivity based on ADC values. Regions of interest for white matter ADC measurement include 1) centrum semiovale, 2) corona radiata, and 3) periventricular WM (which corresponds with MRS voxel). 2-3 year follow-up data will be abstracted from medical records and phone surveys will be completed for those who were lost to follow-up. Outcomes among those with different WM diffusivity profiles will be compared. We will also characterize metabolic profile by MR spectroscopy.

Results: 250 patient charts were reviewed. 75 infants had isolated white matter abnormality. 65 infants had normal MRIs. ADC measurements are ongoing. Results are expected to show that increased diffusivity in white matter does not represent profound brain injury, and outcomes at 2 and 3-years are expected to be normal or almost normal.

Summary: The data allows clinicians to better characterize the implications of increased white matter diffusivity on DWI in newborns. Accurate prognostication of white matter injury can help either reassure families or guide future treatment.

Impact of A Mobile Health Application to Facilitate Transition after NICU Discharge

Diana L. Tang, Ashwini Lakshmanan, Ashley Song

Background: Parents of neonates who require ICU hospitalization face the challenge of caring for a child under difficult circumstances. Consequently, bringing their child home and providing for their neonate's needs is a separately demanding task of its own. While caretaking and patient education provides one facet to transitioning from NICU to home care, the burden of the transition still plays a significant role in quality of life for both caretakers and neonates.

Methods: In this study, 47 patients' caregivers were approached to participate in the use of the mobile application and consequently surveyed over three separate time points. Providers surveyed caregivers at enrollment into the study, 3 months post-enrollment, and 6 months post-enrollment using the Social Needs Screening Tool. Mobile application usage data was collected, time spent on the app, as well as descriptive app meta data was collected (n = 37). Providers surveyed caregivers about their social needs such as housing, food, transportation, utilities, and personal safety.

Results: From the data of the mobile application, top contents visited were Car Seat 76% (28/37), Communicating with NICU 11% (15/137), and Feeding 8% (11/137). Median number of logins onto the application were 36 (13-83) and mean of 62 (SD 68). Caregivers at enrollment 28% (13/47), 3 months-post enrollment 27% (9/33), and 6 months-post enrollment 28% (7/25), expressed that within the past 12 months, food would often or sometimes run out before there was money to buy more. Similar responses were found when caregivers were surveyed if within the past 12 months food bought didn't last and there was no money to buy more food.

Conclusion: Future modeling will be associated with time spent on in-app resources and changes in social complexity. The mobile health application was found to positively support caregivers transitioning home after NICU discharge. A mobile application can be useful in addressing social complexity.

Peak VO2% Correlates with Echocardiographic Left Ventricular Diastolic Dimensions in Pediatric Cancer Survivors Treated with Anthracyclines

Imran Masood, Kyuwan Lee, Christopher Kuo, **Helena Vervaet**, David Freyer, Jennifer Su

Background: Pediatric patients treated with anthracyclines (ANT), a class of chemotherapeutic agents, often experience subclinical cardiac dysfunction preceding symptomatic cardiomyopathy in adulthood. Echocardiography (echo) is a noninvasive tool for evaluation of ANT-induced cardiotoxicity. Studies show that adult ANT recipients have reduced exercise capacity compared to healthy controls. Thus, cardiopulmonary exercise testing (CPET) may be a viable screening alternative for subclinical dysfunction. This study evaluated whether routine echo findings correlate with the extent of cardiorespiratory fitness in pediatric cancer patients treated with ANT.
Methods: We conducted a retrospective cohort analysis examining the cardiorespiratory fitness of 25 patients at CHLA's chemotherapy cardiac surveillance clinic. We used Pearson's and Spearman's rank correlations to elucidate the relationship between echo variables and CPET data. We applied uni- and multivariate analyses to understand the impact of echo and oncologic data on patients' peak VO2%.
Results: Of the 25 ANT recipients, the mean age was 17 years and the mean time from ANT exposure was 8 years. The mean peak VO2% was 62% ± 2.7. 88% of participants had a markedly lowered peak VO2, below 80% predicted. Left ventricular (LV) systolic function, as measured by ejection fraction and fractional shortening, did not correlate significantly with peak VO2%. LV internal dimension in diastole (LVIDd), however, was positively correlated with peak VO2% (R 0.57, $p=0.006$). Multivariate analysis confirmed this relationship (estimate 6.3, $p<0.001$).
Conclusions: Most ANT recipients had diminished cardiorespiratory fitness, despite having normal LV function on echo. LVIDd was the only echo parameter that was closely associated with exercise capacity in these patients. For this population, CPET appears to be a valuable adjunct to echo when screening for subclinical cardiomyopathy.

The Impact of Sleep on Pulmonary Function in Patients with Cystic Fibrosis

Rachel Wang, Daniel Quevedo, Thomas Keens MD, Carmen Reyes, Emely Anaya, Esme Mason, Iris Perez MD

Background: Cystic Fibrosis (CF) is a genetic disorder resulting in impaired respiratory, endocrine, reproductive, and digestive system function. Patients with CF experience frequent respiratory infections, chronic cough, and malnutrition predisposing them to poor sleep. We aim to describe the sleep of patients comparing them with National Sleep Foundation (NSF) recommendations and linking the effect of sleep to pulmonary function in CF patients.
Methods: CF patients (5-21 yrs.) followed at Children's Hospital Los Angeles were recruited. To assess sleep quality, participants were asked to complete a sleep log and wear an actigraphy watch for 14 days. Demographic data, clinical characteristics, and therapies were recorded from chart review and the CF Foundation National Patient Registry. Sleep data was compared to NSF recommendations for adequate sleep for age.

Results: We report 4 patients, 75% female, 3 Hispanic and 1 Caucasian, with a mean age of 15 ± 5 years. 2 of 4 patients were homozygous for F508Del, and 3 of 4 were on CFTR modulator therapy. The average BMI was 23.68 ± 6.55 with 3 at a recommended weight (50-85%ile) and 1 obese (>95%ile). The average FEV1 was 102 ± 28 % predicted.

	Total sleep time (hr)	Sleep latency (min)	Avg # of awakenings (>5 min)	Sleep efficiency (SE) (%)	Wake after sleep onset (WASO) (min)
CF Patients	7.48 ±.74	39.82 ± 19.69	35.96 ± 15.75	78 ± 9	49.70 ± 32.36
NSF Sleep Recommendations	3-5 yr: 10-13 6-12 yr: 9-12 13-18 yr: 8-10 18-60 yrs: ≥7	≤ 15	≤ 1	≥ 85	≤ 20

2 patients had 1 pulmonary exacerbation within the last year with an average SE of 71 ± 9 % and average WASO of 68.75 ± 40.35 minutes.
Conclusion: Patients with CF with normal or mild lung disease have decreased sleep duration and poor sleep quality. Prolonged sleep onset contributes to insufficient sleep. Poorer sleep was found in those with 1 exacerbation in the last year. Our findings highlight the importance of promoting better sleep to decrease the incidence of pulmonary exacerbations.

Outcomes of Pediatric Myasthenia Gravis with Ocular Involvement

Mindy Xu, Melinda Chang, M.D., Dept. of Ophthalmology, KSOM

Objective: An estimated 90% of pediatric myasthenia gravis (MG) cases have some level of ocular involvement. The most recent case series on the outcomes of MG with ocular involvement in children was conducted over 10 years ago, prior to the widespread availability of newer treatments such as rituximab. This case series analyzes the ocular outcomes of children diagnosed with MG with ocular involvement within in the past 10 years.
Methods: All children seen at CHLA over the past 10 years with MG with ocular involvement were screened based on preselected inclusion criteria. A retrospective chart review was conducted for 41 total patients. Statistical analysis was conducted to find significant differences in demographics, presenting symptoms, and diagnostic test results between three groups of patients: 1) generalized MG at presentation 2) ocular myasthenia gravis (OMG) with later generalization and 3) OMG only. Furthermore, a Cox proportional hazards regression analysis was conducted to find factors significantly associated with OMG stabilization, symptom resolution off medication, residual amblyopia, and time to generalization.
Results: Of 41 patients, 18 presented with generalized MG, 6 presented with OMG that later generalized, and 17 had OMG with no generalization. Patients with generalized MG at presentation had the highest proportion of positive Ach antibody titers (88.9%) vs patients with later generalization (50%) and no generalization (35.3%) (p= 0.004). Patients with later generalization had the highest proportion of positive Tensilon tests (66.7%) vs patients with no generalization (11.8%) and generalized MG at presentation (5.6%) (p = 0.002). There were no other significant differences found in demographic data, presenting symptoms, or other diagnostic tests between the three groups. Additionally, Cox regression analysis found that factors associated with symptom resolution off medications were use of prednisone (p=0.02) and steroid-sparing immunosuppressive agents (p=0.01). The only factor associated with failure

to stabilize symptoms was younger age at presentation (p=0.03). There were no treatment- or patient-related factors associated with residual amblyopia. Among patients presenting with OMG, there were no treatment- or patient-related factors associated with later generalization. **Conclusions:** This study found significant differences in diagnostic testing results between pediatric patients with generalized MG at presentation with ocular involvement, OMG with later generalization, and pure OMG without generalization. Specifically, patients with generalized MG at presentation had higher proportions of positive Ach antibody titers and patients with later generalization had higher proportions of positive Tensilon tests. Meta-analysis suggests that MG treatments prescribed (particularly prednisone and steroid-sparing agents) were associated with symptom resolution in children with MG with ocular involvement.

PLASTIC AND RECONSTRUCTIVE SURGERY

Review of Mastectomy Specimens in Gender Affirming Surgery

Tanner Frediani, BS; Mayo Hotta, MD; Malerie Pratt, MD; Justin Cordero, BS; Eva Williams, MD; A. Lyonel Carre, MD; Michael W. Chu, MD

Background: Gender Affirming Mastectomy (GAM) is a procedure offered to transgender men that resects the breast tissue to achieve a masculine-appearing thorax. Few papers have reported the incidence of occult malignancy and atypia in these resected breast specimens. The goal of this study is to generate more data on pathology rates for physicians performing GAM. We use the rates of pathology from previous studies on GAM specimens as a control. We hypothesize incidences in our sample will not differ significantly from previous studies.
Methods: A retrospective review of electronic medical records of Kaiser Permanente Southern California (KPSC) patients was performed to identify all patients between 2018 and 2020 who were diagnosed with gender identity disorders. Variables of interest included patient demographics (age, ethnicity, BMI, ASA score), complications, and outcomes. A *p*-value of <0.05 was considered statistically significant.
Results: Over 4 million patients were enrolled in KPSC from 2018 – 2020 and 9,325 patients were identified with gender identity disorders, and 428 patients underwent chest wall Gender Affirming Surgery. The mean age was 26-years-old and mean BMI was 28.0. The majority were Caucasian (43%), Latinx (33%), Black (8%), and Asian (7%). Preoperative breast imaging in 8% of patients were negative. Major complications occurred in one (0.2%) case (return to OR for hematoma). Minor complications requiring revision or intervention occurred in 19%. The average specimen weight was 517g. Average length of follow-up was 6.8 months. Ductal carcinoma *in situ* was found in one (0.23%) of the 856 total specimens. Benign findings included calcifications in 9 (2.1%) and hyperplasia in 4 (0.9%) specimens. Our findings do not differ significantly from rates available in the literature*.
Conclusion: We report a low incidence of malignancy and atypical findings in GAM specimens. We do not find a significant difference in incidences of occult malignancy and atypia between our sample and the literature*.

*data analysis not yet complete as of 12/6/2021

Surgical Simulation Education in Plastic and Reconstructive Gender Affirmation Procedures: A Literature Review

Robin Kikuchi; Idean Roohani; Joseph Carey, MD

Background: Many gender affirmation (GA) procedures involve plastic and reconstructive surgery (PRS). In a systematic review of PRS surgical simulation-based training tools (SSBTTs) conducted at our institution, a paucity of GA training modalities was identified; 4 of 83 (4.8%) tools identified related to breast augmentation with possible implications for chest feminization, and 0 of 83 (0%) were specific to GA.[1]

We conducted a literature review, expanding upon our systematic review of PRS SSBTTs, to identify additional SSBTTs applicable to GA.
Methods: We expanded our systematic review, conducted by PRISMA-P guidelines,[1] with a literature review across PubMed, MEDLINE, and Embase. Search terms included, “plastic surgery,” “gender affirmation,” “vaginoplasty,” etc. Inclusion criteria were English language peer-reviewed articles published in the last 10 years about PRS SSBTTs related to GA. Two researchers evaluated articles identified by the search to ensure adherence to inclusion criteria and classified each by application within GA procedures (vaginoplasty; scrotoplasty/metoidioplasty/phalloplasty; facial feminization/masculinization; chest femininization; chest masculinization).

Results: In addition to 4 previously identified SSBTTs, we identified 4 additional GA training tools in PRS. Of the 8, 4 were applicable to chest femininization, 2 to vaginoplasty, 2 to facial feminization/masculinization, and 0 to scrotoplasty/metoidioplasty/phalloplasty or chest masculinization. Only 1 of 8 applied to masculinization procedures.
Conclusions: Our review identified a paucity of GA SSBTTs in PRS, in particular, a lack of tools available for masculinization procedure training.

We propose the creation of an open-access, searchable database to streamline curriculum development to increase the utilization of SSBTTs in PRS. We also identified a need to expand the use of existing or create new SSBTTs to improve trainee exposure to GA procedures in PRS.

Citations:

1. Kikuchi, R., Roohani, I., Johnson, M, Etemad, S., Sullivan, M., & Carey, J.. "Plastic Surgical Simulation Education: A Systematic Review And Novel Tool For Resident Education" Plastic Surgery Research Council 2021 Virtual Meeting. ePoster.

Nonpharmacologic Pain Management in Pediatric Burn Patients

Matthew Gillum, MS, Samantha Huang, BS, **Yuki Kuromaru, BS**, Justin Dang, BS, Haig A Yenikomshian, MD, Justin Gillenwater, MD
Department of Plastics and Reconstructive Surgery, Keck School of Medicine of USC, Los Angeles, California

Introduction: While pharmacological therapy can reduce pain, it does not offer complete control and is not without adverse effects. Current literature suggests that non-pharmacological interventions can be used as adjunct therapy in patients to lessen pain. Our purpose was to aim to synthesize the literature on non-pharmacologic pain management in pediatric burn patients.
Methods: Papers were included if they were randomized, controlled, had original data, collected pain scores as a function of non-pharmacologic treatment, and were conducted on pediatric burn patients. Pain scale, pain score during and after treatment, and significance of results were reported. The treatment was considered effective if the percent difference between experimental and control pain scores was significant.
Results: Sixteen studies were analyzed and separated into interactive (n=12) and passive (n=4) groups. Mean age of participants was 8.39 years old and mean percent total body surface area (TBSA%) burned was 5.95%. Interactive treatments like virtual reality (n=6), distraction devices (n=3), child life therapy (n=1), directed play (n=1) and digital tablet games (n=1) required patient activity during treatment, while cartoons (n=1), hypnosis (n=1), massage therapy (n=1) and music (n=1) were passive treatments. Non-pharmacological interventions reduced mid procedure pain by 24.3% (n=12) and post-procedure pain by 33.6% (n=5). Of the studies that reported mid procedure pain, pain reduction was greatest in those who were placed in the interactive modality (32.3% n=10) as opposed to the passive (-15.6% n=2) ($p = .016$).
Discussion/Conclusions: Non-pharmacologic therapy can be an effective adjunct in pediatric pain management. Interactive treatments showed a significant decrease in pain ratings, suggesting greater analgesia; however, further additional studies should be done.

