ABSTRACT BOOK

Medical Student Research Forum & Poster Day

March 4, 2020

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

March 4, 2020

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

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MEDICAL STUDENT RESEARCH FORUM & POSTER DAY

March 4, 2020

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 was formally established as a course this year and 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 Laura Mosqueda, MD, Dean, Keck School of Medicine; 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

Podium Presentations, Mayer Auditorium, 1:00-2:30 p.m.

Opening Remarks
Jeffrey Riddell, MD
Director, Scholarly Project Course

Welcome Address
Laura Mosqueda, MD
Dean, Keck School of Medicine of USC

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

Poster Presentations, Harry & Celesta Pappas Quad, 2:45-5:00 p.m.

Presenters:
Dean's Research Scholars
Class of 2022 Medical Students

2020 PODIUM PRESENTATIONS

Dean's Research Scholars

Angad Gogia, Massry Research Scholar
(Mentor: **Brian Lee, MD, PhD**)
Beta-Band Modulation in the Human Amygdala during a Conflict Response Task

Ashley Polski, Wright Research Scholar
(Mentor: **Jesse Berry, MD**)
Longitudinal Aqueous Humor Sampling Reflects Treatment Response in Retinoblastoma Patients

Tiffany Sierro, Wright Research Scholar
(Mentor: **April Armstrong, MD, MPH**)
Racial and Ethnic Differences in Healthcare Utilization and Costs Among U.S. Non-Melanoma Skin Cancer Patients

Maxwell Singer, Tai Research Scholar
(Mentors: **Amir Kashani, MD, PhD**)
Impaired Layer Specific Retinal Vascular Reactivity Among Diabetic Subjects

Class of 2022

Emily Chan
(Mentor: **Albert Farias, PhD, MPH**)
Racial Differences in Lung Cancer Patient Experiences with Medical Care and Their Association with Cancer Mortality: A SEER-CAHPS Study

Jennifer Li
(Mentor: **Pamela Schaff, MD, PhD**)
A Multidisciplinary Community-Based Participatory Research Approach to the Implementation of a Protocol for Incorporating HIV-Positive Patients' Life Narratives into the Electronic Health Record

Ryan Ota
(Mentor: **Haig Yenikomshian, MD**)
The Impact of No Next of Kin Decision Makers on End-of-Life Care

Muhammad Raza
(Mentor: **Juliet Emamaullee, MD, PhD**)
Analysis of the Overall Health-Related Quality of Life After Anonymous Nondirected Living Liver Donation: A Multi-Center, North American Collaboration

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Director, Scholarly Project Course

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

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Office of the Dean

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Dean's Research Scholars

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DEAN'S RESEARCH SCHOLARS

The Usage of Rat Bone Marrow Cells in Conjunction with Regional Bone Morphogenetic Protein Gene Therapy on 3D Printed Tricalcium Phosphate Scaffold for Repairing Critical-Sized Femoral Defects in Rats

Hyunwoo P. Kang, MD[1], Hansel Ihn, MD[1], **Xiao T. Chen, BA[1]**, Djani Roberson[1], Osamu Sugiyama, MD PhD[1], Jay R. Lieberman, MD[1]

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

Introduction:
Previous studies have demonstrated that mesenchymal stem cells (MSCs) derived from rat bone marrow transduced to overproduce BMP-2 may heal critical-sized femoral defects in rats using collagen-ceramic scaffolds. This study investigates the same healing using a 3D-printed, osteoconductive tricalcium phosphate (TCP) scaffold.

Methods:
Bone marrow was harvested from rat femoral canals. At passage 5, MSCs were transduced with lentiviral vectors containing BMP-2 or green fluorescent protein (GFP). Experimental groups included scaffolds with: (1) 5 million BMP-2-transduced rBMCs, (2) 5 million GFP-transduced rBMCs, (3) 5 million non-transduced rBMCs (4) nothing (empty scaffold), and (5) 10ug recombinant human BMP-2 (rhBMP-2). 6mm femoral defects were created in Lewis rats and TCP scaffolds were implanted. Plain radiographs taken at 12 weeks postoperatively were assessed by independent observers for bone healing. At 12 weeks, experimental femurs underwent microCT scanning followed by biomechanical testing or histological analysis.

Results:
BMP-2-transduced rBMCs had significantly more new bone formation than negative controls (groups 2, 3, and 4) on plain radiographs and microCT at 12 weeks post-implantation. Histomorphometry analysis also showed significantly higher mean bone area, tissue area, and bone area/tissue area in group 1 compared with negative controls. Biomechanical testing demonstrated no significant difference in stiffness, peak torque, peak displacement, and total energy to failure between the BMP-2-transduced rBMCs and rhBMP-2 groups. Femurs that healed in group 1 were biomechanically weaker than contralateral, nonfractured femurs.

Discussion/Conclusions:
3D printed scaffolds may adequately promote bone repair when combined with BMP-2-transduced rBMCs, but more work is needed to assess optimal cell dosage and side effects.

No Difference in Outcomes with High vs Low Implant Density in Growing Construct Conversion to Posterior Spinal Fusion for Early Onset Scoliosis

Edward Compton BS[1], Purnendu Gupta MD[2], Jaime A. Gomez MD[5], Kenneth D. Illingworth MD[1], David L. Skaggs, MD, MMM[1,] Paul D. Sponseller MD[3], Amer F. Samdani MD[4], Steven W. Hwang MD[4], Matthew E. Oetgen MD[6], Jennifer Schottler PT[2], George H. Thompson MD[7], Michael G. Vitale MD[8], John T. Smith MD[9], Lindsay M. Andras MD[1], Pediatric Spine Study Group

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[6]Children's National Health System, Washington, DC.
[7]Division of Pediatric Orthopaedic Surgery, Rainbow Babies & Children's Hospital, Case Western Reserve University, Cleveland, OH.
[8]Division of Pediatric Orthopedics, Columbia University Medical Center, New York, NY.
[9]Department of Orthopedic Surgery, University of Utah, Salt Lake City, UT

Background: Larson et al. demonstrated that implant density (ID) at fusion does not correlate with surgical outcomes in the treatment of adolescent idiopathic scoliosis, but did not address Early Onset Scoliosis (EOS) cases. Our purpose was to determine if low density constructs demonstrate similar outcomes as high density constructs in EOS patients.
Methods: EOS patients treated with growth-friendly constructs converted to definitive fusion between 2000-2017 were reviewed from a multicenter database. Implant density was defined as the number of pedicle screws, hooks, and sublaminar/bands per level fused. Patients were divided into low ID (<1.6) and high ID (≥1.6). Exclusion criteria: < 2 years follow-up from fusion or inadequate radiographs.
Results: 166 patients met inclusion criteria with 47 (28%) patients in the high ID group and 119 (72%) patients in the low ID group. There was no difference in age (p=0.33), pre-conversion major curve (p=0.33), number of levels fused (p=0.27), and operative time (p=0.70) between the high and low ID groups. The high ID group (900.7 ± 575.9 mL) had significantly higher EBL than the low ID group (668.8 ± 571.8 mL)(p=0.02).

There was slightly greater initial improvement in major curve in the high ID group (20.5º) versus the low ID group (13.8º) (p=0.02). During post-conversion follow-up, there was significantly more loss of correction in the high ID group (high ID: -6.9º and low ID: -2.4º) (p=0.04). At final follow-up, the major curve correction from pre-conversion was similar between groups (high ID:13.5º vs low ID:11.3º, p=0.47)

The revision rate was similar between groups (high ID: 6.4% (3/47) and low ID: 10.9% (13/119)) (p=0.56).
Conclusion: In the largest series of growing rod conversions reported to date, implant density at definitive fusion did not correlate with curve correction or revision rate in the management of EOS.

Beta-Band Modulation in the Human Amygdala during a Conflict Response Task

Angad S. Gogia, Kuang-Hsuan Chen, PhD, Roberto Martin del Campo-Vera, PhD, Rinu Sebastian, MS, Morgan B. Lee, BS, Daniel R. Kramer, MD, Terrance Peng, BS, MPH, Ali Tafreshi, BA, Michael F. Barbaro, BA, Charles Y. Liu, MD, PhD, Spencer Kellis, PhD, Brian Lee, MD, PhD

Introduction

The human amygdala is a deep brain structure made of interconnected deep brain nuclei that play a role in emotional learning, fear response, reward-based behavior, and processing emotional conflict. However, it is unknown if it plays a role in processing non-emotional conflict as well. The Stroop Task is a well-studied color-word conflict scenario that has been used to study conflict response in humans. The limited intracranial electrophysiology work done in humans has shown that power changes in the beta-band (13-30 Hz) may be involved in processing non-emotional conflict. Here, we investigate beta-band power changes in the human amygdala during a modified Stroop Task in five patients with medically-refractory epilepsy.

Methods

Intracranial depth electrodes were implanted in five epileptic patients (3 female; age 20-61) for seizure localization and EEG monitoring. Local field potential (LFP) data from macro contacts sampled at 2000Hz was used for the analysis and was collected during a modified Stroop Task with four distinct task conditions. A non-parametric cluster-permutation t-test was used to identify periods of significance during the cue processing period.

Results

Time-frequency analysis for the LFP data showed a statistically significant increase in amygdaloid beta-band (13-30 Hz) power during cue-processing (i.e. post-stimulus, pre-response) in the incongruent condition (650-875ms, cluster-based correction for multiple comparisons, $p < 0.05$) for three out of five patients. There was no significant beta-band power change observed during the cue processing period of the congruent condition in the amygdala of these three patients.

Conclusions

These findings suggest that human amygdaloid beta-band power changes play a role in successful conflict identification and automatic response inhibition. It builds upon work indicating the amygdala plays a role in processing emotional conflict and suggests that the amygdala plays a role processing non-emotional cognitive tasks as well.

Do Routine Nutrition Consults for Neuromuscular Scoliosis Help the Patient or Just the Rankings?

Kavish Gupta, BA; David Skaggs, MD; Stephen Stephan, MD; Adrian Lin, BA; Kenneth D. Illingworth, MD; Lindsay Andras, MD

Background: This study aims to investigate the efficacy of nutrition consults on pre-operative weight gain and outcomes for neuromuscular scoliosis patients undergoing posterior spinal fusion (PSF).

Methods: A retrospective chart review was conducted on patients < 18 years old with neuromuscular scoliosis who underwent posterior spinal fusion. Charts were reviewed for height and weight at 12, 6 and 3 months prior to surgery, nutrition consults, methods of nutritional optimization and post-operative complications.