A Comparative Study of Latissimus Dorsi Flap Reoperation and Complication Rates in Breast Reconstruction

Sasha Lasky BS[1], Jiaxi Chen MD[2], Rachna Goli BS[3], Jessica R Ong PhD[4], Harsh Patel MD[2], Robert Tung MD[2], Edward Ray MD[2]

[1]Keck School of Medicine of USC, [2]Cedars-Sinai Medical Center, [3]Warren Alpert Medical School of Brown University, [4]David Geffen School of Medicine at UCLA

Background: As post-mastectomy reconstructive techniques and preferences evolve, the popularity of the latissimus dorsi (LD) flap (with implant) as a primary and secondary option has fluctuated. Determining the best indications for LD breast reconstruction requires evaluation of outcomes, including complication and reoperation rates.
Methods: All patients undergoing primary breast reconstruction at our institution between December 2007 and April 2021 were identified from the medical record system using a natural language processing artificial intelligence algorithm (Deep 6, Pasadena, CA). A retrospective analysis was performed on patients receiving breast reconstruction with primary autologous LD, salvage LD and salvage abdominal flaps. Indications for reoperation were separated into complications (major vs. minor), aesthetic and cancer-related. Number of reoperations, reconstruction failure status, and complications were tabulated.
Results: The final cohort included 2202 patients with a total of 3325 breast reconstructions. Less patients required reoperation with the primary LD approach compared to all breast reconstruction operations ($p < 0.006317$). Yet, there was a higher aesthetic complication rate for LD approach when compared to total breast reconstruction cases ($p < 0.00001$). No statistically significant differences in reoperation and complication rates were discovered when comparing the LD salvage approach to the salvage abdominal flap or the primary LD approaches.
Conclusion: The primary LD approach was associated with a higher incidence of aesthetic complications and should be offered after careful consideration of other options. It a valuable option as demonstrated by the lower number of reconstructions when compared with the entire cohort.

The lack of significant differences in reoperation rates between secondary LD and abdominal flaps indicates multiple viable options for salvage breast reconstruction.

A Comparison of Negative Pressure Wound Therapy Modalities, VAC Versus Low-Cost NPWT Alternatives: A Systematic Review of RCTs/CCTs

Paloma Madrigal, BS, **Tayla Mosha**l, BS, Rendell Bernabe, BS, Justin Gillenwater, MD

Background: NPWT has been described as an effective treatment for wounds of various etiologies, however it is expensive. Various authors have investigated low-cost alternatives to commercial NPWT devices. A systematic review summarizing their findings is needed for clinicians operating in resource-limited locations.
Methods: We searched the following databases in October 2021: Cochrane, Pubmed and EMBASE. There were no restrictions on the date of publication. We searched for published randomized controlled trials (RCTs) or controlled clinical trials (CCTs) that compared commercially available Vacuum-Assisted Closure devices with low-cost NPWT modalities in human subjects. We excluded studies written in languages other than English. Two review authors independently performed study selection and data extraction. We assessed risk of bias using the Cochrane Risk of Bias Tool.
Results: The review contains six studies with a total of 409 participants. The wounds were of various etiologies. All six studies were RCTs. Four studies delivered NPWT via wall suction applied to a gauze dressing (GSUC), one study used an AquaVac system, and one study used a Redon drain. All compared the low-cost NPWT modality to a commercially available vacuum-

assisted closure device (in most cases the VAC system, KCI, San Antonio, TX, USA). Four studies were found to have high risk of bias for at least one outcome. One study was low risk and one had some concern for bias. Outcomes described in this review: granulation tissue formation, skin graft take when NPWT was used as a bolster dressing, costs, the time required to change dressings and pain levels experienced with dressing changes.
Conclusion: Due to the high risk of study bias, definitive conclusions regarding the benefits of low-cost NPWT modalities over commercialized vacs cannot be made. The decision to use the former intervention should be based on the resources available to the clinician and patient.

POPULATION AND PUBLIC HEALTH SCIENCES

Understanding Medical Mistrust and HPV Vaccine Hesitancy among Multiethnic Parents in Los Angeles

Alec Allee-Munoz, Jennifer Tsui, Bibiana Martinez, Michelle B. Shin, Ivonne Rodriguez, Jazmin Navarro, Kim R. Thomas-Barrios, W. Martin Kast, Lourdes Baezconde-Garbanati

Background/ Purpose/Goal/Hypothesis: Prior to the COVID-19 pandemic, HPV vaccination coverage was highly heterogeneous at both national and local levels. Statewide HPV vaccine initiation rates among adolescents aged 13-17 years old in California have exceeded the national average in recent years. However, pockets of low HPV vaccine coverage persist, including in immigrant and racial/ethnic minority communities in Los Angeles. Barriers to adolescent HPV vaccination previously identified by racial/ethnic minority parents include perceived high financial cost, limited access to in-language vaccine information and understanding of medical terms, lack of provider recommendation, and low HPV vaccine knowledge. Less is understood about the role of vaccine hesitancy in racial/ethnicity communities and the impact on HPV vaccine uptake, particularly in recent years when general vaccine confidence has declined overall in the US and internationally. This study will gauge HPV vaccine hesitancy in diverse communities surrounding USC Norris Comprehensive Cancer Center, data that we hope will ultimately guide interventions to increase HPV vaccine uptake in adolescent. We hypothesized that limited access to HPV vaccine information among parents, lack of engagement with providers in low uptake areas, and increased medical mistrust contribute to higher parental HPV vaccine hesitancy.

Methods: We conducted a cross-sectional survey (March 2021) among parents of adolescents, ages 9-17 years, from an academic enrichment program serving low-income, first-generation, underrepresented minority families in Los Angeles to understand determinants of parental HPV vaccine hesitancy. Logistic regression was used to identify individual and interpersonal factors associated with parental hesitancy and adolescent HPV vaccination. Parents completed self-administered surveys, including a 9-item HPV vaccine hesitancy scale, in either English, Spanish, or Chinese. Moreover, focus groups were conducted in English, Spanish and Chinese to further understand HPV vaccine hesitancy in parents of children who have not received any doses of HPV vaccine which were then analyzed for linguistic patterns using NVivo12 Software.

Results: One-fifth of parents (n=357) reported high HPV vaccine hesitancy and >50% reported concerns about safety or side effects. High medical mistrust was associated with high parental HPV vaccine hesitancy (adjusted-OR 1.69, 95% CI: 1.13, 2.37). In the focus groups, Spanish speakers generally cited the COVID-19 pandemic for reasons their children were not vaccinated and expressed high trust in the medical system while English speakers cited confusion about the vaccine, with a greater range of skepticism towards the medical system. Moreover, Spanish speakers received their information from a wide range of sources including their doctor, while English speakers received their information from unverifiable sources online browsing Google.

Summary/ Conclusion: Our findings indicate nearly one-fifth of parents are hesitant towards HPV vaccines in our study of primarily low-income, Hispanic/Latino and Asian American, immigrant parents. Reports of parental HPV vaccine hesitancy in our study (20%) were slightly lower compared to two recent studies using nationally representative samples (23% to 25%) of parents. The lower proportion of HPV vaccine hesitant parents in our sample may be due to the fact that three-fourths of our sample identified as Hispanic/Latino and prior studies have found lower rates of vaccine hesitancy among Hispanic/Latino parents compared to other racial/ethnic groups. This was corroborated by the attitudes of parents in English and Spanish focus groups. Locally focused, multilevel approaches to comprehensively identify factors associated with HPV vaccine hesitancy in low-uptake communities are necessary to engage and inform stakeholders on how to address HPV vaccine hesitancy. Our findings highlight needed efforts to simultaneously address logistical barriers to accessing routine adolescent preventive care as well as sources of vaccine hesitancy rooted in broader aspects of medical mistrust and

exposure to negative vaccine information to optimize HPV vaccine uptake in medically underserved communities.

Determinants of Early Alzheimer's and Dementia Diagnosis in the Primary Care Setting
Emily Chen, Soeren Mattke

Goal: Approximately 6.2 million Americans over the age of 65 currently have Alzheimer's dementia and the prevalence increases significantly with age, affecting nearly 35% of Americans over the age of 85. Diagnosing dementia and Alzheimer's disease as early as possible is critical for proper clinical management, as recently approved therapeutics such as aducanumab must be initiated early in disease progression in order to slow cognitive decline and preserve function. Our hypothesis is that rates of early diagnosis of dementia and Alzheimer's amongst primary care practices in the U.S. are lower than the current population health prevalence rates of Alzheimer's due to a number of factors on the provider side, which our study will hopefully elucidate.
Methods: This project involves using a national sample of CMS claims data to calculate the diagnostic rates for mild cognitive impairment and dementia amongst primary care practices across the U.S. Then, these calculated rates of diagnosis will be compared with national prevalence data for Alzheimer's, using regression analysis to determine how variables such as geographic location, patient demographics (such as age and race), and payer mix affect physician rates of diagnosis.
Results: Data analysis is still pending. Currently, we are waiting on access to and receipt of claims data from CMS. Once the CMS data is received, we will run statistical analyses to determine correlations between specific variables and rates of diagnosis.
Conclusions: We will use our findings to inform development of a CMS provider quality metric in order to improve rates of dementia screen and diagnosis amongst primary care providers.

Large for Gestational Age is Associated with Parity and Dysregulated Maternal and Newborn Fatty Acid and Amino Acid Metabolism
Zhanghua Chen, Chenyu Qiu, **Roya Gheissari**, Tracy Bastian, Dean Jones, Carrie Breton
Division of Environmental Health, Dept. of Preventive Medicine, Keck SOM

Background: Low and high birth weight are risk factors for developing cardiometabolic disease. The mechanisms by which metabolic dysregulation in a pregnant mother and developing fetus jointly affect birth weight are unclear. We aim to analyze maternal and newborn metabolomic profiles together, along with maternal health factors such as parity, to identify pathways that may play a role in the pathophysiology underlying birth weight.
Methods: 96 mother-infant pairs were categorized by birth weight Z-score as small (SGA), large (LGA), or appropriate (AGA) for gestational age, respectively. Liquid chromatography was performed on maternal serum and cord blood samples to identify metabolic pathways and metabolites significantly associated with birth weight. We used network fusion and analysis to integrate maternal and newborn metabolomic profiles and identify subnetworks associated with birth weight. Additionally, we investigated the association between metabolomic signatures and maternal factors such as parity. We then examined the effect of significant maternal risk factors and maternal metabolites on birth weight.
Results: We identified 491 cord blood and 574 maternal serum metabolomic features associated with birth weight Z-score ($p<.05$). All LGA pairs were characterized by a metabolically-derived endotype that was distinguished from that of non-LGA pairs. In the LGA

group, higher birth weight was associated with prior maternal parity, lower maternal fatty acids, higher cord blood keto-acids, and lower newborn bile acids.
Conclusion: Altered fatty acid and amino acid metabolism in mothers and newborns, as well as maternal parity, may play a role in determining an LGA birth weight outcome. Future studies should investigate inflammatory activation and placental dysfunction in pregnant nulliparous and parous women**,** as pregnancy is an inflammatory state that may alter nutrient transport and predispose the developing fetus to high birth weight.

Improving Referral, Adherence, and Participation Rates in Cardiac Rehabilitation Programs

Annette Gomez, Dr. Sonali Saluja

Background: Cardiac Rehabilitation Programs (CRPs) have been shown to decrease cardiac mortality, all-cause mortality and reduce hospital readmission. However, despite these proven benefits, only 10-34% of eligible individuals are enrolled in CRPs nationally.
Purpose The goal of this study is to examine what factors contribute to underutilization of CRPs at a program serving low-income Latinos (White Memorial Medical Center) and increase referrals to CRPs in a higher-income population (USC Verdugo Hills).
Methods: White Memorial has hypothesized that the cost of CRPs is the primary barrier to utilization at their hospital, while Verdugo Hills believes a lack of referrals from physicians contributes to lower program utilization. Thus, we will be taking two different approaches to understand barriers and improve CRP participation, adherence and referrals.
White Memorial: We will administer a 20-item survey with questions about demographic information, insurance, socioeconomic and behavioral motivation that may impact CRP participation. The survey will be administered by the staff with data entered into Redcap. Participants will receive a gift card for their time. The survey will be administered to patients who forgo the service, are newly enrolling or already in the program.
Verdugo Hills: We will implement automatic CRP enrollment for eligible patients using the electronic health record (EHR) system, as well as educate cardiologists on making referrals. Baseline data has already been collected and data will be collected after a 6-month period.
Results: Results are pending. White Memorial: we expect to see socioeconomic barriers as the leading reason for CRP underutilization. USC Verdugo: we expect to see an increase in referrals and participation in CRP.
Conclusion: By better understanding the barriers to CRP for low-income Latinos in Los Angeles and learning how to intervene to improve adherence, referrals and participation, we can improve the quality of life and health outcomes of patients undergoing cardiac surgery and recovering from cardiac events.

Disparities in Access to COVID-19 Testing

Zain Khalifeh

Introduction: COVID-19 has disproportionately impacted low-income persons and racial and ethnic minorities– primarily Black and Hispanic populations. Although they face higher rates of COVID cases, hospitalizations, and deaths, Black and Hispanic communities experience lower rates of COVID testing than that of white communities. Access to and utilization of COVID-19 testing has been essential to curbing the spread of COVID-19, but racial/ethnic inequities in COVID testing are well documented, and the sources of those disparities are poorly understood.

In this study, we examine access and barriers to COVID-19 testing services during the height of the COVID-19 epidemic in Los Angeles.
Methods: An online, cross-sectional survey was administered between December 5, 2020 and January 10, 2021, and 1,984 adult Los Angeles County residents were included in the study. Our sampling included quotas for race/ethnicity, sex and income, and responses were reweighted using the 2019 American Community Survey to match the demographics of Los Angeles County. Participants were asked if they had "ever been tested for COVID-19", the type and number of tests, if they ever had to pay for a test, if they ever had a positive result, where and when they had their most recent test, how long it took to get those test results and if they would be able to take paid or unpaid time off work while waiting for test results. Participants were also asked if they were ever prevented from getting tested and provided a list of possible barriers to testing as well as a write-in option they could select from. Tests for differences across race/ethnicity and income were conducted using weighted, unadjusted linear probability models, comparing each group to a reference group (Non-Hispanic White or Income>$100,000). Statistical analyses were performed in Stata 15 with α set at 0.05.
Results: Overall, 51% of our weighted sample reported ever having been tested for COVID-19 and 6.4% reported ever having tested positive. Compared to non-Hispanic White respondents, Asians were less likely to report ever having a COVID test (43.5% vs. 53.8%). Despite having similar testing rates as White residents, Hispanic residents were more likely to report ever having tested positive for COVID-19. Persons with an annual income of $20,000 or less were less likely to receive a COVID-19 test compared to those with an annual income of $100,000 or more (41% vs 58%). The three most widely reported barriers included worry about wait times at the testing site (30%), worry about getting the results back in time for it to matter (23%), and worry about being able to get an appointment promptly (22%). Barriers to testing were more prevalent among racial/ethnic minorities and low income persons. Additionally, white respondents and those in the highest income groups were more likely to report the ability to take time off work to await COVID test results.
Conclusion: Despite similar rates of testing across different race and ethnic groups, rates of COVID testing were not commensurate with the rates of infection across groups. Higher rates of reported barriers to testing among Black and Hispanic residents may explain lower rates of testing in these groups despite likely having a higher need for testing. These findings may inform policies and interventions that address structural barriers to COVID testing that disproportionately impact racial/ethnic minorities and low-income populations. Resources may be allocated to public testing sites that serve non-white, low-income populations in order to address lack of available appointments, long wait times, and delayed test results. Stronger policies that grant paid time off for employees while getting tested for COVID-19 and awaiting results and enforcement of such policies, may protect working-class racial/ethnic minorities and low-income persons.