Results: 243 neuromuscular scoliosis patients met inclusion criteria. 46% (111/243) received a pre-operative nutrition consult and 54% (132/243) did not. Mean time from nutrition consult to surgery was 5.8 months. Mean age at time of surgery was 13.8 ± 2.4 (range: 9.0-17.9).

Preoperative nutrition consults led to g-tube placement in 4.5% (5/111) of patients. Mean pre-operative BMI of those who received a nutrition consult at 12, 6 and 3 months prior to surgery was 17.5, 19.0 and 18.6 respectively. Mean BMI of those who did not receive a consult was 18.4, 19.2 and 19.7 at 12, 6 and 3 months pre-operatively. There were no differences in 12-month (p=.66), 6-month (p=.79) or 3-month (p=.29) pre-operative change in BMI. There were also no differences in 12-month (p=.10), 6-month (p=.20) or 3-month (p=.10) pre-operative change in absolute weight. Finally, the incidence of infection (p=.52), implant-related complications (p=.12), wound complications (p=.35), reoperation (p=.44) and length of hospital stay (p=.08) between groups were similar.
Conclusions: Pre-operative nutrition consults did not significantly improve pre-operative weight gain and there were no statistical differences between rates of infection, implant-related complications, wound complications, reoperation or length of hospital stay among neuromuscular scoliosis patients who underwent PSF.

Intravenous gentamicin therapy for junctional epidermolysis bullosa patients harboring nonsense mutations.

Michelle Hao[1], Richard Antaya[2], Jon Cogan[1], Claire Hamilton[2], Yingping Hou[1], Andrew Kwong[1], David T. Woodley[1], Mei Chen[1]

1. Department of Dermatology, University of Southern California
2. Departments of Dermatology and Pediatrics, Yale School of Medicine

Background: Generalized severe junctional epidermolysis bullosa (GS-JEB) is an incurable and fatal inherited blistering skin disease most commonly caused by mutations in *LAMA3, LAMB3,* or *LAMC2* genes. These mutations impair the ability to produce functional laminin 332, needed for epidermal-dermal adherence. Previously, we showed that topical gentamicin therapy generated new, functional laminin 332 and improved wound healing in GS-JEB patients. Although effective, topical administration of gentamicin is cumbersome and would not treat mucosal sites, including the upper respiratory tract.
Methods: In this study, we administered intravenous (IV) gentamicin to three GS-JEB patients with nonsense mutations in either *LAMA3* or *LAMB3*. At day 0, multiple Test Sites from open wounds and intact skin were selected for measuring wound closure and new blister formation. Three patients received daily infusions of 7.5 mg/kg gentamicin for 14 days, and one patient received daily infusions of 10 mg/kg gentamicin for 24 days. Skin biopsies were examined for the expression of laminin 332, and wounds were evaluated using standardized photographs before and at one and three months after treatment. We also evaluated the patients' overall clinical improvement using EB disease activity scores.
Results: After IV gentamicin, Test Sites exhibited newly created, properly localized laminin 332 at the dermal-epidermal junction of patients' skin. In addition, IV gentamicin promoted wound closure and improved the patients' clinical scores. Most interestingly, we also observed improvement of airway symptoms in GS-JEB patients. Lastly, increasing the dosage and duration of infusions resulted in more laminin 332 expression and greater clinical improvement. No adverse effects or autoantibodies against new laminin 332 were observed.
Conclusion: IV gentamicin may offer JEB patients a readily available, safe and effective treatment which improves wound healing and quality of life.

Clinical Management and Recommendations for Children with More than Four Episodes of Recurrent Intussusception Following Successful Reduction of Each: An Institutional Review

Alec Hutchason[1], Amit Sura[2], Nikhil Vettikattu[2]

[1]Keck School of Medicine of University of Southern California, Los Angeles CA, USA
[2]Department of Radiology, Children's Hospital Los Angeles, Los Angeles, CA, USA

Intro: Recurrent intussusception is estimated to occur in approximately ten percent of all children who had a successful initial enema reduction. Despite this rate, there exists little data about optimal management of multiple episodes of recurrent intussusception and risk factors for recurrence.
Objectives: The aim of this study was to describe patterns of recurrence, risk factors for multiple recurrences, and determine optimal management for pediatric patients with more than four episodes of intussusception.
Methods: We retrospectively reviewed all sonographic evaluations performed for intussusception of children less than 18 years of age at our institution over a 6-year period after IRB approval. Data extracted from medical records included age at onset of first intussusception, gender, presenting symptoms, episodes of recurrence after attempted enema reduction, symptoms upon recurrence, presence of pathological lead points, and surgical findings. Patients were then stratified based on clinical outcomes following each attempt at a radiological enema reduction.
Results: During a 6-year period, five cases had four or more instances of recurrence after enema reduction attempts, each of the five cases receiving and received at least four enemas during their pattern of recurrence. All patients were male with an average age of sixteen months. Two of the five cases resolved after the fourth enema reduction and no lead points were identified. Two of the five cases involved surgical reduction with intraoperative findings of Meckel's diverticulum and juvenile polyp, either discovered by additional imaging such as CT or exploratory laparotomy after the fourth reduction. The final case had five episodes of recurrence and six successful attempts at enema reduction at random different time points. Ultimately, lymphoid hyperplasia was discovered on colonoscopy and the patient never recurred after having been treated with steroids.
Conclusion: Given the favorable reduction rate in re-recurrent cases and complete lack of perforation observed, we recommend up to four successful attempts at enema reduction before considering an alternative strategy. If recurrence continues past the fourth reduction attempt, then we recommend using CT to identify a lead point. If CT is inconclusive, then consider exploratory laparotomy.

The Effects of Gain- versus Loss-Framed Messages on Patient Preferences for Therapies in Individuals with Psoriasis

Ari Kassardjian, April W. Armstrong, Dept. of Dermatology, Keck School of Medicine

Goal: It is unknown how clinicians' wording of a treatment influences patients' preferences. Decision framing is the way that a choice is worded. A choice can be worded either positively (gain-framed) to explain the benefits of a therapy, or negatively (loss-framed) to explain the risks of not taking a therapy.
Methods: We conducted a randomized controlled study to evaluate the effect of gain versus loss framing on patients' treatment preference. Ninety adults with psoriasis ± psoriatic arthritis were randomized 1:1 to receive a questionnaire that contains either (1) a gain-framed message that explains the benefits of receiving an injectable medication for psoriasis and psoriatic

arthritis, or (2) a loss-framed message that explains the harms associated with not taking the medication. Both arms received the same information regarding possible side effects. Each patient then scored their likelihood to take the medication (0=definitely will not use the medication; 10=definitely will use the medication).
Results: The average age is 49.6; 64% male; 53% white; 28% with psoriatic arthritis. Patients who received a gain-framed message had a mean score of 7.11 (SD2.20), whereas patients receiving a loss-frame message had a mean score of 8.84 (SD1.59). The difference between the groups was 1.73 (95% CI -2.54 to -0.93, $p<0.0001$).
Conclusion: This study found that loss framing is more effective in influencing patients' treatment preference than gain framing. These findings suggest that patients are more likely to agree to a treatment if the clinician frames the treatment using a loss-frame approach.

MDSC clinical assay for Cancer Detection and Monitoring in Prostate Cancer

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[2]Clinical Investigations Support Office, USC Norris Comprehensive Cancer Center
[3]Dept. of Medical Oncology, USC Norris Comprehensive Cancer Center

Background: Myeloid-derived suppressor cells (MDSC) are a heterogeneous population of immune cells that have been shown to be significantly elevated in patients with various types of cancers. Furthermore, studies have demonstrated a direct correlation between tumor stage and presence of MDSC in the peripheral blood. Therefore, this cell type is an ideal candidate to use as a marker to detect for both the presence and progression of neoplastic disease. In this study, we will measure MDSC in patients with suspected or clinically detectable prostate cancer to determine the mean levels of these cells in these groups. We hypothesize that patients with no evidence of prostate cancer will have a lower mean MDSC level compared to patients with localized or metastatic disease.
Methods: Male patients who present for routine medical care or prostate cancer care or screening were stratified into various study groups based upon their inclusion and exclusion criteria. Each participant underwent the same intervention, which entailed venous blood draw and urine collection. Samples were then processed to isolate peripheral blood mononuclear cells (PBMC), and MDSC levels were measured by using the Flow cytometry MDSC clinical assay.
Results: The study is currently in the recruitment phase, where arms are still being filled to the desired sample size. However, based upon literature and previous studies, we believe that the control group will have a lower mean MDSC level compared to the patients with localized and metastatic disease. Furthermore, we also expect to see a direct correlation between PSA and MDSC levels in patients with neoplastic disease.
Conclusions: Given current deficiencies in prostate cancer screening, more minimally invasive clinical tools are needed to detect malignancy and predict progression. Hence, in this study, we propose a novel immunoassay to detect and quantify MDSC in peripheral blood: a minimally invasive, routine clinical assay to measure tumor burden and response to therapy.

Vessel Density and Caliber Discriminate between Normal Retina and Clinical Stages of Diabetic Retinopathy

Sam Kushner-Lenhoff[1], Kaitlin Kogachi[1], Melissa Mert[3], Zhongdi Chu[4], Neal V. Palejwala[5], Jeremy Wolfe[6], Sujit Itty[5], Kimberly A. Drenser[6], Antonio Capone[6], Pravin U. Dugel[5], Andrew A. Moshfeghi[1], Hossein Ameri[1,2], Ruikang K. Wang[4], Anoush Shahidzadeh[1], Amir H. Kashani[1]

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[6]Associated Retinal Consultants, Oakland University of William Beaumont School of Medicine, Royal Oak, MI, United States

GOAL: To assess the utility of SD-OCTA derived metrics to determine diabetic retinopathy (DR) severity.
METHODS: We carried out a multicenter, retrospective, cross-sectional study using OCTA (AngioPlex™ Carl Zeiss Meditec, Inc). A total of 538 eyes in 349 subjects [102 non-diabetic, 103 mild non-proliferative DR (NPDR), 41 moderate NPDR, 32 severe NPDR, and 71 proliferative DR] were classified according to DR status. Vessel skeletal density (VSD) and vessel diameter index (VDI) were calculated on the superficial retinal layer (SRL). The subjects were divided into initial (227 patients) and validation cohorts (122 patients) for modeling. Multinomial logistic regression models were generated, and the performance of each model was quantified by calculating its area under the curve (AUC).
RESULTS: There is a significant increase in the odds of DR for every 0.001 unit decrease in VSD. Specifically, the odds of having mild, moderate, severe NPDR, and PDR compared to normal subjects increased by 12%, 25%, 27%, and 32% [all $p<0.001$] respectively, after adjusting for comorbidities from past medical history. For every 0.01 unit increase in VDI, the odds of having mild, moderate, severe NPDR, and PDR compared to normal subjects increased by 5%, 17%, 16%, and 21%, respectively [$p=0.02$ for mild, $p<0.001$ for moderate, severe, and PDR]. The AUC graphs in both cohorts showed excellent discrimination of normal subjects vs. any DR for the covariate model (AUC =.89 and AUC =.80 for the initial and validation cohort respectively) and furthermore the models containing VSD and VSD with VDI significantly contributed to the discrimination. For mild vs. more severe DR and for mild/moderate/severe vs PDR, we also confirmed excellent discrimination, but the VSD or VDI did not significantly increase the AUC compared to the covariate only model in the validation cohort.
CONCLUSIONS: VSD and VDI are significantly correlated with the presence or absence of DR and DR severity. These values may be used with other clinically relevant variables to determine DR severity.

Serum Auto-Antibodies in Patients with Psychosis and Seizures

Sobell J, **Lebovitz L**, Adachi M, Matsumoto M, Siegel S

Background:
Neuronal auto-antibodies may underlie some cases of seizures and psychosis but are not fully understood.
Methods:
We tested sera of patients with recent onset psychosis or atypical or treatment-resistant seizures and healthy controls (HCs) for 25 neuronal auto-antibodies using indirect immunofluorescence (IFA), radioimmunoassay (RIA), enzyme-linked immunosorbent assays (ELISAs), cell-binding assay (CBA), and/or western blot (WB). Demographic and medical/psychiatric data were obtained. Symptoms in psychosis subjects were scored using the Positive and Negative Symptom Syndrome Scale (PANSS). All subjects gave written informed consent (IRB USC-HS-18-00975).
Results:
88% of psychosis subjects (**24/27**), **80**% of seizure subjects (**8/10**), and **100**% of HCs (**7/7**) were positive for one or more auto-antibodies. The most commonly noted antibody, anti-tubulin, was found in **81**% of psychosis subjects (**22/27**), **80%** of seizure patients (8/10), and **100%** of HCs (**7/7**). Testing will continue until 50 of each group and 100 HCs are tested. We expect that continued testing will show a higher rate of auto-antibodies in psychosis and seizure patients than HCs. We will assess the extent to which psychotic symptom severity and quality differs in antibody-positive patients. Analysis of prevalence differences between groups and associations with historical data are underway.
Discussion:
A higher prevalence of auto-antibodies in psychosis subjects was observed than in previous reports, possibly due to the wide variety of auto-antibodies tested herein. The high prevalence of all auto-antibodies in HCs and that of anti-tubulin antibody among all groups requires further analysis.

Venous thromboembolism in pediatric inpatients: a retrospective single-institution experience

Alice Liu, BA; Jordan R. Wlodarczyk, MD; Jeffrey Hammoudeh, MD, DDS

Introduction: Hospital-acquired venous thromboembolism (VTE) is recognized as one of the most costly, morbid, and yet preventable diagnoses in the adult population. Consequently, thromboprophylaxis is a routine part of hospital admission, particularly for patients with known risk factors. In contrast, guidelines for prevention and risk assessment do not yet exist in the pediatric population due to the relatively low incidence of VTE in children compared to adults. Recently, however, the improved survival of children with cancer and chronic diseases as well as the increased use of invasive support have led to a rise in pediatric VTE rates. This study aims to evaluate the evolving incidence of VTE while identifying associated risk factors and proposing a prophylactic algorithm in this unique population.
Methods: This was an Institutional Review Board-approved retrospective review of patients admitted to Children's Hospital Los Angeles from 1/8/2008 to 3/31/2018 classified with ICD-9 and/or ICD-10 codes pertaining to VTE. Only cases of hospital-acquired VTE in patients diagnosed before 21 years of age were included. From their medical records, the following variables were abstracted: patient demographics including BMI and weight, thrombus location and provocation, prophylactic and treatment methods, and the presence of possible risk factors including but not limited to concurrent venous catheterization, trauma, infection, malignancy, and thrombophilia.

Results: Of 175,312 patients admitted during the study period, 562 cases matching inclusion criteria were identified, representing a 10-year VTE incidence of 0.32% in hospitalized patients. Between 2008 and 2018, the annual rate of VTE increased by 73.53%, from 34 to 59 cases per 10,000 admissions ($p < 0.001$). A bimodal age distribution at diagnosis with incidence peaks in early infancy (mean = 23.63 days old) and adolescence (mean = 14.32 years old) was present.
84.24% of VTE cases were provoked, among which central venous catheterization was the most commonly documented association (75.67%). Among the 15.76% of VTE cases that were unprovoked, congenital heart disease was associated most strongly with patients under two years of age ($p=0.002$) and BMI>30 in older patients ($p=0.004$). 4.02% of VTE cases were recurrent, with hematologic malignancy being the most strongly associated medical comorbid condition ($p < 0.001$). Prophylactic and therapeutic anticoagulants were inconsistently used, although enoxaparin was the most common pharmacological agent for both indications.
Conclusion: Hospital-acquired VTE at our institution is epidemiologically comparable to data reported in the literature. Unlike in the adult population, pediatric cases of VTE are usually provoked and nonrecurrent. However, thromboprophylaxis may still be of significant benefit in children with congenital heart disease, hematologic malignancy, or obesity.

Using Google Trends and Social Media to Evaluate Population Interest in Vitiligo

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Background: As of 2018, nearly 90% of Americans use the internet, transforming the way information is provided and accessed. More than 72% of Americans reported using the internet and 42% reported use of social medial platforms, such as Instagram, for health-related questions.
Aims: In this study, we utilized Google Trends, a powerful epidemiological tool that reports the search volume of a specific query over time, to track and elucidate the temporal and geographical trends, related interests, and top searches about vitiligo. Social media evaluation was done through reviewing the content of vitiligo related treatments and topics on Instagram.
Methods: On Google Trends, interest over time, interest geographically, and top and rising related queries from January 1, 2004 to December 31, 2018 for the keyword “vitiligo” were recorded; furthermore, on Instagram, the top 300 results of a search of “vitiligo” were recorded and analyzed for content and source.
Results: On Google Trends, search volumes for vitiligo peaked in the summer. Over time, the three most popular related queries to the search “vitiligo” included “vitiligo skin,” “Michael Jackson” and “vitiligo treatment.” On Instagram, 61% of posts contained personal content, 12% advertised treatments and services, 3% provided educational information, and only 3% came from a dermatologist. Where Google Trends offers a population-level analysis, Instagram supplements the more individualized perspective.
Conclusion: As the impact of the Internet and social media continue to grow in scope, understanding how patients are using these platforms and acquiring information will allow physicians to better understand and serve their patients. Thus, it is imperative that health professionals recognize the growing role of the internet and social media and actively engage in the technology to help guide their patients as they navigate online health-related information.

Combined Lymphaticovenous Anastomosis and Vascularized Lymph Node Transfer: Outcomes of a Novel Microsurgical Approach for the Treatment of Breast Cancer-Associated Lymphedema

Nicole Ontiveros, BA, and Ketan Patel, MD

Background: Despite advancements in surgical, medical, and radiation oncology, breast cancer is projected to be the most commonly diagnosed cancer and the second most common cause of cancer death in women in the United States in 2020. Upper extremity lymphedema is a well-known potential sequela of breast cancer and its associated treatments, with an incidence rate as high as 33% in women treated with both axillary lymph node dissection and radiation therapy. Though incidence rates have decreased over time, lymphedema remains a significant issue due to its substantial negative impact on patients' quality of life. One novel surgical treatment involves combining lymphaticovenous anastomosis (LVA) and vascularized lymph node transfer (VLNT) to restore the physiology of the lymphatic system while concomitantly reducing disease burden.

Methods: Fifty patients diagnosed with ISL Stage I or II upper extremity breast cancer-associated lymphedema were recruited for the study at Keck Hospital of USC between 2014 and 2020. Participants were subsequently divided into three study arms – LVA, VLNT, and combined LVA and VLNT. Pre-operative and post-operative lymphedema and quality of life were assessed via geometric volume measurements and the Lymphedema Quality of Life survey, respectively.

Results: Data collection is ongoing. Initial findings suggest that the combined approach of LVA and VLNT will decrease post-operative lymphedema resulting in improved quality of life for patients presenting with ISL Stage I and II breast cancer-associated lymphedema.

Conclusions: The results of this study bolster the recent paradigm shift towards a more surgical approach to the treatment of breast cancer-associated lymphedema. By combining microsurgical techniques that restore physiology and reduce disease burden, patients experience fewer lymphedema related complications and improved quality of life.

Longitudinal aqueous humor sampling reflects treatment response in retinoblastoma patients

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Purpose: Current diagnosis and surveillance of retinoblastoma (RB) is based on clinical observations and imaging, whereas molecular tumor information is derived almost entirely from enucleated eyes. However, recent development of the aqueous humor (AH) liquid biopsy allows for *in vivo* sampling of tumor-derived cell-free DNA (cfDNA) during active treatment of RB. In this study, we assess the relationship between AH cfDNA properties—including tumor fraction (TFx) and amplitude of somatic copy number alterations (SCNAs)—and therapeutic response over time.
Methods: Eyes with ≥3 AH samples extracted during intravitreal chemotherapy (IVM) and/or at secondary enucleation between 2015-2019 were included. AH cfDNA was sequenced to assess RB SCNA amplitude, and ichorCNA software was used to estimate TFx. Eyes without SCNAs and/or with TFx<0.10 in all samples were excluded. Therapeutic response (clinical progression or regression) relative to baseline was determined for each eye from clinical records. Mann-Whitney U and Pearson correlation tests were used for statistical analyses.
Results: Twenty eyes of 20 patients underwent ≥3 AH extractions; 6 eyes lacked SCNAs and/or had TFx<0.10 throughout sampling and were excluded. Clinical progression was associated with significantly higher TFx values (mean 0.60±0.34) than regression (mean 0.34±0.34; P=0.022). Relative increases in TFx (ΔTFx 2.70±3.23) from first to last AH samples were associated with overall progression, whereas relative decreases in TFx (ΔTFx 0.48±0.41) were associated with overall regression (P=0.008). A ≥15% increase in TFx relative to baseline was associated with an over 20-fold increased likelihood of clinical progression (OR=20.67, 95% CI=3.83-111.64, P=0.0004). TFx and RB SCNA amplitude were significantly positively correlated throughout sampling (P≤0.004).
Conclusions: Longitudinal changes in cfDNA TFx and SCNA amplitude from the AH reflect clinical dynamics of intraocular RB during active therapy.