Health Insurance Premium Tobacco Surcharges Reduce Coverage Among Older Individuals

Nathan Menard, Cameron Kaplan PhD, Keck School of Medicine

Background: The Affordable Care Act (ACA) allows health insurance companies to adjust insurance premiums based on four criteria – age, location, household size, and tobacco usage. In most states, insurance companies can apply a tobacco surcharge to premiums of up to 50%. Thus, health insurance is more expensive for tobacco users. This could potentially impact particular groups, like older individuals who have higher baseline premiums.
Methods: Data was acquired from a Qualtrics survey from May 20th through July 9th in 2019. The survey collected 1034 responses from U.S. adult tobacco users between the ages of 18

and 64. The survey collected 514 responses from tobacco users with health insurance through the ACA marketplace and 520 responses from users without insurance. 796 respondents lived in surcharge states while the remaining 238 did not. Regression analysis was performed in Stata. A logistical regression model was used due to the binary categorical outcomes of the data.
Results: When evaluating the likelihood of having insurance, the logistical regression model showed living in a surcharge state resulted in an odds ratio of 0.4355 with P<0.000. The second analysis evaluated what tier (Bronze, Silver, Gold, etc.) of health insurance plans people were selecting. The regression model found that individuals 50 years old and over who live in a surcharge state were 72% less likely to have a high tier plan with a P value of 0.024.
Conclusions: Tobacco surcharges on health insurance premiums increase the cost of health insurance and reduce enrollment rates. Moreover, for older tobacco users who do get health insurance, tobacco surcharges reduce the likelihood they will select a robust plan, instead diverting them to cheaper plans. Older users are more likely to need healthcare and these tobacco surcharges increase the likelihood they will be underinsured, leading to suboptimal health outcomes.

Assessing Racial/Ethnic Differences in General and Mental Health Status and their Role in Mortality Among Colorectal Cancer Patients

Paul Yoon, BA[1], Stephanie Navarro, BA[2], Carol Y. Ochoa, PhD(c), MPH[2], Elleyse Garrett, MPH[2], Angel Arizpe, MPH[2], Albert J. Farias, PhD, MPH[1,3]

[1]Keck School of Medicine, University of Southern California, Los Angeles, CA
[2]Department of Population and Public Health Sciences, University of Southern California, Los Angeles, CA
[3]The Gehr Family Center for Health System Science, University of Southern California, Los Angeles, CA

Background: Patient-reported outcomes (PROs) are recognized as strong predictors of cancer prognosis, outcomes, and care. However, racial/ethnic minorities with colorectal cancer (CRC) tend to report poorer general health status (GHS) and mental health status (MHS) compared to non-Hispanic whites. The objectives of this study were to determine: (1) if there are racial/ethnic differences in GHS and MHS within 36 months of CRC diagnosis and (2) if poorer GHS and MHS in recently diagnosed CRC patients are associated with mortality.
Methods: We used the population-based Surveillance, Epidemiology, and End Results (SEER)-Consumer Assessment of Healthcare Providers and Systems (CAHPS) dataset to analyze Medicare beneficiaries aged ≥65 years who were diagnosed with CRC between 1998 and 2011, received surgical resection for their tumor, and completed a CAHPS survey within 6-36 months post-diagnosis. CAHPS surveys captured patient-reported GHS and MHS on a five-point Likert scale ranging from “poor” to “excellent.” We used stepwise multivariable logistic regression to examine associations between patient race/ethnicity and fair or poor health status, adjusting for clinical and sociodemographic factors. Additionally, a multivariable Cox proportional hazards regression was used to determine the risks of mortality associated with fair or poor GHS and MHS.
Results: Of 1,867 patients with CRC, 79.5% were non-Hispanic white (NHW), 6.4% were non-Hispanic black (NHB), 7.5% were Hispanic, and 6.6% were non-Hispanic Asian (NHA). In Model 1 of our stepwise logistic regression, NHB patients had higher unadjusted odds for fair or poor GHS (OR 1.56, 95% CI 1.06-2.28) compared to NHW patients while Hispanic patients had higher unadjusted odds for both fair or poor GHS (1.48, 1.04-2.11) and MHS (1.92, 1.23-3.01). In Model 2, this relationship persisted after adjusting for clinical factors, with NHB patients being

more likely to report fair or poor GHS (1.62, 1.10-2.40) and Hispanic patients being more likely to report fair or poor GHS (1.49, 1.04-2.13) and MHS (1.92, 1.22-3.00). In Model 3, after adjusting for both clinical and sociodemographic factors, the association between race/ethnicity and fair or poor GHS (p = 0.53) and MHS (p = 0.23) no longer remained. Reporting fair or poor GHS and MHS was associated with a greater risk of mortality among all CRC patients (HR 1.52, 95% CI 1.31-1.76 and 1.62, 1.34-1.99, respectively).
Conclusion: Our study illustrates that racial/ethnic differences in PROs are largely driven by sociodemographic factors as opposed to clinical factors. As fair or poor GHS and MHS shortly after diagnosis reflect a higher risk of mortality in CRC patients, efforts to understand unmet biopsychosocial concerns may help further elucidate racial differences in CRC survival that may be otherwise overlooked in standard clinical practice.

PSYCHIATRY

Examining Racial Differences in the Associations Between Resilience, Emotion Regulation, and Eating Disorders

Zoya Khalil, Kathryn Smith, Dept. of Research, KSOM

Goal: The association between emotion dysregulation and eating disorders (ED) has been widely documented; conversely, higher resilience correlates with better ED outcomes. However, it's important to note that ED symptomatology varies across race. Therefore this study examined whether relationships between resilience, emotion regulation, and EDs differ by race. While it was predicted the relationship between resilience and poor emotion regulation (measured by the Brief Resilience Scale [BRS] and Acceptance and Action Questionnaire [AAQ]) and ED symptoms (measured by the SCOFF screener) would differ across races, no specific hypotheses were made regarding the exact nature of differences.

Methods: This was a cross-sectional archival analysis of women who completed the 2019-2020 wave of the Healthy Minds Study (N=18,538), a national survey of undergraduate and graduate students in the U.S. Generalized linear models examined the effects of BRS and AAQ scores as predictors of screening positive for an ED based on the SCOFF . Race was examined as a moderator of these associations.

Results: There was a main effect of BRS scores predicting positive ED screens (F=72.28, p<.001), such that lower resilience was related to a greater likelihood of a positive ED screen, but there were no effects of race or the interaction of race and the BRS. There was a main effect of AAQ (F=195.2, p<.001), race (F=17.34, p=.015), and their interaction (F=16.65, p=.020) predicting positive ED screens. As shown in Figure 1, higher AAQ scores correlated with a higher likelihood of a positive ED screen for all races, yet an opposite pattern was found in the Middle Eastern/Arab/Arab American group.

Conclusions: The data indicate the association between emotion regulation and ED symptoms vary by race, yet resilience appears to be a protective factor across races. The exact differences across racial groups should be explored in future studies.

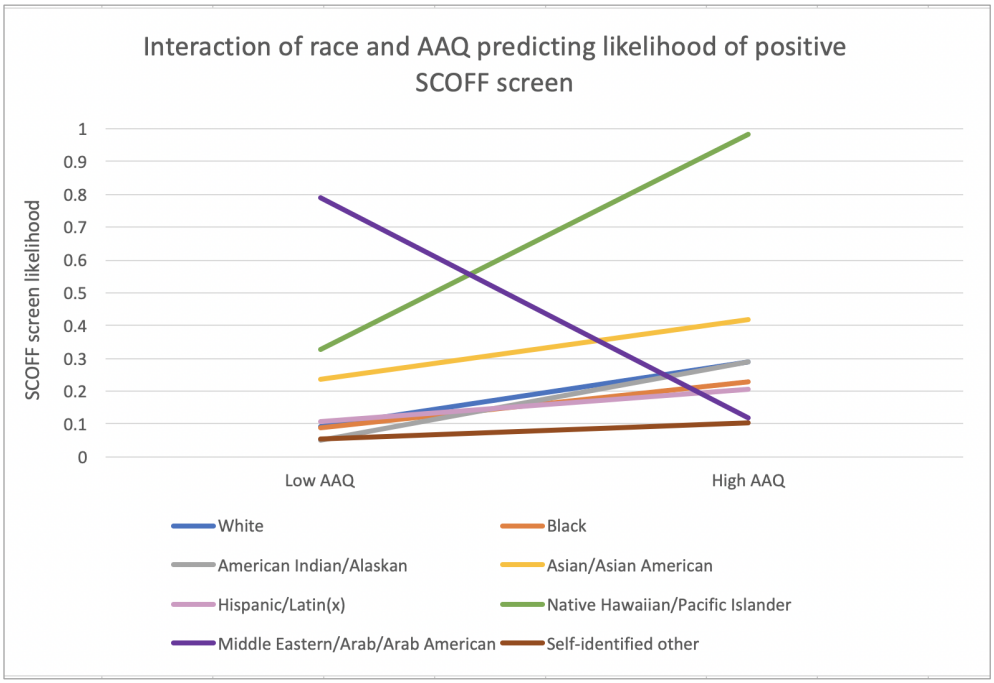


Figure 1. Interaction effect between race and AAQ

Mental Health in Medical Students

Jennifer Wang, B.A., Eric Pedersen, Ph.D., Reagan Fitzke, B.S., Denise Tran, Ph.D., Jewel Grell

Purpose: To investigate the factors surrounding mental health conditions, such as depression, anxiety, and substance use disorders, and the barriers to seeking mental health treatment among medical students.

Background: While healthcare professionals treat their patients, it is important to also consider their wellbeing, including mental health. Current literature regarding mental health and emotional wellbeing in healthcare professionals and healthcare professionals-in-training suggests that burnout is more common in physicians than in their non-physician counterparts[1] and that fear of stigma is often viewed as a barrier to seeking mental health treatment, including when seeking treatment for substance use disorders[2]. There is a shortage of studies related to mental health and emotional wellbeing, such as burnout [3], among medical students. This particular study focuses on mental health in U.S. medical students, the factors surrounding mental health conditions, and obstacles to seeking treatment.

Methods: This research project is currently a cross-sectional study conducted through a confidential Qualtrics survey sent out in the fall of 2021 to medical students currently enrolled in U.S. accredited medical schools. As an incentive to complete the survey, participants would be entered in a raffle to win gift cards. This survey includes various scales to assess mental health conditions, such as the PHQ-8 and GAD-7 scales. In addition to multiple choice questions, the survey includes free-response questions in order to gain both quantitative and qualitative data. The survey was distributed by contacting medical schools, through online medical student forums, and through word-of-mouth and is designed to be a baseline survey. The project is eventually intended to be a longitudinal study, with a follow-up survey projected to be sent out in the spring of 2022. Analyses will be conducted through SPSS and Dedoose for qualitative data.

Results: The first round of data has been collected, with responses from 568 medical students, and the research team is currently working on coding the qualitative data of the survey. So far, The second round of data will be collected in the spring of 2022.

Discussion: This study, which is notable in including longitudinal quantitative and qualitative data for U.S. medical students, is aimed to investigate the various factors surrounding mental health conditions in medical students and the possible barriers to their seeking mental health treatment. With the results, we hope to shed light on the various and unique obstacles keeping future medical professionals from receiving help and encourage discussion and positive change regarding healthcare professional and student culture, perception, and attitudes towards mental health and treatment.

Citations:

1. Dyrbye, L., West, C., Satele, D., Boone, S., Tan, L., Sloan, J., & Shanafelt, T. (2014). Burnout Among U.S. Medical Students, Residents, and Early Career Physicians Relative to the General U.S. Population. *Academic Medicine*, *89*(3), 443–451. https://doi.org/10.1097/ACM.0000000000000134
2. Vayr, F., Herin, F., Jullian, B., Soulat, J., & Franchitto, N. (2019). Barriers to seeking help for physicians with substance use disorder: A review. *Drug and Alcohol Dependence*, *199*, 116–121. https://doi.org/10.1016/j.drugalcdep.2019.04.004
3. Dyrbye, L., Thomas, M., & Shanafelt, T. (2006). Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Academic Medicine*, *81*(4), 354–373. https://doi.org/10.1097/00001888-200604000-00009

RADIOLOGY

Ultrasound Evaluation of Endometrial Polyps and the Prediction of Malignancy

Rene Ayala, **MSII**, Robert Harris, MD, Dept. of Radiology, Keck USC

Background: Endometrial polyps are intrauterine lesions of varying morphology. Their composition can consist of endometrial glandular tissue and vasculature. In addition, the location of endometrial polyps can vary; however, they are most often localized to the fundal region [1]. Risk factors that can lead to the formation of endometrial polyps include obesity, hypertension, age, and the use of selective estrogen receptor modulators, such as Tamoxifen [2]. The prevalence of endometrial polyps varies across different studies and populations; however, one meta-analysis reports a prevalence range of 8% to 35%. Some studies report that menopause may be a contributing factor. However, this could be due to a selection bias as postmenopausal women with any vaginal bleeding are more like to undergo diagnostic screening than premenopausal women. While most endometrial polyps are benign growths, they can develop hyperplastic changes and even malignancy. The following study will provide clinicians with the information needed to guide clinical decision-making. If malignancy can be ruled out following a transvaginal ultrasound, this could prevent patients from undergoing costly and invasive procedures, such as hysteroscopy, dilation and curettage (D&C), and hysterectomies. The purpose of this study is to assess the ultrasound characteristics that have the highest positive predictive value for endometrial cancer. These findings will potentially assist in understanding the risk for malignancy on initial transvaginal ultrasound to better guide clinical management.

Methods: The following study will consist of a retrospective chart review of patients who have undergone transvaginal ultrasound (TVUS) and endometrial biopsy. Researching Radiologists and Radiology residents will then undergo double-blind readings of past ultrasound images of patients suspected to have either benign endometrial polyps or malignancy. The readings will then be compared to the biopsy findings to assess the differences in sensitivity and specificity of diagnosing endometrial malignancy.

Results: While the data collection and double-blind readings are currently in progress, the expected possibilities can be discussed. If there is no statistically significant difference in the rate of endometrial malignancy of the biopsy findings vs. the double-blind TVUS readings, then it can be inferred that TVUS has an adequate sensitivity in predicting endometrial malignancy. Conversely, if there is a significant difference in the detection of endometrial malignancy, it will provide evidence for the need for additional diagnostic methods to detect endometrial malignancies.

Conclusions: The following project is a worthwhile study of the use of transvaginal ultrasound in differentiating benign endometrial polyps from endometrial malignancy. The current methods used in the detection of endometrial malignancies, such as hysteroscopy, D&C, and even hysterectomy, are far more invasive when compared to TVUS. In addition to being invasive, they carry the inherent risk of infection and infertility.