Racial and Ethnic Differences in Healthcare Utilization and Costs Among U.S. Non-Melanoma Skin Cancer Patients

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Goal: Racial and ethnic differences in healthcare utilization and expenditures for non-melanoma skin cancer (NMSC) patients are unknown. Compared to white patients, NMSC is less prevalent in other racial groups. However, it is important to evaluate healthcare use and costs among racial and ethnic minorities with NMSC to identify gaps in care. This study aims to identify and compare healthcare expenditures and utilization among non-Hispanic white, non-Hispanic black, and Hispanic white patients with NMSC.
Methods: We performed a nationwide cross-sectional study using the Medical Expenditure Panel Survey (MEPS) from 1996 to 2015. Among 50,895,706 NMSC patients (weighted) from the 20-year period, 49,653,877 (97%) were non-Hispanic white, 155,980 (0.3%) were non-Hispanic black, and 701,682 (1.4%) were Hispanic white patients.
Results: After adjustment for socio-demographic characteristics and comorbidities, compared to non-Hispanic whites, Hispanic whites had significantly more ambulatory visits (4.79 vs 3.28, p=0.01). Compared to non-Hispanic whites, non-Hispanic blacks had significantly more ambulatory visits (11.66 vs 3.28, p=0.037), inpatient visits (.32 vs .01, p=.04), and prescription

medications (1.28 vs 0.31, p=0.05), as well as higher prescription medication costs ($244.83 vs $42.95, p=0.03).
Conclusions: In conclusion, racial and ethnic minority patients with NMSC utilized more healthcare resources. Additionally, non-Hispanic black patients also incurred greater prescription medication costs.

Impaired Layer Specific Retinal Vascular Reactivity Among Diabetic Subjects

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Purpose: To investigate layer specific retinal vascular reactivity (RVR) in diabetic subjects using swept-source OCTA.
Methods: This was a single-armed, prospective, observational study. A previously described (Ashimatey et al., IOVS 2019) non-rebreathing apparatus was used to deliver room air, a 5% CO_2 gas mixture, and 100% O_2 to controls (N=30) and diabetics (N=22) with simultaneous acquisition of 3x3 mm2 swept-source OCTA images (PlexEliteTM, Carl Zeiss Meditec, Dublin, CA) centered on the fovea. Vessel skeleton density (VSD) metric was calculated for each condition for the segmented superficial retinal layer (SRL) and deep retinal layer (DRL) as previously described (Kim et al., IOVS 2016). Analyses were performed using averaged OCTA images derived from 2 or more scans for each subject. Data analysis was performed using mixed factorial analysis of covariance (ANCOVA) stratified by diabetic stats. All models were adjusted for age, gender, and hypertension.
Results: There is a significant effect of gas on VSD among non-diabetics ($p<0.001$). This difference is driven by both change in the SRL ($p<0.001$) and DRL ($p<0.001$). Within each layer there is a significantly higher VSD during room air and CO_2 conditions than during O_2 (both $p<0.017$). Among diabetics, there is a borderline significant effect of gas on VSD regardless of layer ($p=0.04$). The magnitude of this effect is less than in non-diabetics and this effect is driven primarily by lower VSD in the DRL between gas conditions ($p<0.007$). Specifically, in the DRL the VSD is significantly lower under O_2 conditions compared to room air conditions ($p<0.017$). Similar results were obtained when only single images were used for the analysis.
Conclusions: Impairment in RVR in diabetic subjects is driven largely by a decrease in the robustness of the response to O_2 in the SRL as well as almost complete attenuation of CO_2 in all layers. These layer and gas specific impairments in diabetics may play a useful role in disease detection.

Intraoperative Evaluation of Condylar Width and its Variation Due to Limb Position in Tibial Plateau Fractures

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Purpose:

Uncorrected tibial plateau widening following fracture is associated with valgus instability, articular incongruity and meniscal injury. Thus, restoration of condylar width to preinjury dimensions is critical. Additionally, variation in limb position have been shown to alter important measurements for accurate reconstruction of distal femoral fractures, while variations in limb rotation have been shown to affect the selection of a proper starting point in medullary nailing of the tibia. Therefore, establishment of a standardized positioning for the measurement of condylar width, as well an understanding of how variations in limb position affect these measurements is necessary.

Methods:

Following IRB approval, we prospectively identified patients undergoing operative fixation of tibial plateau fractures. Fluoroscopic images were obtained of the uninjured tibial plateau in (1) full extension and (2) slight flexion on foam ramp. Rotational views of the tibial plateau were then obtained by arcing the fluoroscope around the knee in 5 degree increments up to 15 degrees in both internal and external rotation with a in frame 1-inch ball bearing for calibration. Measurements for distal femoral condylar width (DFW), distal femoral articular width (FAW), proximal tibial articular width (TAW) and lateral plateau widening (LPW) were performed per Johannsen et al 2018 using Synapse software. Positive LPW values indicated that the proximal lateral tibia was more lateral than the femur, and negative values indicated the lateral femoral condyle was more lateral than the tibial plateau. Statistical analysis performed in Microsoft Excel and Prism GraphPad. Significance was set at $p < 0.05$.

Results:

21 patients were included in this study. LPW was decreased at all degrees of rotation (AP-15˚) when in flexion compared to extension (-1.11 - 0.54 mm vs 1.13 - 2.13 mm, p=0.04-0.0009). Additionally, FAW/TAW ratio was increased at all degrees of rotation other than 10˚ internal rotation when in flexion compared to extension (0.923-0.960 vs 0.915-0.932, p= 0.046-0.009). There were no differences between any measurements when comparing 5˚-15˚ internal and external rotation to the AP radiograph.

Discussion:

We present the first attempt to report variations of condylar width due to leg positioning. Our study suggests that analysis of condylar width with the knee in flexion may underestimate the degree of lateral displacement compared to a knee in extension. Additionally, the knee in flexion may overestimate FAW/TAW ratio compared to a knee in extension. However internal and external rotation to a maximum of 15˚ in do not alter the LPW or other parameters of condylar width. This knowledge may assist surgeons in operative planning for repair of tibial plateau fractures.

ANESTHESIOLOGY

Evaluating catechol O-methyl transferase (COMT) effectiveness as a predictor for pain, levels of anxiety, depression, and function, and quality of rapport between patient and pain provider.

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Goal: Recent evidence suggests that activity of the COMT enzyme is associated with increased pain sensitivity, anxiety and depression. As genetic individualization of pain management strategies is becoming increasingly feasible, this study aims to evaluate COMT polymorphisms as a predictor of pain, anxiety, depression, function and quality of rapport between patient and pain provider.
Methods: 300 chronic pain patients underwent genetic testing, including evaluation of two COMT polymorphisms, rs4680 and rs4818. These patients also completed a number of self-report measures associated with pain severity (NRS), health-related quality of life (SF-12), functional disability (ODI for LBP), anxiety (GAD-2, GAD-7), depression (PHQ-2, PHQ-9), and their rapport with their pain medicine providers after a clinic visit (Session Rating Scale).
Results: We expect to see increased pain severity in patients with the rs4680 minor allele (G>A) and the rs4818 minor allele (C>G). The existing literature strongly supports the link between rs4680 and increased pain sensitivity, but the evidence supporting the link between rs4818 and pain severity is much weaker. Though there is conflicting evidence on whether the major or minor allele of rs4680 is associated with anxiety, we expect to see increased levels of anxiety in patients with the rs4680 minor allele. We expect the minor allele of rs4680 to also be associated with higher levels of depression based on the existing literature. As few articles were found discussing rs4818 and anxiety or depression, we hope our study can add to the existing body of knowledge on this polymorphism.
Conclusions: Associations between the rs4680 and rs4818 polymorphisms of COMT with higher pain sensitivity or the other characteristics evaluated can be used by pain providers to tailor genetically individualized treatment regimens, improving outcomes and rapport with patients.

Enhanced Recovery After Surgery in Head and Neck Cancer Surgery with Free Flap Reconstruction

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Goal: Recent studies have shown that Enhanced Recovery After Surgery (ERAS) protocol can reduce the length of stay for post-surgical patients and decrease the need for post-operative opioid use for pain management. We are investigating these outcomes in ERAS protocol implementation in head and neck cancer surgery with free flap reconstruction.
Methods: This is a retrospective cohort study of the Keck Hospital ERAS protocol for head and neck cancer resection with free flap reconstruction. Baseline characteristics will be compared by descriptive statistics, using unpaired t-tests for continuous and chi-squared tests for frequency data. The primary endpoint, opioid consumption, will be compared by univariate analysis of variance. Secondary endpoints will be analyzed by both univariate and multivariate regression analysis.
Results: Primary outcome measures included morphine milligram equivalent (MME) utilization, peak subjective pain scores, and overall blood utilization. Secondary outcome measures included intensive care unit (ICU) length of stay (LOS), overall LOS, and complication rates. Preliminary data has been collected thus far. They show that MME utilization was 247.5 MME vs 68 MME ($p<0.0000001$) in control patients and ERAS patients, respectively. Peak subjective

pain scores showed significant reduction ($p<0.001$) at post-operative day (POD) 1, POD 2, and POD 3. Overall blood utilization showed a significant reduction ($p = 0.001$) of 3 vs 2 units in control patients and ERAS patients, respectively. ICU LOS was significantly decreased ($p = 0.002$) at 46 hours vs 29 hours in control patients and ERAS patients, respectively. There was no significant difference between the control patients and ERAS patients with respect to overall LOS or complications from surgery.
Conclusions: These preliminary results demonstrate the effectiveness of implementing ERAS protocol to head and neck cancer surgery with free flap reconstruction without increasing complication rates or overall LOS.

Provider characteristics of post-discharge opioid prescribers for patients following thoracic surgery

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Background: Diversion of opioid pain medications prescribed for post-operative analgesia is a contributor to diversion and opioid abuse in the United States. The California Department of Justice operates the CURES (Controlled Substances Utilization Review and Evaluate System) database, which records each prescription for a controlled substance within the state, as well as prescriber information. The present investigation examines the characteristics of the prescribers of post-operative opioid pain medications following elective thoracic surgery.
Methods: All patients undergoing elective open or video-assisted thoracotomy surgery at a single academic institution in California between January 1, 2019, and July 31, 2019, were searched in the CURES database. Data abstracted included the opioid medication, dose, quantity, number and timing of prescriptions, and identity of the prescriber for up to 6 months following surgery. Subsequent internet search for these providers using the website www.healthgrades.com reported specialty and training characteristics.
Results: Out of 170 post-discharge opioid prescriptions written over a six-month period, physician's assistants (PAs) wrote the majority of scripts (68%), followed by physicians (27%), advanced practicing nurses (4%), and dentists (1%). Nearly 90% of the prescriptions by PAs were made by only three individuals. Nearly 60% of all prescriptions were written within the first month, and 64% of prescriptions ranged from 100-499 MMEs.
Conclusions: Most post-discharge opioid prescriptions were written by a very small number of providers, who were mostly non-physician providers that were not directly affiliated with the surgeon. Most prescriptions were issued within the first month after surgery and most were for modest doses or short courses of medication. Targeted interventions for these providers could potentially reduce the total quantity of post-discharge opioid medications released into the community.

Perioperative Respiratory Adverse Events in Children Undergoing Triple Scope

Kyle Sanders, Manvi Bansal, Vrinda Bhardwaj, Christian Hochstim, **Hyun Jin (Jen) Yim**

Background/ Purpose/ Goal/ Hypothesis: Previous studies have shown that children with respiratory and neurological comorbidities, among other factors, were at a significantly increased risk of perioperative respiratory adverse events (PRAEs) than children without these characteristics. Given that Aerodigestive Clinic patients at CHLA have a high incidence of respiratory and neurological comorbidities, the incidence of PRAEs during triple endoscopy is of

concern but is not yet known. Therefore, this study seeks to evaluate the incidence of PRAEs in Aerodigestive Clinic patients undergoing triple endoscopy at CHLA.
Methods: Data was collected from patients' medical records and from data that had already been collected from subjects aged birth through 17 years that consented to the CHLA aerodigestive clinic study and underwent a triple endoscopy. Descriptive statistics will be utilized to analyze the data, and patients with any PRAE will be compared to those without any PRAE utilizing chi-squared and paired T-tests. Multivariate logistic regression will be employed to investigate any statistically significant difference further, if appropriate.
Results: The data has been collected but not yet been analyzed. It is expected that patients with more co-morbidities and recent illnesses will have a higher incidence of PRAEs, and that the incidence of PRAEs in Aerodigestive Clinic patients undergoing triple endoscopy will be higher than that of the general surgical population.
Summary/ Conclusion: The data from this study will help develop evidence-based guidelines to inform decisions regarding appropriate level of postoperative care required and appropriate timing of triple endoscopy in high risk patients with recent illnesses and comorbidities.

DENTISTRY – OMFS

Graft Materials, Canine Vertical Position and Cleft Width are Associated with Alveolar Bone Graft Outcomes Assessed by Three-dimensional Cone Bean CT

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OBJECTIVE: To evaluate the critical factors, including graft materials, permanent canine vertical position, and cleft width, which determine the success of the alveolar bone graft (ABG) outcomes by three-dimensional cone bean CT radiographic.

METHODS: A total of 79 patients (6-20 years of age, average 10.4 years, 47 males and 32 females) with non-syndromic complete unilateral cleft lip and palate had been treated with ABG (2015-2018) in one center by four surgeons. The postoperative CBCT (n=79, 6-79 month after graft) was analyzed by the Bergland scale score rather than the traditional occlusal radiograph to assess the post-graft outcomes. Preoperative cone bean computed tomographic (CBCT) scans (n=27) were available to determine the cleft width. Three panoramic radiographic planes were used to assess canine vertical positions. A novel method for categorizing canine eruption based on position relative to the palatal and occlusal planes separated the post-graft outcomes into *Group 1* Early bone graft before central or lateral incisor eruption, *Group 2* high canine position with 2/3 of canine crown above the palatal plane, *Group 3* the 2/3 canine crown below the palatal plane with adjacent premolars not fully erupted, *Group 4* canine crown close to occlusal plane but not erupted with premolar eruption and *Group 5* complete canine eruption. Two types of graft materials were compared, bone morphogenetic protein-2 with demineralized bone matrix (BMP2/DBM) versus iliac crest bone (ICB). Potential covariates include sex, timing of surgery, surgeon, supernumerary, or impacted teeth in the cleft, were also compared.

RESULTS: The ICB graft group (n=44, average score 2.21) shows better alveolar graft outcomes compare with BMP2/DBM group (n=35, average score 2.72, p=0.023), regardless of timing for collecting CBCT images at 6 months (p=0.01) or over 10 months (p=0.02). During mixed dentition, unerupted high permanent canine vertical position is highly associated with poor graft results. The group 3(n=23, ave=1.7), significantly higher than other group 2 (n=29, ave= 2.9, p<0.001), group 4 (n=12, ave=2.8, p=0.006) and group 5 (n=12 ave=2.6, p=0.04). But no difference between group 3 with group 1 (n=3, ave=1.8 p>0.05). A trend was observed but there was no significance between cleft outcome and cleft width in this small sample(n=27, R2=0.378, p>0.05). In total, 21 (26.6%) patients have supernumerary or impacted teeth in the cleft. Inter-surgeon comparisons showed no statistical difference in graft outcomes among the four surgeons.

CONCLUSION: These results suggest that graft outcomes correlate with pre-graft canine positions. High unerupted canines was associated with poor Bergland scale outcomes. In patient with complete unilateral cleft lip and palate, iliac crest bone graft tended to have better graft outcomes than BMP2/DBM in this sample. Volumetric measurement of CBCTs are needed to confirm these results in the future.

Analysis Of Flumazenil Efficacy During Recovery From IV Midazolam Deep Sedation Anesthesia During Wisdom Teeth Extraction

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Background: IV midazolam is commonly used to induce deep sedation during wisdom teeth extraction procedures. Flumazenil has been used as a reversal agent for IV midazolam sedations, but its use in oral and maxillofacial surgery remains controversial. The objective of this research is to analyze and establish the safety and efficacy of using flumazenil for IV midazolam sedation recovery post-wisdom teeth extraction.

Methods: A retrospective chart review on over 500 patients that underwent IV midazolam deep sedation for wisdom tooth extraction will be conducted. Patients will be placed into two groups. Group I will consist of the control group that did not receive flumazenil, and Group II will be the patients that received IV flumazenil. From the charts, significant adverse events from both groups will be recorded and compared using the chi-squared test. Respiratory rate, oxygen saturation, and end-tidal CO2 at time of dismissal to recovery room as well as length of time in the recovery room will be recorded for both groups and compared using Student's t-test. Results will be considered significant at $p<.05$. Demographic data of patients will also be used for further analysis.
Results: Data collection for this research project is ongoing. However, the expected results are that the use of IV flumazenil for post-surgery anesthesia recovery will be significantly associated with quicker average recovery time and fewer adverse events.
Conclusion: This research project will aim to demonstrate the safety and efficacy for routine use of flumazenil for IV midazolam deep sedation anesthesia reversal in certain patient populations. It will be the most recent attempt at establishing guidelines for use of flumazenil in oral and maxillofacial surgery and will be a baseline from which more widespread use and research of flumazenil can be conducted, leading to better patient outcomes after wisdom teeth extraction.

DERMATOLOGY

Explaining low rates of dermatology visits in solid organ transplant recipients

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Goal: Solid organ transplant recipients (SOTR) are at an increased risk for skin cancer due to long-term graft-preserving immunosuppressive therapy. We recently described rates of skin cancer and infectious complications in a majority Hispanic population of SOTR (Adler et al, 2019). In our retrospective cohort, we noted that only 12% of our SOTR had seen a dermatologist post-transplant. We hypothesize that this low rate of dermatology visits may be associated with factors such as health insurance, language barriers and travel distances to see dermatology.
Methods: This retrospective chart review study focuses on access to dermatological care for SOTR at USC from 1993 to 2016. A total of 2032 SOTR charts were reviewed, including kidney, liver, heart and lung recipients. Factors potentially contributing to the low number of dermatological visits in this population were assessed, including insurance status, distance to dermatologist, organ transplanted, racial/ethnic group and primary language. The reason for referral was also assessed (preventative skin check versus other).
Results: On preliminary analysis, patients seen by a dermatologist (n=241) primary insurance was 64.1% Medicare, 19.0% MediCal, 11.4% PPO, 5.1% HMO. English was the preferred language in 66.8% and Spanish in 29%. 53.5% identified as White, 27.8% Other, 14.1% Asian and 3.7% Black. 57% were Hispanic. 43% were non-Hispanic. For patients not seen by a dermatologist (n=1791) primary insurance was 44.9% Medicare, 24.1% HMO,18.7% MediCal, 11% PPO. English was the preferred language in 78.6% and Spanish in 19.8%. 53.2% identified as White, 27.4% Other, 12.9% Asian and 5.9% Black. 45.8% were Hispanic. 54.2% were non-Hispanic. Mean distance to USC was 42.4 miles for those who saw dermatology and 157.8 miles for those who did not.
Conclusions: Our data suggest that the patients who saw dermatology were more likely to live closer to our clinic and were more likely to have private insurance, highlighting potential reasons for disparities in care.

Characterizing Disease Features and Comorbidities of Pityriasis Rubra Pilaris

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Background and Aims: Pityriasis Rubra Pilaris (PRP) is a rare, poorly characterized dermatologic condition that typically manifests in the skin as an inflammatory, erythematous papulosquamous rash with areas of sparing, along with other associated, symptoms. The etiology of PRP has not been elucidated, except for in the rare familiar form, which can be attributed to autosomal dominant inheritance of a defective *CARD14* gene. We created a survey study to investigate the most common presentations of PRP to better characterize disease features and comorbidities.
Methods: We conducted a retrospective, online-based anonymous survey study of patients with self-reported Pityriasis Rubra Pilaris. We collected a total of 625 patient responses to the survey and 467 patients were included in this study. Patients were included if they reported their PRP was confirmed by a dermatologist with explicit exclusion of psoriasis or other PRP mimics, as well as current age >18.
Results: 97 (20.8%) patients reported allergic rhinitis, making it the most common comorbidity in our cohort. 72 (15.4%) patients have comorbid cardiovascular disease. Concurrent skin conditions were frequent, as 40 (8.6%) patients reported eczema and 33 (7.1%) patients

reported psoriasis. Irritable bowel syndrome was also present in 33 (7.1%) patients. 60 (12.8%) patients reported cancer diagnoses.
Conclusion: It has been suggested that autoimmune disease or cancer could be a trigger for PRP, and because we found a high number of patients with concomitant autoimmune diseases and neoplasia, our data may support this theory. The association with psoriasis is particularly interesting as the *CARD14* gene mutations that are responsible for the inherited form of PRP are also implicated in the pathogenesis of some cases of psoriasis. Although *CARD14* mutations are not commonly involved in the sporadic form of PRP, the co-occurrence with psoriasis may indicate that they share another common mechanism.