References:

1. Ben-Arie A., Goldchmit C., Laviv Y., Levy R., Caspi B., Huszar M.et al. The malignant potential of endometrial polyps. Eur J Obstet Gynecol Reprod Biol. 2004; 115: 206-210 https://www.ejog.org/article/S0301-2115(04)00055-7/fulltext
2. Kim K.R., Peng R., Ro J.Y., Robboy S.J.. A diagnostically useful histopathologic feature of endometrial polyp: the long axis of endometrial glands arranged parallel to surface epithelium. Am J Surg Pathol. 2004; 28: 1057-1062. https://www.researchgate.net/publication/8457788_A_Diagnostically_Useful_Histopathologic_Feature_of_Endometrial_Polyp
3. Savelli L., De Iaco P., Santini D. et al. Histopathologic features and risk factors for benignity, hyperplasia, and cancer in endometrial polyps. Am J Obstet Gynecol. 2003; 188: 927-931. https://pubmed.ncbi.nlm.nih.gov/12712087/

Strong Association of Enlarged Perivascular Spaces with Future Cognitive Impairment

Brendon Chou, Nasim Sheikh-Bahaei, Giuseppe Barisano, Farshid Sepehrband, Jay Acharya, Anandh Rajamohan, Paul Kim, Meng Law, Author Toga, Wilson Xu, Helena Chui

Background: The underlying pathogenesis for aggregation of beta-amyloid and tau in Alzheimer's disease (AD) to development of dementia remains unclear. Perivascular spaces (PVS) are involved in cerebrospinal fluid flux and interstitial waste clearance from the brain, and glymphatic disruption with enlarged PVS may be pivotal to the development of proteinopathy in AD and related cognitive decline. We seek to determine if increased PVS burden is associated with the development of future cognitive impairment.
Methods: Through the Alzheimer's Disease Neuroimaging Initiative, we recruited cognitively normal cases who developed mild cognitive impairment (n=64) or dementia (n=25) during follow-up, as well as age and sex-matched controls (n=64). The number of enlarged PVS in the centrum semiovale (CSO) and basal ganglia, number of cerebral microhemorrhages, and severity of white matter hyperintensities were measured. We then compared PVS between convertors when cognitively normal and non-convertor controls. Additionally, we recorded demographic data, amyloid and tau levels, and cardiovascular risk factors including hypercholesterolemia. We used multi-regression models to investigate associations between PVS and these factors.
Results: We found significantly higher PVS in the CSO ($p<0.0001$), amyloid positivity ($p=0.03$), and hypercholesterolemia ($p=0.03$) in convertors compared to non-convertors. This association between PVS and conversion remained significant after adjusting for demographic factors, amyloid, tau, and cardiovascular risk factors. Additionally, when added to the regression models with PVS, the effects of amyloid ($p=0.11$) and cholesterol ($p=0.85$) disappeared. Furthermore, Clinical Dementia Rating at the time of conversion was highly associated with PVS in the CSO ($p=0.02$) but not with amyloid ($p=0.11$) or tau ($p=0.36$).
Conclusions: We found enlarged PVS to be the only factor significantly associated with future cognitive impairment. Increased soluble amyloid with glymphatic disruption may contribute to early pathophysiology of AD, providing enlarged PVS as a potential imaging biomarker for diagnosis and prognosis of dementia.

Radiogenomic Associations with Prognostic and Predictive Molecular Biomarkers in Clear Cell Renal Cell Carcinoma

Derek H. Liu[1,], **Komal A. Dani**[1,], Sharath S. Reddy[1], Xiaomeng Lei[2], Natalie L. Demirjian[2], Darryl H. Hwang[2], Bino A. Varghese[2], Suhn K. Rhie[3], Felix Yap[10], David Quinn[5], Imran Siddiqi[6], Manju Aron[6], Ulka Vaishampayan[7], Haris Zahoor[5], Steven Y. Cen[2,8], Inderbir S. Gill[4], Vinay A. Duddalwar[2,4,9]

[1]Keck School of Medicine, University of Southern California, Los Angeles, CA 90033
[2]Department of Radiology, Keck School of Medicine, University of Southern California, Los Angeles, CA 90033
[3]Department of Biochemistry and Molecular Medicine, University of Southern California, Los Angeles, CA 90033
[4]Institute of Urology, University of Southern California, Los Angeles, CA 90033
[5]Department of Medicine, University of Southern California, Los Angeles, CA 90033
[6]Department of Pathology, University of Southern California, Los Angeles, CA 90033
[7]Department of Medicine, University of Michigan, Ann Arbor, MI 48109
[8]Department of Neurology, University of Southern California, Los Angeles, CA 90033
[9]Department of Biomedical Engineering, University of Southern California, Los Angeles, CA 90089
[10]Radiology Associates of San Luis Obispo, Atascadero, CA, USA

Objectives: This study investigates how quantitative texture analysis can be used to non-invasively identify novel radiogenomic correlations with Clear Cell Renal Cell Carcinoma (ccRCC) biomarkers.
Methods: The Cancer Genome Atlas–Kidney Renal Clear Cell Carcinoma (TCGA-KIRC) open-source database was used to identify 190 sets of patient genomic data that had corresponding multiphase contrast-enhanced CT images in The Cancer Imaging Archive (TCIA-KIRC). Only CT tumor images with more than 8 pixels were included for analysis. 2824 radiomic features spanning fifteen texture families were extracted from CT images using a custom-built MATLAB software package. Robust radiomic features with strong inter-scanner reproducibility were selected. Random Forest (RF), AdaBoost, and Elastic Net machine learning (ML) algorithms evaluated the ability of the selected radiomic features to predict the presence of 12 clinically relevant biomarkers identified from literature. ML analysis was repeated with cases stratified by stage (I/II vs. III/IV) and grade (1/2 vs. 3/4). 10-fold cross validation was used to evaluate model performance.
Results: Before stratification, radiomics predicted the presence of several biomarkers with weak discrimination (AUC 0.60-0.68). Once stratified, radiomics predicted KDM5C, SETD2, PBRM1, and mTOR mutation status with acceptable to excellent predictive discrimination (AUC ranges from 0.70 to 0.86).
Conclusions: Radiomic texture analysis can potentially identify a variety of clinically relevant biomarkers in patients with ccRCC and may be used in addition to biopsy results to predict prognosis and select treatment.

UNET for Spine Segmentation, Towards Fracture Detection

Jon Renslo MS[1,2], Brian Chang MD[2], Qifei Dong MS[2], David Haynor MD PhD[2], Sean Johnston MD[1], Gang Luo PhD[2], Sarah Shubber BS[2,3], Jeffrey Jarvik MD MPH[2], Nathan Cross MD MS[2]

[1] *Keck School of Medicine, University of Southern California, Los Angeles, CA*
[2] *University of Washington School of Medicine, Seattle, WA*
[3] *Lake Erie College of Osteopathic Medicine, Erie, PA*

Background: Advances in deep learning have enabled automation of many tasks in Radiology and Medicine. Osteoporosis screening is evidence based and recommended. Incidental spinal fractures can be an early indicator of osteoporosis but are underreported. Automated screening of radiographs could facilitate detection of incidental fractures. To build such a tool, the location of vertebral bodies must first be identified.
Methods: Annotated images from the Osteoporotic Fractures in Men Study (MrOS) were used to train a UNET deep learning model to segment the spine in lateral thoracic and lumbar radiographs. Images were preprocessed with contrast limited adaptive histogram normalization, then downsampled. Output probability maps were binarized and postprocessed, and bounding boxes were drawn around vertebral body candidates. Bounding boxes were used to crop the original image and pass individual vertebral bodies to a fracture detection model under development. Model performance was evaluated by Jaccard score and failure analysis of image confounders. Bounding box placement was also evaluated by mean-centroid-distance.
Results: The mean Jaccard score for all radiographs was 76% (background vs. any vertebral body). The model also found unannotated vertebral bodies, leading to an artificially lower Jaccard score. Sensitivity analysis revealed an optimal threshold of 0.63 for binarization. Failure analysis revealed significant Jaccard score losses only to writing on the image. Bounding box centroid-distance analysis is revealed average 2.18 pixel displacement, or 3.9% of the average endplate width. F1 score for object detection was 96.1%

Conclusion: This demonstrates an effective model for vertebral body semantic segmentation from background and the analytics to refine this into object detection and instance segmentation on lateral thoracic and lumbar spine radiographs. It shows promise for future incorporation into automatic fracture detection pipelines.

Vascular and Connectivity Changes in Chronic Migraines and Episodic Migraines without Aura: A Pilot Study

Wilson Xu (Medical Student), Dr. Nasim Sheikh-Bahaei, MD MRCP FRCR PhD, Department of Radiology (Mentor)

Type of project: Case-control study
Research categories: Imaging and Radiology, Neurology, Clinical
Background: Perivascular spaces, otherwise known as PVS or Virchow-Robin spaces, are a series of cavities surrounding cerebral blood vessels; they are involved in the clearance of waste products and interstitial fluid in the brain. Recent studies have shown that changes in this microvascular PVS system play a role in various neurological diseases and disorders, in particular migraines. Our primary aim in this study is to examine changes in PVS structure and functional connectivity in migraine patients and compare these changes to that of age-matched migraine-free controls. We will investigate PVS volume differences in patients with chronic migraine (CM) and episodic migraine without aura, ultimately to examine the relationship between microvascular and functional changes in the brain and how they relate to duration and severity of disease. Additionally, we hope to find a correlation between these structural/functional changes and the severity and duration of disease in our migraine patients.
Statement of the problem: Migraine is a common neurological disorder involving recurrent headaches and contributes to significant disability around the world, affecting approximately 15% of the American population alone. While the International Headache Society (IHS) has described in detail how migraines and many other headache disorders present in patients, there is still much to learn about the pathophysiology and underlying mechanisms of migraine—in particular, advancements in and further investigations into migraine imaging may improve our understanding of the disease and how to treat it. We would like to learn more about how quantity and volume of PVS are related to the development and presentation of migraine in different migraine types. This study could reveal novel mechanisms of migraine as they relate to PVS and in the future, additional investigation could lead to more effective means of treating and preventing migraine. A better understanding of how exactly PVS and migraine are connected could also improve our use of imaging to diagnose different types of migraine and perhaps even assess how susceptible certain patients are to developing migraine. In order to investigate how PVS affects migraine (and vice versa) in this study, we will recruit migraine patients, collect clinical and imaging data on controls and different migraine groups, and perform statistical analysis on the data. By doing so, we hope to learn more about the relationship between migraine and PVS, as well as how we might be able to better treat it in the future.
Hypothesis: We hypothesize that microvascular and functional connectivity changes will differ between our three groups (CM, episodic migraine without aura, control), and that these changes are also associated with disturbed cerebral perfusion.
Study design (including student role/responsibilities and research plan): We have recruited 20 adult patients, ages 25-60 years old–10 patients with chronic migraine, 10 with episodic migraines without aura, and 5 age-matched migraine-free control patients. We have also collected clinical and imaging data; 7T magnetic resonance imaging (MRI) scans have provided us with structural and functional neuroimaging information for each patient. PVS is mapped using automated segmentation, then manually corrected and scored. We will then compare this data to functional and perfusion findings between each of the migraine groups, to

assess how these changes may affect migraine duration and severity. I am responsible for analyzing and correcting PVS segmentations in T1W MRI scans, using T2W and FLAIR images to help eliminate non-PVS structures and manually segment missed PVS. I aim to generate more accurate PVS volume data for comparison between patient groups in this study. The quantity and pattern of PVS can then be scored and compared to functional/perfusion findings in each patient; I will then help with statistical analysis to investigate migraine severity/duration and functional/structural changes in brain parenchyma are related.

SURGERY

Adjuvant Chemotherapy, not Radiotherapy, Prolongs Survival for Node Negative Non-Small Cell Lung Cancer with Positive Surgical Margins

Arman Ashrafi[1], Li Ding[2], Jason C. Ye[3], Alexander T. Kim[1], Elizabeth A. David[4], Sean C. Wightman[4], Scott M. Atay[4], Takashi Harano[4], Anthony W. Kim[4]

[1]Keck School of Medicine; [2]Division of Biostatistics; [3]Department of Radiation Oncology; [4]Division of Thoracic Surgery, Keck School of Medicine, University of Southern California, Los Angeles, CA.

Objective: To determine differences in overall survival (OS) depending upon type, timing, and sequence of adjuvant therapies in patients with positive margins and node negative disease following non-small cell lung cancer (NSCLC) resection.
Methods: The National Cancer Database was queried for patients with positive margins after surgical resection of treatment-naïve clinical stage $T_{1-4}N_0M_0$ and confirmed pN0 NSCLC who received adjuvant chemotherapy and/or radiotherapy from 2010-2016. Adjuvant treatment groups were defined as: surgery alone (SA), chemotherapy alone (CTX), radiotherapy alone (PORT), concurrent chemoradiotherapy (cCRT), sequential chemo- then radiotherapy (sCRT), and sequential radio- then chemotherapy (sRTC). Multivariable Cox regression was used to evaluate the impact of time to adjuvant radiotherapy initiation on OS. Kaplan-Meier curves were generated to compare 5-year OS.
Results: Of the 1,713 patients with positive margins and negative nodes, 1,027 (60.0%) underwent SA, 230 (13.4%) CTX, 220 (12.8%) PORT, 177 (10.3%) cCRT, 31 (1.8%) sCRT, and 28 (1.6%) sRTC. 5-year OS differed between cohorts: 40.7% with SA, 47.0% with CTX, 35.1% with PORT, 45.7% with cCRT, 36.7% with sCRT, and 32.2% with sRTC ($p = 0.03$). On aggregate, compared to SA, CTX was the only adjuvant treatment that improved OS ($p = 0.002$). For pT2 disease, neither PORT nor any combination modality yielded a survival benefit, only CTX did ($p = 0.0015$). In pT3 disease, CTX, cCRT and combined sequential sCRT and sRTC were all associated with significant improvements in survival compared to SA. All adjuvant therapies were equally efficacious in prolonging survival, with no individual treatment providing a significant relative advantage. Multivariable Cox regression identified a linear relationship between prolonged time to adjuvant radiotherapy initiation and decreased OS, but the trend was not significant (HR 1.001, 95% CI 0.996 – 1.006; p=0.66).
Conclusions: In treatment-naïve cT1-4N0M0 pN0 patients with positive surgical margins, adjuvant chemotherapy alone is associated with an improvement in survival compared to surgery alone, with no radiotherapy-inclusive treatment providing additional survival benefit to chemotherapy alone. Re-evaluation of standard-of-care practices regarding adjuvant therapy for this patient population may be warranted if prospective studies corroborate these findings.
Key Words: Non-small cell lung cancer (NSCLC), radiotherapy, chemotherapy, margins of excision, surgery, timing

---

Long-term Outcomes of Isolated Aortic Valve Replacement in Young- to Middle-aged Adults with Bicuspid Aortic Valve Disease in a Tertiary Care Center

Neelesh Bagrodia BS, Ramsey S. Elsayed MD MS, Michael E. Bowdish MD MS, Brittany G. Abt MD, Ram K. Subramanyan MD PhD, Craig J. Baker MD, and Vaughn A. Starnes MD

Goal: To compare outcomes of young adult patients with bicuspid aortic valves undergoing isolated aortic valve replacement with the pulmonary autograft inclusion technique (Ross procedure) versus a bioprosthetic aortic valve replacement (AVR).
Methods: From 2005 – 2021, 114 patients aged 18-54 years with bicuspid aortic valves underwent isolated aortic valve replacement at our institution. Patients were divided into two

groups: those receiving a bioprosthetic valve (AVR, n=64) and those receiving the Ross procedure via the pulmonary autograft inclusion technique (Ross, n=50). Patients requiring a mechanical valve, concomitant cardiac or aortic procedures, or with a history of previous aortic valve repair were excluded. Need for aortic valve or aortic reintervention was analyzed using multivariable logistic regression. Overall survival was estimated using Kaplan Meier methods.
Results: Survival at 1, 5, and 10 years, respectively, was 95%, 88%, 88% in the AVR cohort and 100%, 100%, and 100% in the Ross cohort (p=.04, Figure 1). Aortic valve or aortic reintervention was required in 10 (15.6%) of the AVR cohort (7 patients required aortic valve replacement, 2 required an ascending aortic replacement, and 1 required a root replacement) and 2 (4%) of the Ross cohort (p=.04, Figure 2). The Ross procedure was associated with lower rates of aortic valve or aortic reintervention when compared to bioprosthetic AVR (Odds ratio 0.9, confidence interval .01-.81, p=.032).
Conclusions: The Ross procedure utilizing the pulmonary autograft inclusion technique was associated with improved survival and freedom from aortic valve or aortic reintervention. The Ross procedure represents an excellent option in young- to middle-aged adults with bicuspid aortic valves requiring aortic valve replacement and is superior in this patient population to conventional bioprosthetic aortic valve replacement in specialized centers.

Figure 1:

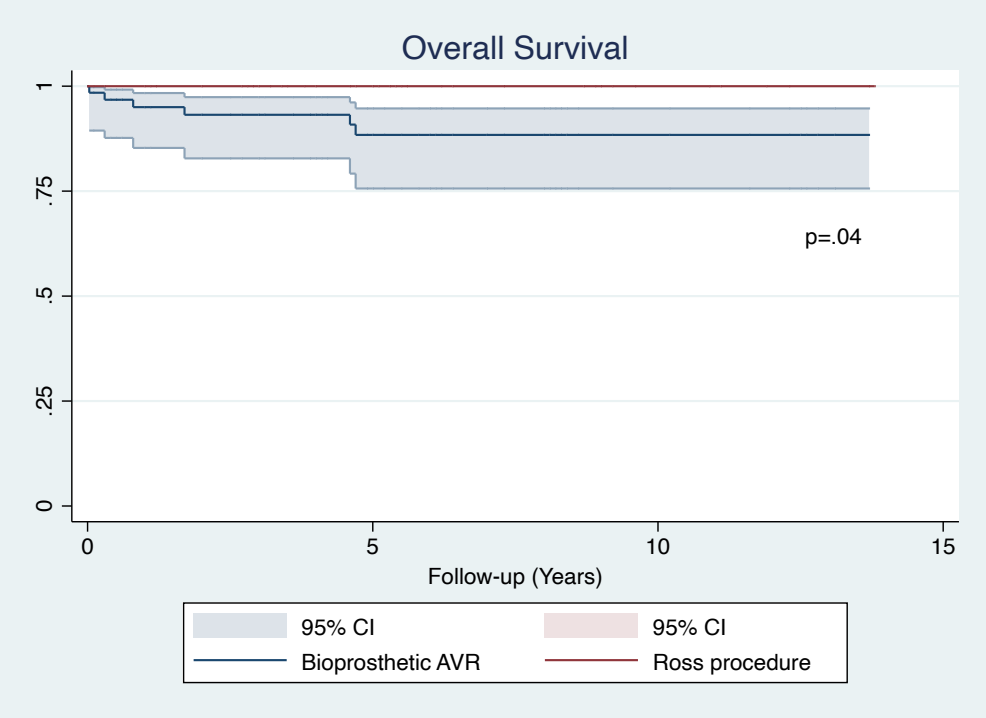
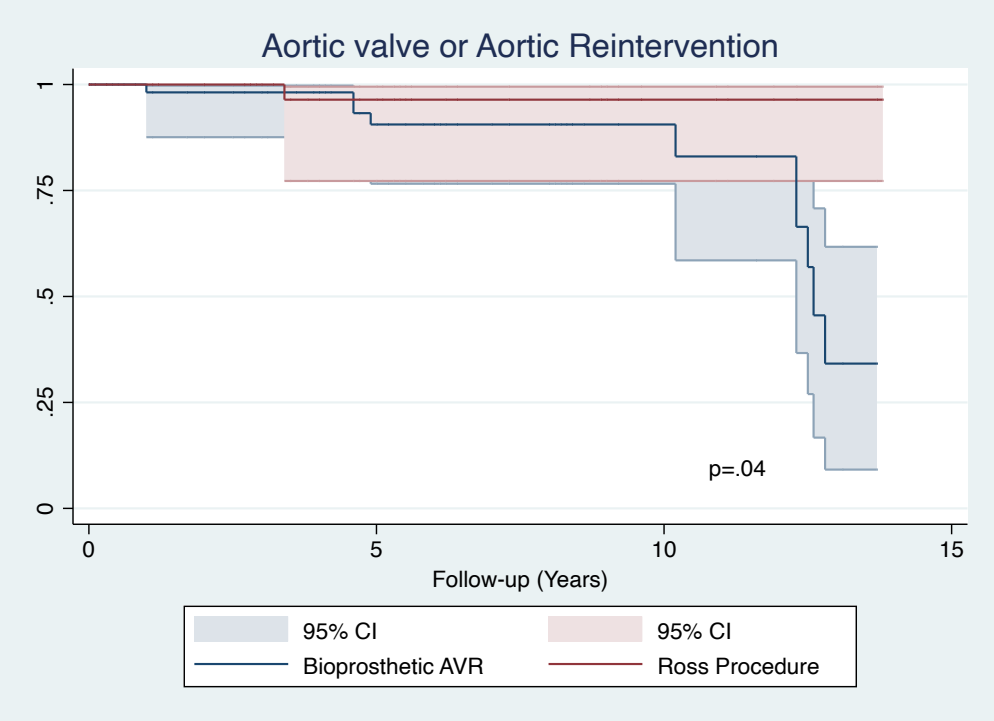


Figure 2:



Toe and Flow: The Optimal Timing of Minor Amputation after Revascularization for Wound Healing and Limb Salvage

Sebouh Bazikian Medical Student, Alyssa Pyun MD**,** Vincent Rowe MD FACS, Laura Shin DPM PhD

Goal: Chronic limb threatening ischemia is a complication of peripheral artery disease which increases the risk for major amputations. In the U.S, the number of major amputations have decreased while the combination of minor amputations and revascularizations have increased. This allows for less tissue removal long term by allowing increased perfusion to the minor amputation wound site. Despite advances, major amputations are still common. Creating an algorithm is crucial in mitigating this problem.

Methods: This is a retrospective case series for patients that underwent at least one minor amputation and one revascularization. The following datapoints were recorded: noninvasive vascular studies, perioperative mortality, all-cause mortality, major and minor amputations, vascular revascularizations and revisions, time interval between revascularization and minor amputation, overall complications, wound healing status, time to reintervention, time to wound healing, and functional status.

Results: The data collection is complete but the analysis is not.

Summary: The importance of optimizing the likelihood of healing minor amputations after revascularization is its potential for limb salvage, improved functionality, reduced reinterventions and adverse events, and cost.

Current Outcomes of Surgical Mitral Valve Repair for Degenerative Disease in the Era of Increased Penetrance of Percutaneous Mitral Valve Technology

Michael Brown Brittany G. Abt, MD, Michael E. Bowdish, MD MS, Ramsey S. Elsayed MD MS, Robbin Cohen MD, Alexander Vorperian, and Vaughn A. Starnes MD

Goal: An increasingly aging population has resulted in increased degenerative valvular diseases and repair, with disease of the mitral valve being most common. This has created an onus of developing new technologies to provide favorable outcomes for these patients. These new developments have pressured institutions to adopt new practices and neglect traditional surgical approaches. This study aims to understand the long-term outcomes of surgical MVR and determine its efficacy in treating degenerative mitral valve disease (DMVD). We hypothesis that long-term surgical MVR outcomes will be excellent and a viable treatment option for a large subset of patients with DMVD.
Methods: We retrospectively reviewed 452 patients' charts who underwent MVR for DMVD between 2010 and 2021 at Keck Hospital. Survival, need for MV reoperation, and mitral regurgitation (MR) progression were compared between those < 60 years old (n=200, Cohort 1) and those ≥ 60 years of age (n=252, Cohort 2).
Results: STS predicted risk of 30-day mortality was very low (<1.0%) for both cohorts when isolated MVR was performed. Kaplan-Meier survival at 1, 3, and 5 years was 100, 99.3, and 99.3% in Cohort 1 and 98.3, 97.2, and 94.6% in Cohort 2. The need for reoperation with death as a competing outcome at 1, 3, and 5 years was 0.9, 1.4, 1.8% in Cohort 1 and 2.7, 4.0, 5.1% in Cohort 2. Incidence of MR progression to moderate to severe or greater with death as a competing outcome at 1, 3, and 5 years was 1.4, 3.6, and 5.1% in Cohort 1 and 2.7, 3.5, and 4.7% in Cohort 2. After adjusting for sex, atrial fibrillation, leaflet repair location, diabetes, and prior sternotomy, age > 60 was not associated with increased mortality, MV reoperation, or MR progression.
Conclusion: Surgical repair of valvular disease continues to be excellent, even in low-risk patients over 60. It is essential to consider this in the reality of increasing pressures to enroll patients in percutaneous MV trials.

Contemporary Outcomes for Mitral Valve Repair for Degenerative Disease in the Era of Increased Penetrance of Percutaneous Mitral Valve Technology

Kenneth Calero

Background: Contemporary surgical outcomes related to Mitral Valve (MV) repair are excellent. Due to the increasing interest in percutaneous MV technology it is important to further understand the surgical outcomes with MV repair, particularly in older populations.
Methods and Results: 452 patients undergoing MV repair for degenerative diseases at a single institution between 2010 and 2021 were assessed as a part of a retrospective review. Preoperative characteristics were similar in all patients regards to comorbities and MV pathology. Survival, need for reoperation, and mitral regurgitation progression were the primary outcomes compared by using time-based methods between those <60 yrs (n=200, Cohort 1) and those =>60 yrs (n=252, Cohort 2). Survival at 1, 3, and 5 yrs was 100, 99.3, and 99.3% in Cohort 1 and 98.3, 97.2, and 94.6% in Cohort 2 (log rank p=0.02). After adjustment for sex, prior sternotomy, diabetes, atrial fibrillation, and location of leaflet repair (anterior, posterior, or bileaflet), being >=60 yrs of age was not associated with increased mortality (HR 6.96, 95% CI 0.85-56.8, p=0.07). Need for MV reoperation occurred in 15 (3.3%) patients (3 in Cohort 1; 12 in Cohort 2, p=0.05). Failure, defined as development of moderate to severe Mitral Regurgitation (MR) or greater, occurred in 13 patients (6 in Cohort 1; 7 in Cohort 2). Current results with MV repair continue to be excellent, even in low-risk patients over 60 years of age.

Disparities in the Injury Characteristics, Admission Rates, and Length of Stay Among Minority Pediatric Burn Patients: A Retrospective Review

Tiffany Calero BS, Justin Gillenwater MD MS, Haig A. Yenikomshian MD

Introduction: Children are particularly vulnerable to burn injuries. Previous studies have characterized racial disparities in the incidence and outcomes of pediatric burn injuries in the United States. With the current literature, there is a need to evaluate the association of racial and socioeconomic factors with admission and readmission rates and reasons among pediatric burn patients. We investigated the association between race/ethnicity and admission rates and burn severity to examine long-term care in pediatric patients.
Methods: A retrospective chart review of pediatric patients with acute burn injury was completed at a single burn center from 2016 to 2021. We stratified pediatric burn patients into groups based on race/ethnicity: African-American/Black, Hispanic/Latinx, Asian, and White. Variables collected included patient demographics, mechanism of injury, body area burned, total body surface area (TBSA), and length of stay. Comparisons were performed using Fisher's exact, T-test, and Wilcoxon rank-sum as appropriate.
Results: A total of 20 pediatric burn patients were identified. Of these patients, 70% (n = 14) were Hispanic/Latinx, 15% (n = 3) were Asian, 10% (n = 2) were African-American/Black, and 5% (n = 1) were a different race for the purpose of our study. The most common burn etiologies were scald (72.3%), contact (10.9%), and flame (7.9%). The most frequent body area burned was arms (48.5%), legs (44.6%), and chest (42.6%). Compared to other pediatric patients, Hispanic patients had the highest rates of admission (P = 0.007) and longest length of stay (P = 0.008).
Conclusion: Pediatric burn injuries admitted to the burn unit varied showing that minority pediatric patients were more likely to be admitted and have longer length of stay compared to White pediatric patients. These findings suggest that previously established racial/ethnic disparities persist in pediatric burn patients.

The Role and Effect of Telemedicine Visits for Bariatric Surgery Patients in the Pandemic Era

Kenzie Cohen, Jack P. Silva MD, Jessica Wu MD, Ryan Palmer, Tiffany Calero, Edward Compton, Matthew J. Martin MD, Stuart Abel MD, James D. Nguyen MD, Adrian Dobrowolsky MD, Kamran Samakar MD

Background: During the Covid-19 pandemic, there has been increased use of telemedicine for preoperative consultations and postoperative clinic visits in bariatric care. The goal is this study is to analyze the effect of preoperative telemedicine visits (PTV) versus in-person visits (IPV) at one bariatric center. We hypothesize that perioperative and postoperative outcomes will be similar in the PTV cohort compared to the IPV cohort.
Methods: We conducted a retrospective chart review of 185 bariatric surgery patients from 2018 to 2020. Patients who underwent revisional operations were excluded. The variables that were collected from the Keck EMR were demographics, weight metrics, perioperative details and complications, and postoperative outcomes. Patients who had PTV were compared to those who had IPV using univariate statistics and a multivariate regression model for failed excess weight loss (<50%) at 6 months.
Results: Of the 185 patients included, 39% had PTV and 61% had IPV. Both groups were similar in their demographics, comorbidities, preoperative weight loss, and early perioperative outcomes. At 6 months, the PTV cohort showed a higher percentage of excess weight loss than the IPV cohort (55% vs 43%, P<0.01). However, at 1 year, there was no significant difference in percent excess weight loss between the two groups (61% vs 52%, P=0.11). There were no

differences in resolution of comorbidities. On univariate analysis, PTV was associated with lower excess weight loss failure at 6 months, and was also an independent predictor on multivariate analysis (OR 0.47, P=0.03).
Conclusion: The implementation of telemedicine visits for preoperative consultation and evaluation prior to bariatric surgery was effective at this bariatric center, showing comparable perioperative and weight loss outcomes compared to patients who had in-person visits. The continued use of telemedicine visits may be an effective method for increasing patient access to and utilization of bariatric care.