Clinical Correlations in Familial Melanoma

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Goal: There are multiple known gene mutations that predispose a person to developing melanoma, but it is unclear if these known genomic loci are separate or share a common pathway. Our goal is to assess the relationships between the known melanoma susceptibility genes in terms of the three-dimensional distance existing between these genes. We hypothesize that the known melanoma genes may share a spatial contiguity in chromatin space.
Methods: We have catalogued 19 known melanoma genes and their non-melanoma associated malignancies. We then created a map of gene sequence loci and charted the known mutations in each region. We will use standard gene mapping based on linkage studies to determine the distances between these genes. We will then use new recently developed programs based on X-ray crystallographic structural mapping to localize these genes and compute actual distances.
Results: We expect to find that some of the genes in questions exist closely within a three dimensional chromatin area. We anticipate that there will be one or several common pathways involving multiple melanoma susceptibility genes.
Conclusion: With this data, we hope to further our understanding of how known susceptibility genes interact and predispose an individual to melanoma. With better awareness of how these genes relate, we can better determine an individual patient's risk. Furthermore, this data has implications for pharmaceutical development, potentially targeting shared pathways or promoter substances.

Investigating the Role of Pollution in Psoriasis Pathogenesis

Manan Mehta, BS,[1] Indira Singh MD,[1] April W. Armstrong MD, MPH[1]

Background: Both environmental and genetic factors contribute to the pathogenesis and progression of psoriasis. Several exogenous factors that may contribute to psoriasis etiology or exacerbation include infection, trauma, smoking, alcohol, and diet. However a gap exists on whether air pollution, a major public health concern, contributes to psoriasis pathogenesis. We aimed to determine the association between psoriasis and air pollution.
Methods: We investigated the relationship by examining PM2.5 data from the CDC and linking it to online queries for psoriasis using Google Trends, a method that has been validated for dozens of previous medical research studies. We used searches for "obesity" against PM 2.5 data as a control and compared "psoriasis" search data to CO2 as a negative control. Results were evaluated using linear and multivariate regression analyses.
Results: We expect to see a positive correlation between PM2.5 levels and search queries for "psoriasis", and a stronger correlation with a multivariate analysis. The controls should show no correlation to help provide validity for the model and the association.

Conclusion: Our study suggests that air pollution in the form of fine particulate matter may serve as an important environmental factor that contributes to the pathogenesis of psoriasis and, therefore, highlights the need for more clinical and population-level studies on air particulate matter and psoriasis. As air pollution and the prevalence of psoriasis continue to rise, further research needs to be done to quantitively examine the association between air particulate matter pollution and psoriasis.

A Randomized Controlled Pilot Trial for DRESS: Steroids vs Cyclosporine

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Background: Drug reaction with eosinophilia and systemic symptoms (DRESS) is a drug hypersensitivity reaction caused by a variety of medications, including antiepileptics, antibiotics, sulfonamides, and others. DRESS generally presents with a fever, polymorphic skin rash, lymphadenopathy, eosinophilia, and internal organ involvement (usually of the liver, kidney, heart, and/or pancreas), among other symptoms. Currently, the primary management of DRESS is centered around corticosteroids, though there have been reports of other drugs with potential efficacy, including cyclosporine. Given that there has not been a clinical trial to compare the efficacy of steroids versus cyclosporine in treating DRESS, we have established a pilot trial to compare both drugs on a variety of parameters.
Methods: Patients will be recruited to the study based on satisfying an inclusion and exclusion criteria. A dosing regimen was created for steroids and cyclosporine administration based on clinical experience and reports in the literature. All procedures performed for this study (including physical exam, blood draws, EKG, and chest x-rays) are all also performed as standard of care.
Results: The primary endpoints compare the drugs based on the proportion of patients with resolution of erythema and internal organ involvement at days 7 and 30. The secondary endpoints include time to resolution of fever, edema, pruritus, and lymphadenopathy, along with monitoring for autoimmune disease, total hospitalization length, absolute eosinophils, viral reactivation, mortality, and 30-day readmission rate.
Conclusion: We expect to show non-inferiority of cyclosporine in comparison to corticosteroids in treatment of DRESS, on the basis of the factors mentioned above. This will be an important finding as reports have shown the cyclosporine course to have a shorter duration, whereas a prolonged steroid course and taper often results in adverse effects for the patient.

Ethnic Disparities in Non-Melanoma Skin Cancer Based on Mohs Micrographic Surgery Defect Size, A Retrospective Chart Review

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Goal: Many studies have revealed disparities in the health outcomes in patients of color as compared to their white counterparts. Our aim with this study is to investigate these differences as they pertain to skin diseases, particularly skin cancers. Non-melanoma skin cancers (NMSCs) comprise the majority of skin cancers, and can be surgically treated with Mohs micrographic surgery (MMS). We hypothesize that NMSCs, specifically basal cell carcinomas (BCCs) and squamous cell carcinomas (SCCs), in our skin of color patients will

have significantly larger surgical defect sizes after obtaining clear margins as compared to our white patients.
Methods: We are conducting a retrospective chart review of all BCCs and SCCs treated with MMS from January 2014 through December 2018. We will utilize this data to compare final surgical defect sizes following MMS at 3 different sites: LAC+USC, Keck Medicine at USC, and UCLA Dermatology. In addition to final surgical defect sizes, we will be collecting data on parameters including age, gender, self-reported ethnicity, insurance type, history of solid organ transplantation or other immunosuppression, anatomic location of cancer, recurrence, and metastasis (regional or distant).
Results: Once the data collection is complete, multivariate analysis will be used to analyze the data and control for confounders, performed by the research team and a statistician from CTSI. We expect that our analysis will reveal a statistically significant difference in surgical defect sizes between our skin of color patients and their white counterparts.
Conclusion: With the findings of this study, we hope to stimulate dialogue concerning skin cancer in patients of color and possible misconceptions regarding their risk of skin cancer due to the higher pigmentation in their skin. We hope to demonstrate the importance of early diagnosis and treatment in these patients in order to reduce the morbidity and mortality associated with larger and more advanced skin cancers at time of presentation.

Bullous Pemphigoid and Malignancy in Two Different Hospital Populations: A Retrospective Cohort Review

Benjamin Wright, BS, Katherine Halper, BA, Scott Worswick, MD

Background: Bullous Pemphigoid (BP) is a rare autoimmune blistering condition characterized by antibodies to the structural proteins BP1 and BP2 in the dermal-epidermal junction. The link between BP and malignancy remains unclear. Due to the rarity of the disease, there have been few studies with small sample sizes characterizing the association of BP to malignancy.
Objectives: There were two main goals of this retrospective cohort study: 1. To look at the associated risk of malignancy in patients with BP compared to controls and 2. To compare the rates of malignancy in two separate hospitals with differing patient populations.
Method: We reviewed the medical records of 99 patients diagnosed with BP observed between 2014 and 2019. 66 patients were from Keck Hospital and 33 were from Los Angeles County/University of Southern California (LAC/USC) Hospital. Each patient was age and sex matched to a control from the same hospital.
Results: Malignancies occurred in 26 BP patients and 29 controls. 7 of the BP patients from LAC/USC hospital (21.2%) and 19 patients from Keck Hospital (28.8%) had malignancies.
Conclusions: Overall, we did not find an increased risk of malignancy in BP patients compared to controls. Nor did we find a statistically differing rate of malignancy in BP patients from differing socioeconomic and ethnic background.

EMERGENCY MEDICINE & TRAUMA

Analyzing the Usage and Impact of an EHR-Embedded Compassionate Release Form for LA County Jail Inmates at LAC+USC

Zack Bonzell, Rebecca Trotzky-Sirr, MD, Dept. of Family Medicine, KSOM

Goal: This study asks the following questions: If a compassionate release from custody form were embedded in the ORCHID EHR, how often would physicians at LAC+USC use it? And, demographically, for which patients would it be used? For patients who undergo compassionate release from custody, how does their end of life experience differ from if they had remained incarcerated? What are the potential benefits, to incarcerated persons as well as to the penal system, of creating such a pipeline? Our hypothesis is that an ORCHID-embedded form would allow greater health justice for terminally ill incarcerated patients, particularly those most socially marginalized.
Methods: The study will begin with a literature review to understand the prevalence of compassionate release in healthcare settings that serve incarcerated persons similar to LAC+USC. We will use an ORCHID-based chart review to track the usage of the compassionate release form. We will collect deidentified patient data to understand the form's usage process (not specific to any individual patient). We will search publicly available mortality and court records for data on patient outcomes. All of these tasks will be performed by the medical student.
Results: We have not yet collected any data. We expect to see an initially moderate usage of the compassionate release form at LAC+USC with a gradual increase over the coming year.
Conclusions: This proposal is a worthwhile project because it could further the goal of health justice at LAC+USC. Incarcerated patients often represent some of the most marginalized people in our society. Affording them a means of compassionate release from custody for dignified palliative care represents our last opportunity to achieve for them some measure of health equity. Our goal is for our study to serve as a model for the implementation of EHR-embedded compassionate release forms in similar healthcare settings across the country. Future efforts will focus on approximating the unmet need in local jail facilities by ascertaining how many patients die each year who would have benefited from compassionate release.

Assessing Medical Student Knowledge and Attitudes Regarding Justice-Involved Health Curriculum

Margaret English, Medical Student; Rebecca Trotzky-Sirr MD, Advisor; Department of Emergency Medicine, LAC+USC

Background: The need for sustainable and effective jail and prison health care is supported by the literature, but there is only one mandatory class in any US medical school. There is no validated national curriculum. It is unclear if USC students feel prepared to give care to the justice-involved population or if the hands-on training they receive is of educational benefit. Investigators aimed to assess medical student factual knowledge, demographics, and attitudes. We hypothesized that students would not have the knowledge base or attitudes necessary to give competent care to justice-involved patients.
Methods: A Qualtrics survey was designed by the investigators and approved by the Medical Education Council. It was sent to all current USC medical students by email in accordance with the Med Ed Department. The survey consisted of a demographics section, 15 knowledge-based questions, and 10 attitudes statements rated on a 5-point Likert scale. Data was analyzed using StatsIQ and Crosstabs within the Qualtrics platform.
Results: 295 complete survey responses were recorded. 74, 86, 61, 71, and 3 responses were recorded from MSIs, MSIIs, MSIIIs, MSIVs, and those in dual degree years respectively. 89.2% (66/74) of MSIs and 5.6% (4/71) of MSIVs had worked for 0 hours in a jail or prison healthcare

setting. 6.8% (5/74) of MSIs and 33.8% (24/71) of MSIVs “strongly disagreed” with the statement “I feel unsafe working in a jail or prison ward (i.e. “they feel safe”). Of the 15 knowledge-based questions, MSIs averaged 50.1% (7.6/15) and MSIVs averaged 60.6% (9.1/15).
Conclusions: Our data suggest that medical students do not receive a passing grade (>70%) on factual knowledge about justice-involved health. While our data does suggest that experience on the wards improves knowledge, pairing a validated curriculum with clinical experience is likely to raise the grade and supplement hands-on learning. It is our goal to institutionalize justice-involved health to improve the care of justice-involved patients and mindfully train future physician-activists.

Assessing MAT outcomes in the Emergency Department

Madison Huffman, Medical Student; Rebecca Trotzky-Sirr, MD, Department of Emergency Medicine, KSOM

Goal/Background: The opioid epidemic has become a public health emergency in the United States and is responsible for thousands of deaths every year. Treatment of Opioid Use Disorder (OUD) includes Medication Assisted Therapy (MAT) with buprenorphine, which clinical trials have found to be more effective at preventing relapse than a traditional, abstinence-only approach. This study seeks to evaluate the efficacy of MAT at the LAC+USC Medical Center’s Emergency Department and Urgent Care Clinic and to assess the role that insurance status and empanelment plays in patient adherence to medication.
Methods: Patients who received naloxone or buprenorphine at the LAC+USC Emergency Department or Urgent Care from June-December 2019 were included in this study. Review of the patient’s electronic medical records was used to obtain patients’ insurance status, to determine whether patients were empaneled, and to quantify the number of patients that presented to the Bridge clinic for a follow-up visit. The CURES database provided information on whether each patient picked up their buprenorphine from the pharmacy and whether they continued to receive buprenorphine after their initial prescription. Primary and secondary medication adherence was calculated for each patient and then averaged in aggregate.
Results: This study is still being conducted. We expect to see variable rates of medication adherence among patients. Additionally, patients who are empaneled and have insurance accepted by LAC+USC Medical Center are expected to have higher rates of follow-up and medication adherence than those who are not empaneled and are out of plan.
Conclusion: We hope that the data obtained from this study can be used to identify ways that we can better serve patients with OUD and to assess gaps in care among the patient population.

Healthcare Utilization and Payment Types among Latinx Patients of Los Angeles County in the Context of Federal Anti-immigration Policy

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Background: The current federal administration consistently promotes anti-immigrant rhetoric and policies that affect healthcare utilization among Latinx immigrant communities. Proposals such as expansion of the public charge rule introduce a hazard for enrolling in government-sponsored health insurance such as Medicaid. Moreover, payment types such as Medicaid

require identifying information which may discourage enrollment from communities with high prevalence of undocumented status due to fear of immigration enforcement. In contrast, payment types such as the pre-payment plan require only proof of residence in Los Angeles County (LAC). To better characterize the impact of these anti-immigrant policies on healthcare utilization among LAC Latinx residents, we compared payment types for services before and after the 2016 presidential election.
Methods: We retrospectively examined LAC healthcare utilization data from July 2015 to June 2019, identifying payment types associated with application for Medicaid and enrollment in health insurance against those requiring out of pocket payments with no enrollment. Chi-Squared analyses were also performed to compare payment types pre- and post-election among this sub-group.
Results: Payment types differed significantly between the two time periods. Post-election, 14.2% (65,714/461,729) of Latinx patients paid for ED visits by a method requiring no identifying information compared to 8.3% (24,190/291,083) pre-election ($p<0.01$). Moreover, 1.2% of Latinx patients used pre-payment after the election as compared to only 0.7% prior.
Conclusions: The current federal administration's rhetoric and policies appear to discourage LAC Latinx residents to apply to Medicaid and instead opt for pre-payment plans that cover limited services. This could have dire impacts on healthcare access for these populations and may shift their healthcare utilization away from high value longitudinal care.

Patient Perceptions of Language Congruency with Healthcare Providers

Cynthia Ramirez, **Rodrigo Sandoval,** Vanessa Garcia, Alberto Ortega, Elizabeth Burner, MD

Background: The number of Limited English Proficiency (LEP) patients are increasing in the United States, with many of these patients utilizing the healthcare system through the emergency department (ED). There are many barriers that exist in the ED to effective communication at the time of evaluation including, but not limited to language discordance.
Goal: To gain a better understanding of patient perceptions of language congruency and skills in their providers in the ED setting. We are hoping to answer the following questions:
1) Does patient perception of language congruency with healthcare providers impact care, understanding of care?
2) Do patient perceive that their culture impacts care, provider perceptions of them?
3) Why do patients delay care?
Methods: The study will be using a qualitative inductive approach. 25 patient interviews will be conducted, which will then be transcribed. Analysis will be done with a modified grounded theory technique using Dedoose. The following strategies will be used to maintain scientific integrity and to enhance validity of the qualitative findings: consistent use of the discussion guide, audio-taping, independent preparation of transcripts, multiple researchers for data analysis, and standardized coding and analysis.
Results: Data collection is still ongoing. Currently, 10 patient interviews have been conducted and transcribed. We currently have a preliminary code book with 14 codes. We have noticed several themes emerging from the interviews, including "importance of communication", "health understanding", and "cultural norms". Analysis is pending.
Summary: We expect that the results will help us better understand the impact of language congruency on patient care, which will ultimately lead to better care for patients. We also hope that the results will give us a better understanding on how perception of culture affects care, as well as why patients delay emergent care.

Mobile Health Improves Diabetes Outcomes in ED Patients with Comorbid Depression

Authors: Travis Eurick, **Jorge Serrano**, Janisse Mercado, Nefertari Rincon Guerra, Adriana Berumen, Elizabeth Burner

Background: ED-based mobile health (mHealth) programs are a cost-effective method to manage and address chronic disease such as diabetes outside the confines of the ED. Given the comorbidity of depression and diabetes, depression should be considered in interventions for diabetes. In this study, we compare the efficacy of a diabetes mHealth intervention in ED patients with and without depression.
Methods: Patients with uncontrolled diabetes (HbA1C>8.5) were enrolled during an ED visit. They and a patient-designated supporter were registered in a mHealth program to improve diabetes self-care. The program sent 3 text messages daily for 6 months. At enrollment, we collected demographics, Patient Health Questionnaire-9 (PHQ9) and World Health Organization-5 (WHO5) quality of life assessments, sBP, and HbA1C. Measures were repeated at 6-months.
Results: We enrolled 166 patients at baseline and 130 patients were depressed. Enrolled patients were 51% female, 93% Latino, and 70% Spanish-speaking, with no differences based on depression. There was no difference in baseline HbA1C, sBP, or weight for depressed patients. Baseline WHO5 scores were higher for non-depressed patients, 79.8 (95%CI 73.4 to 86.2) vs 54.6 (95%CI 49.8 to 59.4) p<0.001. 97 patients followed up at 6 months. There was a decrease in combined group sBP (95%CI: -4.26 to -17.7) p=0.0017, with no difference by depression. Depressed patients showed decreased HbA1C by an average of 1.74 (95%CI 1.19 to 2.29) compared to an increase of 0.04 (95%CI -0.85 to 0.77) in non-depressed patients, p<0.001. Reductions in HbA1C varied by severity of depression (F= 4.29, p=0.003), with those with mild (95%CI 1.31 to 3.47), moderate (95%CI 0.308 to 2.12), and severe (95%CI 1.07 to 3.71) depression improving the most.
Conclusion: In this mHealth ED-based intervention, overall patients had mean improvements in sBP; patients with depression showed HbA1C reductions. ED-based mHealth chronic disease interventions may be particularly effective for depressed patients.

Waiting Room to Doctor's Office: Ensuring Competent Care for Transgender and Gender Non-Conforming Patients

Bhavana Vadrevu, Hudson Tibbetts, Carlee Street-Carranza, Rebecca Trotzky-Sirr

Background: In seeking gender affirming care as well as other medical care, transgender and gender non-conforming (TGNC) patients should be affirmed and supported in their identities during their entire interaction with the medical system. This is crucial as TGNC patients experience baseline anxiety interacting with the medical system to get affirming and competent care. Guidelines have been made for providers and healthcare settings including the use of preferred pronouns and names, have a baseline understanding of options available to gender affirming care, and to be able to provide necessary screenings and medical treatments. There are varying levels of comfort with these recommendations on the part of practitioners and ancillary staff and competency must be built in order for TGNC patients to feel safe and interact with medical care that they may need.
Methods: 4 ancillary staff and providers will be interviewed from the primary care and emergency medicine departments. 30 minute interviews will begin by providing the interviewee with copies of SOGI (sexual orientation and gender identity) chart field screenshots and scripting. Interviews will assess attitudes and beliefs with eight survey questions. Interviews will be recorded, transcribed, and analyzed for themes around willingness, exposure, perceived barriers, and comfort.

Results: Predicted results include willingness to affirm gender identity but discomfort due to lack of exposure, inability to code accurate names and pronouns into the electronic medical record, and increased difficulty with these practices for non-provider professionals due to less one-on-one time. Additionally, expected differences between primary care and emergency room settings due to number of exposures to patients and time available in various care settings.
Conclusions: Expected that despite willingness to affirm patient identities and trainings increasing, implementation of gender affirming care requires infrastructural changes and increased understanding of perceived barriers and increased interprofessional communication.