Social Media as a Platform for Burn Survivor Outreach at a Safety Net Hospital

Rachel A. Colbath BS, Erin E. Ross BS, Peggy J. Ebner MD, Jeremy Yu MS, Haig A. Yenikomshian MD

Background: Outpatient follow-up is a critical component of burn recovery. Patients with barriers to care are at risk of having a lower quality of life after burn injury. Social media provides a platform for improvement of patient support. This study investigates accessibility and interest in social media interventions among socioeconomically disadvantaged and minority burn patients.
Methods: Patients receiving treatment at the LAC+USC burn clinic were asked to complete a survey about social media usage, difficulty attending follow-up appointments, and interest in engaging with the hospital through social media. Patient demographics and clinical data were obtained via chart review. The relationship between clinical or demographic factors, and interest in social media engagement, was assessed via exact logistic regression.
Results: Data were collected from 65 eligible patients. Social media use among participants (76.9%) was similar to the proportion in the U.S. general population (72%). 58.3% of respondents expected to encounter challenges when planning follow-up appointments. Challenges included difficulty with transportation (26.2%), trouble taking time off work (9.8%), and forgetting to schedule (9.8%). 36.5% of patients were very or moderately interested in receiving post-discharge education and follow-up reminders via social media, 27% were slightly interested, and 36.5% were unsure or not at all interested. 20% of patients both expected follow-up challenges and were moderately or very interested in social media engagement. There was a pattern of lower interest in social media engagement with higher %TBSA, while controlling for age or social media use, though *P* values were higher than .05.
Conclusions: Observed overlap between follow-up difficulty and outreach program interest may suggest such a program could ameliorate follow-up challenges. The next step will be to create HIPAA-compliant patient-driven social media platforms to facilitate burn reintegration.

Ethnicity Influences Outcomes of Adult Burn Patients

Nicola DiPaolo, BS, Ian F Hulsebos, BS, Jeremy Yu, MS, T Justin Gillenwater, MD, MS, Haig A Yenikomshian, MD

Introduction: Outcomes of burn survivors is a well-studied field; however, there has been little data comparing the outcomes of burn survivors by ethnicity. This study seeks to identify disparities in burn outcomes of broad ethnic groups.
Methods: A retrospective chart review of a burn center identified adult inpatient admissions from 2015 to 2019. 1142 patients were categorized by primary ethnicity: 142 Black/African American, 72 Asian, 479 Hispanic/Latinx, 90 white, 215 other, and 144 patients whose race/ethnicity was not recorded. Firth logistic regression was used to study the relationship

between ethnicity and binary outcomes. Zero-truncated negative binomial regression was used to examine hospital length of stay and intensive care unit LOS. Adjustment was made for demographic, social and pre-hospital clinical factors to help isolate ethnic disparities that might not be explainable by other factors.
Results: Relative to white patients, surviving Black patients had a 29% higher hospital LOS (ratio 1.29; 95% CI 1.01-1.64; unadjusted P=.04). The odds of being discharged home or to hospice care were 123% higher for Hispanic patients relative to white patients (OR 2.23; 95% CI 1.28-3.88; unadjusted P=.005). Compared with non-Hispanic ethnicity, Hispanic ethnicity was associated with a 44% decrease in the odds of discharge to acute care, inpatient rehabilitation, or a ward outside the burn unit (OR 0.56; 95% CI 0.34-0.92; unadjusted P=.022). Black and Hispanic patients had a higher chance of having publicly assisted insurance, versus private insurance, than their white counterparts (P=.041, P=0.011).
Conclusions: Even when controlling for burn severity and other factors, Black patients had longer hospital stays. Hispanic patients were more likely to be discharged to home or to hospice care. The causes of these disparities are indeterminate. They may stem from socioeconomic status not entirely accounted for, ethnic differences in comorbidity related to stressors, or inequity in health care delivery or insurance coverage.

Screening for Child Abuse in Children with Isolated Skull Fractures

Stephanie Y Chen MD[1], **Leland Gao BS[1]**, Karen Kay Imagawa MD[2,3], Eric R Roseman LCSW[4], Cathy E Shin MD FACS FAAP[1,5], Eugene S Kim MD FACS FAAP[1,5], Ryan G Spurrier MD[1,5]

[1]Division of Pediatric Surgery, Children's Hospital Los Angeles, Los Angeles, CA
[2]Division of General Pediatrics, Children's Hospital Los Angeles, Los Angeles, CA
[3]Department of Pediatrics, Keck School of Medicine, University of Southern California, Los Angeles, CA
[4]Department of Social Work, Children's Hospital Los Angeles, Los Angeles, CA
[5]Department of Surgery, Keck School of Medicine, University of Southern California, Los Angeles, CA

Background: Head trauma is the most common cause of death in child abuse, and each encounter for recurrent physical abuse is associated with greater morbidity. Children with isolated skull fractures (ISF) are often treated conservatively in the emergency department (ED). We aimed to determine patterns of physical abuse screening for children with ISF in a large academic children's hospital ED.
Methods: An IRB-approved retrospective chart review was performed for children age ≤3 years who presented to a large academic children's hospital ED from 01/01/2015-12/31/2019 with closed head trauma and ISF diagnosis (with or without scalp swelling). Primary outcome was hospital medical social work (SW) assessment to prescreen for possible abusive environment. Secondary outcomes included suspicion for physical abuse based on Child Protective Services (CPS) referral and/or subsequent ED encounters within 1 year.
Results: 66 patients with ISF were identified (41F:25M). Unwitnessed injuries were reported in 33.3% (n=22) and witnessed injuries reported in 66.7% (n=44). Of unwitnessed injury patients, 77.3% (17/22) were age <12 months. Of these, 88.2% (15/17) underwent SW assessment and 47.1% (8/17) were referred to CPS. Of witnessed injury patients, 52.3% (23/44) were age <12 months. Of these, 60.9% (14/23) underwent SW assessment, with no CPS referrals. Overall, 18.2% (4/22) unwitnessed injury patients and 20.5% (9/44) witnessed injury patients returned to our ED within 1 year. One patient from each group returned for recurrent trauma, and both were age <12 months.

Conclusions: We maintain a high level of vigilance in screening for physical abuse, particularly in children age <12 months. To decrease risk of missed physical abuse, future considerations include consulting SW for all patients with ISF, particularly those that are non-ambulatory, regardless of whether injury was witnessed or not.

A Survey of Socioeconomic and Cultural Factors in a Safety Net Bariatric Population

Fergui Hernandez, BS[1], Tayler J. James, MD[2], Agnes Premkumar, BS[1], Kamran Samakar, MD[2], James D. Nguyen, MD[2], Adrian Dobrowolsky, MD[2]

[1]*Keck School of Medicine of USC, Los Angeles, California*

[2]*Department of General Surgery, Keck School of Medicine of USC, Los Angeles, California*

Background: In 2017, a bariatric surgery program was introduced at one of the country's largest public safety net hospitals serving a primarily Hispanic population. The objective of this study was to survey this population to investigate socioeconomic and cultural factors that might affect bariatric success in these patients.

Methods: A retrospective cohort study was performed of patients who underwent bariatric surgery at this institution from 2017 to 2020. A total of 169 patients who were at least one year from surgery were contacted to participate in a 35-question telephone survey regarding demographics, obesity history, home life, dietary habits, and postoperative satisfaction.

Results: A total of 105 patients (62%) responded to the survey. Fifty-six percent reported an annual household income <$25,000, and 38% attained education beyond high school. Forty-five percent struggled with obesity since childhood, and 45% lived with others with obesity. Thirteen percent did not take recommended postoperative vitamins, with "financial constraints" reported as a reason. Some patients reported that aspects of their LatinX heritage imposed unique challenges to weight loss, including the importance of food in their culture ("If you are from [a] Mexican background, you are taught to eat a lot of food…") and lack of family support ("My Latina family did not think being big was a problem…")

Conclusion: This study highlights unique socioeconomic and cultural factors that could affect bariatric outcomes in this population. Future work will compare patient demographics and outcomes in this population to patients who undergo bariatric surgery at the university hospital affiliate.

Longer Hospitalizations, More Complications, and Greater Readmissions for Patients with Comorbid Psychiatric Disorders Undergoing Pulmonary Lobectomy

Alexander T. Kim[1], Li Ding[2], Matthew J. Ashbrook[3], Arman Ashrafi[1], Sean C. Wightman[4], Scott M. Atay[4], Elizabeth A. David[4], Takashi Harano[4], Anthony W. Kim[4]

[1]*Keck School of Medicine of the University of Southern California, Los Angeles, CA*

[2]*Division of Biostatistics, Keck School of Medicine of the University of Southern California, Los Angeles, CA*

[3]*Department of Surgery, Keck School of Medicine of the University of Southern California, Los Angeles, CA*

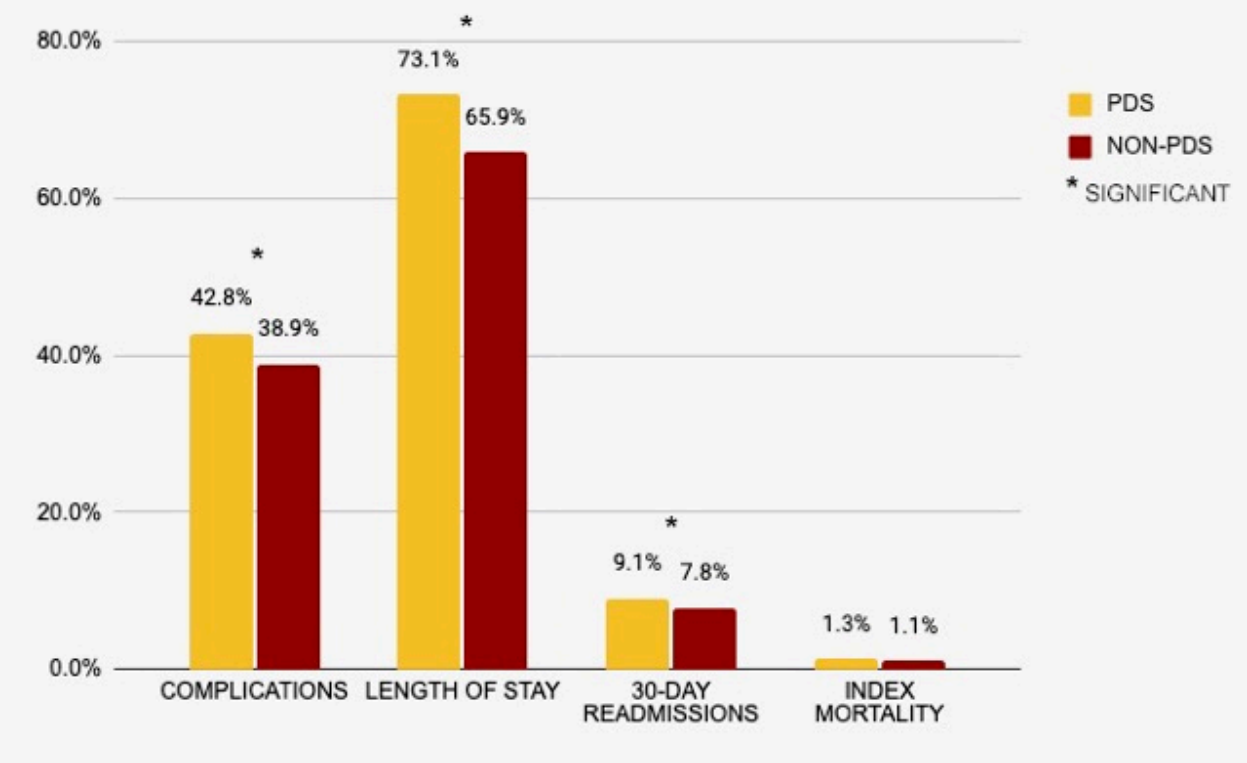
[4]*Division of Thoracic Surgery, Keck School of Medicine of the University of Southern California, Los Angeles, CA*

Objective: Patients with comorbid psychiatric disorders (PDS) are at an increased risk for adverse perioperative and postoperative outcomes when receiving medical care. The objective of this study is to examine the impact of PDS in pulmonary lobectomy patients.

Methods: A retrospective analysis of the Healthcare Cost and Utilization Project Nationwide Readmissions Database (HCUP-NRD) from 2016-2018 was performed. Patients with primary lung malignancies who underwent pulmonary lobectomy were selected using the International Classification of Diseases Clinical Modification and Procedure Coding System (ICD-10 CM, PCS). Psychiatric disorders were identified using ICD-10 codes consistent with the Diagnostic and Statistical Manual of Mental Disorders, 5th edition. Postoperative complications included pulmonary, cardiovascular, gastrointestinal, infectious, wound related, genitourinary, psychiatric, and systemic complications. The association of comorbid psychiatric disorders with in-hospital mortality, complications, length of stay (LOS), 30-day readmissions was assessed in a multivariable regression and were adjusted for age, sex, insurance, hospital-type, and Elixhauser Comorbidity Index.

Results: A total of 46,573 pulmonary lobectomy patients were examined. There were 19,617 (42.1%) patients with at least one of the PDS and 26,956 with none of the PDS. 18,876 (40.5%) of the total cohort experienced complications: PDS - 8,395/19,617 (42.8%) vs non-PDS - 10,481/26,956 (38.9%), p<0.001). 32,091 (68.9%) of the total cohort had a LOS >3 days: PDS - 14,340/19,617 (73.1%) vs non-PDS - 17,751/26,956 (65.9%), p<0.001. 3,585 (8.4%) were readmitted: PDS - 1,640/17,981 (9.1%) vs non-PDS - 1,945/24,819 (7.8%). On multivariable analysis, patients with PDS had increased postoperative complications (RR 1.049; 95% CI: 1.025-1.073; p<0.0001), longer LOS (IRR [Incident Rate Ratio] 1.122; CI 1.104-1.141; p<0.001), and greater 30-day readmissions (RR 1.114; CI 1.032-1.203; p=0.0057). Index mortality did not increase among patients with PDS (OR 1.046; CI 0.867-1.261; p=0.6393).

Conclusions: Patients with comorbid psychiatric disorders represent a particularly vulnerable surgical patient population which may manifest more prominently owing to the need for active patient participation in their recovery. Improving upon perioperative interventions may enhance the postoperative course for lung cancer patients with comorbid psychiatric disorders undergoing pulmonary lobectomy.



Early Intervention of Surgery-Induced Lymphatic Insufficiency

Sean Kim[1], Chang-Won Cho[4, 2], Dongwon Choi[2,3] Eunkyung Park[2,3], Sunju Lee[2,3], Eunson Jung[2,3], Somin Lee[5], Chester J. Koh[6], Noo Li Jeon[5], Il-Taeg Cho[2], and Young-Kwon Hong[2,3]

[1]*Keck School of Medicine of USC*
[2]*Department of Surgery, KSOM*
[3]*Department of Biochemistry and Molecular Medicine, KSOM, Los Angeles, CA, USA*
[4]*Research Group of Traditional Food, Korea Food Research Institute, Wanju-gun, Jeollabuk-do, South Korea*
[5]*Department of Mechanical and Aerospace Engineering, Seoul National University, Seoul, South Korea*
[6]*Division of Pediatric Urology, Texas Children's Hospital, Baylor College of Medicine, Houston, Texas, USA*

Background: Lymphedema is defined by tissue swelling and pain due to dysfunction in the lymphatic collection system. It commonly occurs secondary to procedures such as tumor resection and lymph node biopsy in breast cancer patients. Current treatments of lymphedema are inconsistent, and ideal treatment has not yet been described. This study seeks to develop therapy for preventing lymphedema in a mouse model using Rg3, a compound derived from ginseng with anti-tumor and anti-inflammatory properties. We hypothesized that mice treated with Rg3 would develop less severe lymphedema compared to control.
Methods: The mouse tail lymphedema model used has been previously determined to have a similar pathophysiology to lymphedema in human patients. The procedure involves removing a circumferential skin flap of 3mm in length starting 2cm from the base of the tail and severing deep collecting lymphatics while avoiding disruption of adjacent blood vessels. The treatment group (n=6) was administered Rg3 10mg/kg in H2O, and the control group (n=6) was administered H2O via oral gavage for 7 days, beginning on the day of the procedure. Tail images were captured biweekly and analyzed via ImageJ to calculate changes in tail volume.
Results: After 3 weeks of monitoring, five mice were excluded from the study due to tail necrosis. Variable swelling was noted between groups. The control group (now n=4) and Rg3 treated group (now n=3) showed a progression of edema up to 250% and 200% of the original tail volume, respectively. These data are not statistically significant (p value 0.52).
Discussion: No conclusion on the efficacy of Rg3 in the setting of lymphedema can be drawn at this time. The occurrence of tail necrosis indicates an error in execution. Thus, more experiments are warranted to improve technique to eventually observe consistent results and assess the effects of Rg3 in mice.

Metformin Upregulates *Prom1* Expression by *Mat1a*$^{-/-}$ Murine Hepatocytes in an *In Vitro* TGF-β-induced Liver Fibrosis Model

Nicolas Malkoff, Allen Zhong, M.D., Jiabo Xu, M.S., Kasper Wang, M.D., Department of Surgery, KSOM

Background: Biliary Atresia (BA), a congenital fibro-obliterative cholangiopathy, is the leading cause of pediatric end-stage liver failure. Prominin-1 (Prom1) is a transmembrane glycoprotein associated with fibrosis in BA. Our lab has previously shown that null mutation of Prom1 is associated with decreased liver fibrosis. Anti-glycemic agent metformin downregulates *Prom1*-expression in hepatocellular carcinoma *in vitro*. We hypothesize that metformin downregulates *Prom1* and decreases fibrosis in Transforming growth factor-β (TGF-β)-induced liver fibrosis *in vitro*.

Methods: *Prom1*-expressing *Mat1a* $^{-/-}$ cells, a hepatic progenitor-like cell line, were treated with metformin (1 mM and 10 mM) ± TGFβ (5 ng/mL). Cells were collected at 48 hours for RT-qPCR and immunofluorescence (IF) staining (10 mM metformin only). Statistical analysis was performed using ANOVA test on Prism software.
Results: In comparison to control, media conditioned with 10 mM metformin had no significant effect on *Prom1*-expression but was associated with significant increases in cholangiocyte marker *Cytokeratin-19* (*CK19) (p* = 0.0019) and hepatocyte marker *Albumin* (*p* = 0.0434). Corresponding increased expression of CK19 and ALBUMIN were observed by IF in metformin vs control. We did observe a significant increase in *Prom1* expression in media conditioned with metformin/TGFβ (*p* = .0071) but no significant reduction in fibroblastic marker *αSMA* expression when compared to TGFβ treatment alone.
Conclusion: Our data would suggest that metformin does not decrease fibrogenesis but does promotes bipotential differentiation of Prom1-expressing hepatic progenitor cells. Further studies are required to understand the effect of metformin on Prom1 and its potential effects on liver fibrosis in BA.

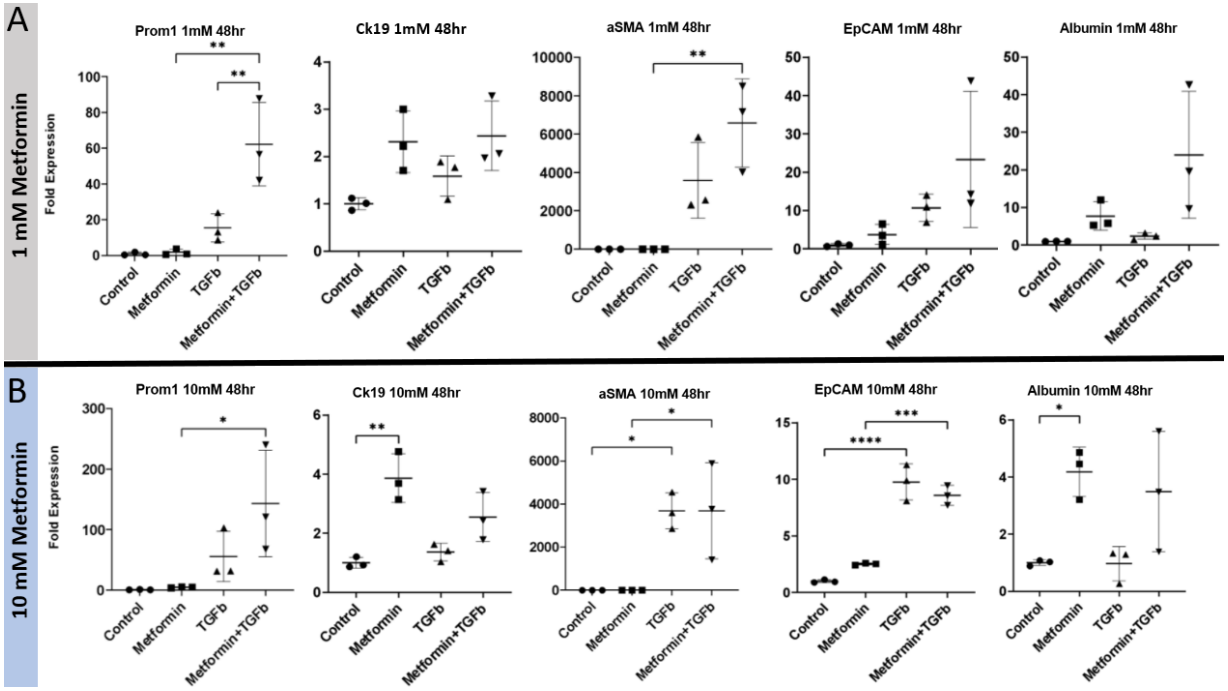
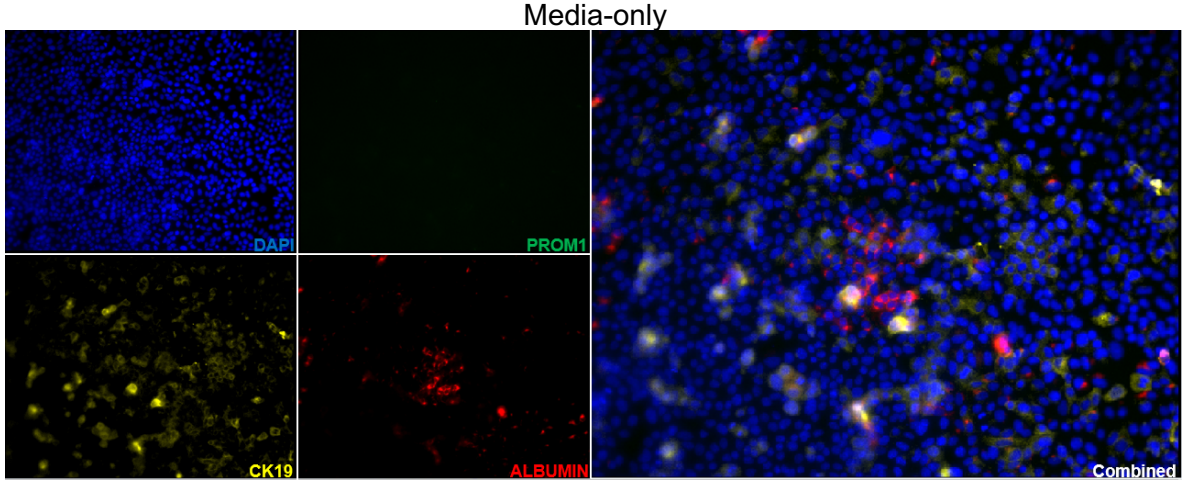


Figure 1
Relative expression *Prom1*, *CK-19*, *αSMA*, *EpCAM*, and *Albumin* after 48h treatment with (A) 1mM metformin and (B) 10mM metformin. *p<0.05, **p<0.01, ***p<0.001, ****p<0.0001

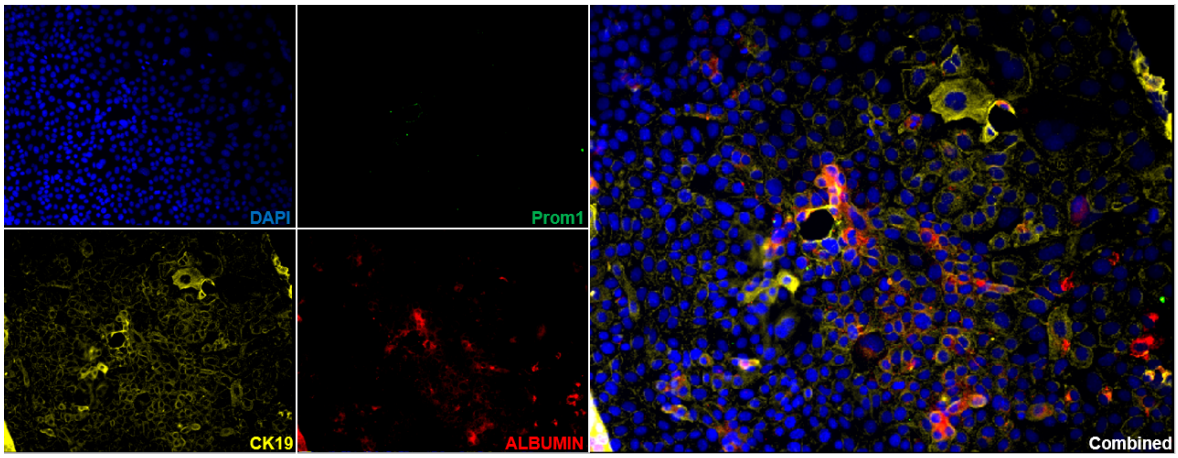
A

Media-only



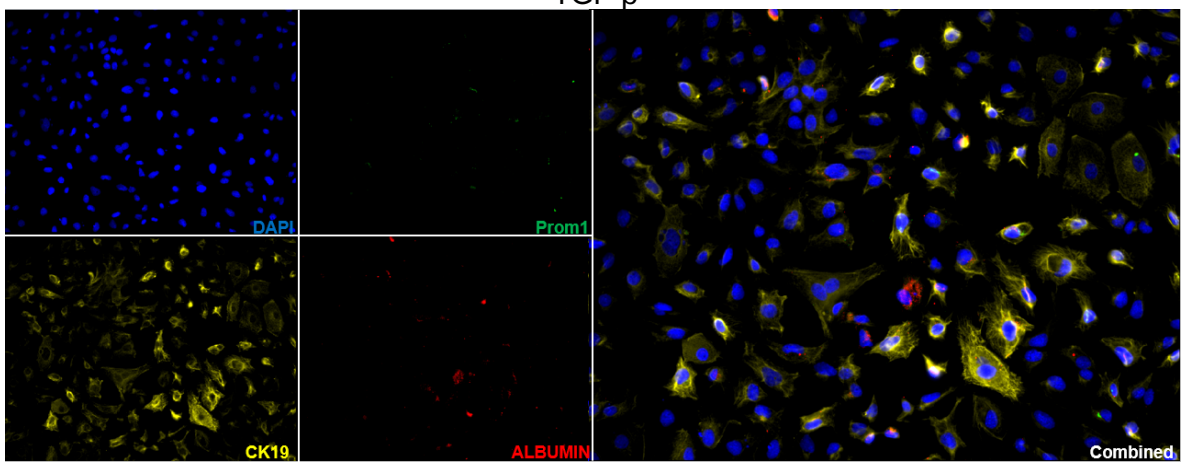
B

Metformin



C

TGF-β



D

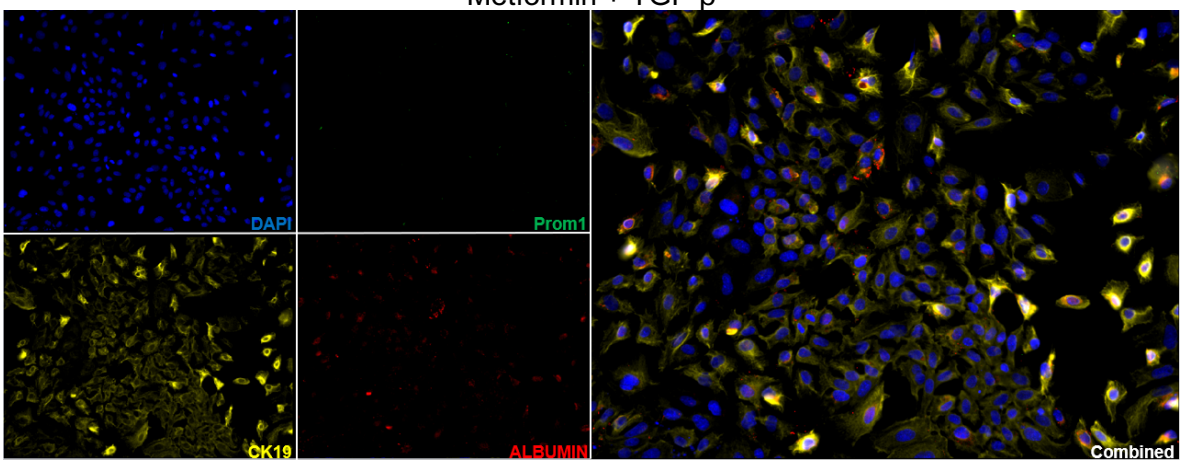


Figure 2
IF after 48h treatment.

Burn Injuries in Asia: A Global Burden of Disease Study

ZJ Collier, MD,[1,2] **K McCool,**[3] TS Potokar, MBChB, FRCS,[4] TJ Gillenwater, MD, MS[1,5]

[1]*Division of Plastic and Reconstructive Surgery, University of Southern California, Los Angeles, CA, USA*
[2]*Operation Smile Global Surgery Fellowship, Virginia Beach, VA, USA*
[3]*Keck School of Medicine, University of Southern California, Los Angeles, CA, USA*
[4]*Interburns, Swansea University, Swansea, UK*
[5]*Southern California Regional Burn Center, Los Angeles County – University of Southern California Medical Center, Los Angeles, CA, USA*

Goal: Burn injuries disproportionately affect low- and middle-income countries. Work conditions, rapid industrialization, social conditions, cultural activities, political conflict, and lack of access to safe and affordable surgery are critical barriers to effective burn care in Asia. This study aimed to better define the burn burden in Asia, its sub-regions, and related sex and age disparities to elucidate populations where targeted burn care interventions are most needed.
Methods: The 2019 Global Burden of Disease (GBD19) of the Global Health Data Exchange was used to acquire 151,741 sources of epidemiological data on fire, heat, and hot substance-related injuries for 53 countries in Asia from 1990 to 2019. Measures used to derive summative statistics included incidence, deaths, disability-adjusted life years (DALYs), and mortality ratio (deaths:incidence) by year, sex, age, and location.
Results: From 1990 to 2019, there were an estimated 117 million burns in Asia, during which the relative proportion of global burns, deaths, and DALYs from Asia increased. By 2019, 46% of all global burn cases, 47% of deaths, and 46% of DALYs were from Asia. South and Southeast Asia were the most burdened sub-regions, which accounted for 30-40% of all global cases, deaths, and DALYs. Throughout Asia, men had a higher burn burden than women as compared to global sex disparities. Children under 5 years were most impacted by DALYs (314 years/100,000 people), 5-14 year olds had the highest burn rate (219 cases/100,000 people), and 70+ year olds had the highest death rate (8.4 deaths/100,000 people) and mortality ratio (54%).
Conclusion: While Asia's burn indicators have declined since 1990, global improvements have surpassed Asia's. South and Southeast Asia accounted for the greatest burden of burn morbidity

and mortality, but Central Asia consistently had the highest rates relative to the overall population. Men were more affected than women, except in South Asia, and the extremes of age (<5 and 70+ years) suffered the greatest rates of disability and death.

Understanding Postoperative Prescription Opioid Use, Storage, and Disposal for Adolescents Undergoing Surgery

Adaeze Obinelo, Marjorie Odegard, Shadassa Ourshalimian, Donia Hijaz, Alvina Rosales, Rachel Caesar, Lorraine Kelley-Quon.

Background: Diversion of unused prescription opioids is the most common source of opioid pills for adolescents who misuse opioids. Our research group prospectively enrolled a cohort of adolescents undergoing a surgery associated with an opioid prescription at discharge and found that only 22% disposed of their unused pills safely. The aim of the present study is to conduct focus groups for adolescents and parents recruited from our prospective cohort to identify barriers to safe prescription opioid use, storage, and disposal. As most participants were Hispanic/Latino, many with marginal health literacy, the focus groups will specifically address challenges related to race/ethnicity, health literacy, and language.
Methods: 26 participants (13 adolescents and 13 parents) were enrolled. Enrollees were partitioned into 4 focus groups: (1) English speaking adolescents, (2) English speaking parents, (3) adolescents speaking both English and Spanish at home, and (4) Spanish speaking parents. One-time, 2-hour focus group discussions were held for each group. Discussions centered around patient pre- and post-operative perceptions of opioids, and the perioperative counselling participants received. In addition, participants were asked to provide feedback on the "*Safe and Effective Pain Control After Surgery for Children and Teens"* educational pamphlet developed by the American College of Surgeons.
Results: Fourteen enrollees participated in discussion; (1) N=2, (2) N=4, (3) N=4, and (4) N=4. Thematic analysis methodology will be used to code session transcripts and identify topics and meaningful patterns. The American College of Surgeons "*Safe and Effective Pain Control After Surgery for Children and Teens"* will be refined according to suggestions made during focus group sessions.
Conclusions: The results of the focus group will be used to improve educational materials for families of adolescents who require an opioid prescription after surgery. Educational materials will reflect the unique needs of minority families and families with marginal to inadequate health literacy.

Procedural Volume and Physician Reimbursement for Thoracic Endovascular Aortic Repair and Open Surgical Repair of Aortic Aneurysms Between 2009-2018: An Analysis of Medicare Data

Neil Parikh, B.S., B.A.,[1] Meeki Lad, M.P.H.,[2] Radhika Gupta, B.S.,[3] Alex Raman, M.S.,[4] Aakash Shah, M.D.,[5] Raghav Gupta, M.D.,[6] Mark Cunningham, M.D.[7]

[1]*Keck School of Medicine, University of Southern California, Los Angeles, California, USA*
[2]*Department of Neurosurgery, Rutgers New Jersey Medical School, Newark, New Jersey, USA*
[3]*Krieger School of Arts and Sciences, Johns Hopkins University, Baltimore, Maryland, USA*
[4]*Western University of Health Sciences, Pomona, CA, USA*
[5]*Department of Cardiothoracic Surgery, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA*
[6]*Department of Neurosurgery, Keck School of Medicine, University of Southern California, Los Angeles, California, USA*

[7]*Department of Cardiovascular Surgery, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA*

Purpose: Thoracic endovascular aortic repair (TEVAR) has gained popularity over open surgical repair (OSR) to treat aortic aneurysms. Although a few papers studied utilization of TEVAR and OSR in the early 2010s, recent trends are understudied.[1,2,3] We examine the usage and reimbursement of TEVAR and OSR from Medicare data between 2009-2018.
Methods: CPT codes for TEVAR (33880, 33881) and OSR (33875, 33877, 35091, 35092) were isolated, and the number of procedures and inflation-adjusted Medicare payments extracted from the CMS Part B National Summary Data Files. A linear regression was used to analyze the chronological trend in procedures per 100,000 Medicare enrollees (PPME) and payments per procedure. Tests for equality of slopes (α=0.05) were used to compare whether trends in TEVAR and OSR usage differed significantly between 2009-2018. Finally, ANOVA with post-hoc Tukey HSD tests were used to compare average payment procedure.
Results: Between 2009-2018, OSRs for aortic aneurysm PPME decreased by 0.401 procedures/year (R^2=96%, p<0.001), whereas TEVAR PPME increased by 0.041 procedures/year (R^2=41%, p<0.045). TEVAR increased from 52.2% (6.19/11.86 PPME) to 74.6% (6.49/8.69 PPME) of the total aneurysmal repairs over the 10 years. Thus, the number of TEVARs was 1.1 times greater than the number of OSRs in 2009 and 2.9 times greater in 2018. Conversely, the Medicare reimbursement per TEVAR declined an average of 10% from $1046 to $944 by 2018 ($R^2$=0.73, p<.002) while the reimbursement trend per OSR only decreased by approximately 5% from $1594 to $1515 ($R^2$=0.44, p<.036).
Conclusions: In 2018, three-fourths of aortic aneurysms were repaired via TEVAR, while OSR usage declined on an absolute and normalized basis. Along with the 10% vs 5% drop in Medicare reimbursement for TEVAR over OSR, these metrics indicate the sustainability of TEVAR amid an aging population with increased cardiovascular disease risk.
References:

1. Scali ST, Goodney PP, Walsh DB, et al. National trends and regional variation of open and endovascular repair of thoracic and thoracoabdominal aneurysms in contemporary practice. *J Vasc Surg.* 2011;53(6):1499-1505. doi:10.1016/j.jvs.2011.02.014
2. Liao JM, Bakaeen FG, Cornwell LD, et al. Nationwide trends and regional/hospital variations in open versus endovascular repair of thoracoabdominal aortic aneurysms. *J Thorac Cardiovasc Surg.* 2012;144(3):612-616. doi:10.1016/j.jtcvs.2011.10.098
3. Levin DC, Rao VM, Parker L, Frangos AJ, Sunshine JH. Endovascular repair vs open surgical repair of abdominal aortic aneurysms: comparative utilization trends from 2001 to 2006. *J Am Coll Radiol.* 2009;6(7):506-509. doi:10.1016/j.jacr.2009.02.003

Psychosocial Outcomes in Burn Survivors: Clinical and Sociodemographic Factors

Erin E. Ross BS[1], Rachel A. Colbath BS[1], Jeremy Yu MS[2,], Naikhoba Munabi MD[3], Haig A. Yenikomshian MD[3]

[1]*Keck School of Medicine, University of Southern California*
[2]*Department of Psychiatry and Behavioral Sciences, Keck School of Medicine, University of Southern California*
[3]*Division of Plastic Surgery, Keck School of Medicine, University of Southern California*

Background: There has been conflicting data on the impact of burn severity on psychological outcome, and effects of sociodemographic factors on psychosocial outcomes has not previously been explored. Here we characterize the baseline psychosocial disposition of burn survivors impacts of clinical course and sociodemographics on psychosocial well-being.

Methods: Adult patients attending outpatient burn clinic completed two 4-question sub-domains of the National Institutes of Health Patient-Reported Outcomes Measurement Information System Self-Efficacy for Managing Chronic Conditions: Managing Emotions (ME) and Managing Social Interactions (MSI). Sociodemographic factors (age, race/ethnicity, language, employment, marital status, zip code) and clinical course (total body surface area burned (TBSA), initial hospital length of stay (LOS), surgical intervention, days since injury) were also collected. Percent of neighborhood below US poverty level was estimated by US census data from patient's home zip code. ME and MSI scores were compared to the population mean by one-sample T-test, and relationship between ME and MSI scores and clinical and sociodemographic factors were evaluated by multivariable Tobit regression.
Results: 71 patients completed surveys. Patients had lower scores on MSI (mean=48.0, p=.041) but ME (mean=50.9, p=.394) compared to the general US population. Hospital LOS was associated with both ME and MSI (p=.020, p=.039); marital status and poverty level of home zip code were each associated with MSI scores (p=<.001, p=.008).
Conclusions: Burn patients may have difficulty getting support after injury, a challenge that may be increased in patients with more extensive debilitation after injury, without a partner, or from a lower income neighborhood. Optimizing transition to outpatient care may minimize the impact of prolonged hospitalization on patient's well-being. Outpatient support services such as burn survivor groups may be helpful for under resourced patients.

Investigating the Impact of COVID-19 Delays on Elective Cholecystectomy Outcomes

Mark C. Wang, Jessica Wu MD, Jack P. Silva MD, Michael Kim, Kenzie T. Cohen, Adrian Dobrowolsky MD, Luke R. Putnam MD MS, James D. Nguyen MD
Division of Upper GI and General Surgery, Department of Surgery, University of Southern California, Los Angeles, CA

Background: In March 2020, many hospitals postponed elective procedures due to the COVID-19 pandemic. To evaluate how these delays impacted elective cholecystectomy outcomes at LAC+USC Medical Center, we compared the outcomes of patients who underwent the procedure before the pandemic with those of patients who underwent the procedure after the resumption of elective procedures.
Methods: A retrospective cohort study was conducted on patients who were diagnosed with symptomatic cholelithiasis and underwent elective cholecystectomy at LAC+USC Medical Center. The Pre-COVID cohort consisted of patients who underwent cholecystectomy in the six-month period before the postponement of elective procedures (9/1/2019-3/1/2020), and the Post-Resumption cohort included patients who had their surgery in the six-month period after the resumption of elective procedures (2/1/2021-8/1/2021). Preoperative metrics, patient characteristics, and perioperative and postoperative outcomes were collected from the LAC+USC EMR. The two cohorts were compared using statistical analysis.
Results: This study included 101 patients (51 Pre-COVID, 50 Post-Resumption). As expected, the Post-Resumption patients endured a longer duration of symptoms before their first clinic visit (27 vs 20 months, p=0.039) and a longer time to surgery (120 vs 84 days, p=0.034). The cohorts experienced no difference in perioperative outcomes such as operative time, conversion to open surgery, and drain placement. They also experienced no differences in postoperative variables such as length of hospital stay, readmission rate, and ED visit rate and in complications such as bile duct injury, retained gallstones, wound infections, and abscesses.
Conclusion: While patients with COVID-19 delays in their elective cholecystectomies endured a longer duration of symptoms, they ultimately experienced no difference in perioperative and postoperative outcomes compared to patients who underwent the procedure before the pandemic.

UROLOGY

Conception and Development of an End-To-End Assessment of Suturing Expertise (EASE)

***Taseen F. Haque, B.A**., Monish Aron, M.D., Justin Collins, M.D., Hooman Djaladat, M.D., Ahmed Ghazi, M.D., Kenneth A. Yates, Ed.D., Andre L. Abreu, M.D., Siamak Daneshmand, M.D., Mihir M. Desai, M.D., Alvin C. Goh, M.D., Jim C. Hu, M.D., Amir H. Lebastchi, M.D., Thomas S. Lendvay, M.D., James Porter, M.D., Anne K. Schuckman, M.D., Rene Sotelo, M.D., Chandru P. Sundaram, M.D., Jessica H. Nguyen, B.S., Inderbir S. Gill, M.D., Andrew J. Hung, M.D.: Los Angeles, CA*

Purpose: Validated skills assessment tools can help trainees understand their progress. Herein, we aimed to exhaustively map out all relevant sub-skills of suturing and to define criteria around said sub-skills to differentiate performance.
Methods: The first step was to conduct a Cognitive Task Analysis (CTA), where 4 expert surgeons, moderated by an educational psychologist, deconstructed the process of robotic suturing into its most basic sub-stitch maneuvers and described the accompanying skills to accomplish them at differing proficiency levels ("sub-skills"). We then utilized the well-established Delphi methodology to guide consensus on the CTA results from a panel of 16 leading surgical educators. Each sub-skill identified in the CTA underwent review and revision with binary "agree"/"disagree" responses and free text for commentary. This process was iterated until all sub-skills reached a content validity index (CVI), defined as proportion of participants who "agree" with each sub-skill, of at least 0.80.
Results: The 16 surgeons who served as panelists for the Delphi process had a median H-index of 23 (range 11-107). In Round 1 of Delphi, 60/64 (94%) of proposed sub-skills met the CVI threshold. Three of the four (75%) sub-skills that were below CVI threshold in the first round were within the "Pre-Planning" domain (*Figure 1)*. The domains of EASE and their overall Round 1 CVIs are *Pre-Planning* (0.82), *Needle Handling* (0.90), *Needle Entry* (0.90), *Needle Driving* (0.97), *Needle Withdrawal* (1.0), *Suture Placement and Management* (0.92) and *Knot Tying* (0.90). In Round 2, the number of sub-skill descriptions was reduced to 61 as panelists suggested combining two sub-skills. These remaining sub-skills all reached CVI threshold.
Conclusions: Our study defined the end-to-end process of suturing sub-skills and built consensus around them utilizing the expert opinions of leading surgical educators. EASE will set the foundation of future research goals, such as the full automation of skills assessment.
Source of Funding: Research reported in this publication was supported in part by the National Institute of Biomedical Imaging and Bioengineering of the National Institutes of Health under Award No. K23EB026493, and by the National Cancer Institute under AwardNo.1R01CA251579-01A1

Domains	Sub-Skills
Pre-Planning	• Surgical Field Optimization
Needle Handling	• Gesture Sequence • Needle Hold Ratio • Needle Hold Angle • Depth of Needle Hold
Needle Entry	• Needle Entry Angle
Needle Driving	• Driving Sequence • Wrist Rotation • Depth of Suture
Needle Withdrawal	• Wrist Rotation
Suture Placement and Management	• Suture Awareness • Cinching Technique • Suture Spacing • Tissue Approximation
Knot Tying	• Free Tie Length • Knot Tying Preparation • Knot Tension • Secure/Air Knot

Figure 1: EASE Domains and Sub-Skills

Brain Activity Corresponding to Degree of LUT Dysfunction in Post-Stroke Patients

Priya Kohli M.D. Candidate, Evgeniy Kreydin M.D.

Background: Post-stroke incontinence is a common problem but the neurological mechanisms underlying lower urinary tract (LUT) dysfunction that occurs after stroke are poorly understood. Our group has recently shown that, compared to healthy controls, incontinent stroke patients exhibit a unique pattern of brain activity during bladder filling and emptying, with decreased activation of several cortical areas, such as the dorsolateral prefrontal cortex, the cingulate cortex and the motor cortex. However, it remains to be determined whether a relationship exists between the degree of LUT dysfunction and brain activity changes in stroke patients.
Methods: Stroke patients with varying degrees of voiding dysfunction will be recruited. LUT function will be characterized by validated questionnaires, clinical urodynamic studies and voiding diaries. A composite variable accounting for these parameters will be generated to represent overall LUT function. Patients will then complete blood-oxygen-level-dependent (BOLD) brain MRI, while undergoing simultaneous urodynamic studies, consisting of bladder filling and emptying. The relationship between BOLD signal in the cortical regions of interest and the composite LUT dysfunction variable will then be determined. Standard statistical techniques will be used to account for patient variables, such as age, sex, and overall disability.
Results: We hypothesize that better LUT function is associated with greater activation of the above regions of interest in stroke patients. Data analysis corresponding to 16 patients is in the process of being analyzed.
Summary/Conclusion: If successful, this study will demonstrate that aberrations in neurovascular coupling, as detected by BOLD-MRI, may be the neural mechanism underlying LUT dysfunction in patients with stroke.