Emergency Department Management of Patients Suspected of Ingesting Illicit Drugs (Body Stuffers)

Marissa Valenzuela, Dr. Fiona Garlich, Dept. of Emergency Medicine, KSOM

Goal: Body stuffers - patients who hastily ingest loosely packaged illegal drugs in order to hide evidence of drug possession - commonly present to the ED in law enforcement custody. While many patients suspected of body stuffing remain asymptomatic, packet rupture within the GI tract can lead to significant drug toxicity and death. Wide variation exists in the diagnostic and management strategies of suspected body stuffers, including X-rays and CT scans. The utility of abdominal imaging in managing body stuffer patients has not been previously studied The goal of this study is to determine whether imaging studies such as abdominal x-ray and CT are useful in the management of patients suspected of ingesting drug packets.
Methods: This study is a retrospective chart review of patients suspected body stuffing. Patients will be identified by searching the Toxicology patient log for body stuffers, searching the electronic medical record for diagnosis codes, and searching patient records for all jail patients who obtained CT Abd or abdominal x-ray. Identify occurrence of primary and secondary outcome measures. Compare outcomes in patients who got imaging vs no imaging.
Results: Primary outcome measures: length of stay, specialty consultation, and intervention such as endoscopy, surgery, whole bowel irrigation.
Secondary outcome measures: administration of activated charcoal, antidote administration (benzodiazepines or naloxone), sustained tachycardia (>120 x 2hrs), composite endpoint of severe toxicity: intubation, seizure, ventricular dysrhythmia, death.
Conclusions: We hypothesize that patients who are symptomatic on presentation are more likely to have abdominal imaging, and those patients are more likely to have increased length of stay and an intervention. Asymptomatic patients who undergo abdominal imaging are likely to have increased length of stay and increased consultation, but no change in secondary outcome measures.

What is the Optimal Probe Position to Identify the Gallbladder on Point-of-Care Ultrasound?

Matt Woodle, BA, Caroline Brandon, MD, Tom Mailhot, MD

Background: Point-of-care ultrasound of the gallbladder to evaluate for suspected cholecystitis is a core application of emergency ultrasound training. The gallbladder may be visualized by placing the probe in a variety of positions using different windows, however, no research has been done to establish which probe position is most likely to result in successful visualization of the gallbladder. Knowing the probe starting position with the highest likelihood of success can be helpful when instructing learners in order to maximize success, as well as to reduce the time required to diagnose biliary pathology.

Methods: Expert ultrasonographers will attempt to obtain optimal imaging of the gallbladder from a variety of probe positioning. Time to obtain imaging as well as if manipulation/movement is required will be recorded. Best possible image from each original probe position will then be scored by a blinded observer using ACEP image quality guidelines.
Results: It is expected based on expert ultrasonographer experience that an intercostal probe position, despite being less frequently utilized, at the midclavicular line is more likely to result in successful immediate visualization of the gallbladder than alternate probe locations (Subcostal, Morison's).
Discussion: Study remains in its infancy, but we hope that this study will be one of the first of its kind by examining the optimization of US probe placement. This data can be used to inform US education and improve POCUS efficacy/techniques.

Sedation and Hyperoxia: Associations in the Emergency Department

Zachary Gandee; Sonia Joshi; **Frank Y Wu**; Jasmine Gale; Lauren Noel Precopio; Arman David Israelyan; Sarah Elizabeth Pajka; Jennifer Liu; Rebecca Marlene Baron, MD; Raghu R Seethala, MD; Peter C Hou, MD

Background: Numerous studies have shown an association between hyperoxia as well as heavy sedation in ICU patients with adverse outcomes, including increased mortality. The effects of hyperoxygenation and deep sedation on emergency department patients, however, has been less thoroughly examined. This study aims to assess whether early exposure to hyperoxygenation and/or deep sedation in the emergency department is associated with increased in-hospital mortality of critically ill patients.
Methods: This is a retrospective cohort study of 330 adult patients presenting to the Brigham and Women's Emergency Department between 1/1/2016 to 12/31/2017 who required intubation and mechanical ventilation. In-hospital mortality was the primary outcome. Hyperoxia was determined by evaluating the highest PaO2 or SpO2 equivalent levels in the Emergency Department within the first 24 hours of admission. Sedation depth was assessed using the Richmond Agitation and Sedation Scale (RASS) during the first 24 hours, as well as with a sedation intensity score, defined as the sum of negative RASS scale measurements divided by the total number of assessments.
Results: Data collection is currently ongoing, and results and analyses are pending. We speculate that patients receiving higher levels of oxygenation and/or deeper sedation in the emergency department will have a higher rate of in-hospital mortality than those who were normoxic and lightly sedated.
Conclusion: The results from this study will add to the understanding of the effect of early exposure to hyperoxia and/or deep sedation in the emergency department on the mortality of critically ill patients.

FAMILY MEDICINE

The Effect of Strength and Exercise Based Education on Medical Student Attitudes towards Patient Exercise Counseling

Ronald Castillo, Victoria Dunn, MD

Background: Research has shown the benefits of regular exercise in the context of chronic disease management. However, there is a lack of undergraduate medical education focused on teaching future doctors how to discuss exercise and physical activity with their patients. There is currently a gap of knowledge regarding the impact of structured physical activity specific education in undergraduate medical education. A specific area of interest is the impact of strength and exercise-based education on medical students' confidence to discuss physical activity during patient encounters. The Keck School of Medicine, Primary Care Program provides a didactic lecture to a cohort of 24 medical students on the topic of "Recommending Exercise to Improve Our Patients' health and Wellbeing." The purpose of this study is to evaluate the effect this training lectures has on the students' perceived confidence regarding patient physical activity and exercise counseling.

Methods: This retrospective cohort study was conducted using post-survey data collected by the Keck School of Medicine of USC, Primary Care Program. The survey data consists of first year medical students who attended the didactic lecture titled "Recommending Exercise to Improve Our Patients' health and Wellbeing" and first and second year medical students who had not received the exercise counseling training.

Results: Data analysis is still ongoing. However, preliminary findings suggest that the didactic lecture on exercise counseling increased student's self-reported knowledge and confidence on patient exercise counseling.

Conclusion: If we want future physicians to be equipped to counsel patient about physical activity, then we must provide the proper education and opportunities that allow them to practice this skill. Preliminary findings indicate that the Primary Care Program physical activity lecture and Core Strength Exercise are designed to meet this need.

A Multidisciplinary Community-Based Participatory Research Approach to the Development of a Protocol for Incorporating HIV-Positive Patients' Life Narratives into the Electronic Health Record

Brandon Chau, Jonathan Chou, Pamela Schaff, Department of Medical Education, KSOM

Goal: The electronic health record (EHR) provides a unique opportunity to integrate narrative medicine-based interventions into clinical settings, which can aid interdisciplinary healthcare teams in fostering open dialogue with and about patients living with HIV. This study examines the feasibility and sustainability of implementing HIV-positive patients' life narratives into team-based clinical practices through a multidisciplinary community based participatory research (CBPR) team.

Methods: 10 patients' life narratives were constructed through medical student-patient interviews and uploaded to their respective EHR at the Maternal Child and Adolescent Adult Center (MCA). Medical students' experience with completing the protocol and clinicians' experiences of patients' life narratives will be evaluated using qualitative methods, including focus group interviews. Thematic analysis of the focus group interviews will be conducted in an iterative fashion and adhere to the constant comparative method, entailing increasingly focused phases of coding and continuous discussion of emergent categories and themes until a consensus is achieved. Data triangulation will be achieved through constant comparison across methods.

Results: Results are pending. We have established thematic categories for the qualitative analysis, such as affirmations of one's desire to become a physician and challenges to integrating the life narrative protocol into clinical practice.
Conclusion: A feasible and sustainable life narrative protocol can lead to its implementation in other health care settings, not only bolstering positive clinician-patient relationships, but also providing an increased sense of social support amongst medical students and patients.

Assessing Efficacy of Laser Removal Treatment in Amateur vs. Professional Tattoos in a Predominantly Darker-Skinned Population

Miguel De La Torre, Laura Sprunt, Sneha Paranandi, Holly Gui, Philip Spektor, Jennifer Kim, Sarah Soliman, Michael Repajic, Jo Marie Reilly MD.

Background: The Ya' Stuvo Program at Homeboy Industries has become one of the highest volume tattoo removal centers in the world; treating over 3,000 tattoos every single month for over 950 community clients at no charge. While Homeboy not only strives to serve as many clients as possible, they also have a mission of leaving no trace behind. Signs of ineffective tattoo removal can put an individual and their family in danger as they try and move away from prior gang involvement. Given the enormous volume of patients that Homeboy Industries sees every day, it is imperative that these treatments are administered in the most effective way that will yield the best results while providing patients with the comfort that once that they have finished their treatments, there will be no sign that they ever had a tattoo. A common scenario of the clients at Homeboy Industries is getting amateur tattoos while in prison or from peers with very rudimentary equipment. Given the obvious variability in terms of the type and quality of ink, depth of the tattoo, and layers of ink injected, we wanted to determine the variability, if any, between these tattoos and those done in a professional setting.
Methods: From an initial subset of 800 patients who were deemed eligible candidates, an electronic database was constructed from paper charts which included demographic information, tattoo history, composition, laser treatment settings, and complications from prior treatments. Tattoo history and treatment variables will be compared with tattoo removal outcomes using a two-tailed two-sample unequal variances t-test.
Results: Of the original 800 patients, data from 555 of these patients will be included in the final analysis. It was decided to exclude data from tattoos with less than 3 treatments, those with 50% or more treatments missing, and those with missing data. Overall, the total number of individual tattoos in the final dataset totaled 2,161.
Summary: Data analysis has yet to be completed.

Laser Tattoo Removal Outcomes in Patients of Color

Holly Gui, Laura Sprunt, Miguel De La Torre, Philip Spektor, Michael Repajic, Sneha Paranandi, Jennifer Kim, Sarah Zhou, Jessica Bogner and Jo Marie Reilly, MD

Background: In addition to cosmetic benefits, laser tattoo removal can offer immense psychosocial benefits to those with visible tattoos. Ineffective treatment and adverse reactions to tattoo removal can pose a threat to former gang members and inmates in particular as they seek employment and work to re-integrate into society. This study aims to better understand differences in laser tattoo removal outcomes in patients of color to better inform tattoo removal guidelines.
Methods: This retrospective study was conducted at Homeboy Industries. We reviewed over 1400 charts from Homeboy's tattoo removal patients who received treatments between Jan 2016 and Dec 2018. Data on patient demographics, Fitzpatrick skin type, tattoo history,

treatment settings and treatment complications were collected. Tattoo history and treatment variables will be compared.
Results: Our final sample included 555 patients and 2161 tattoos with >3 treatments. A total of 230 tattoos resulted in adverse effects, including 127 tattoos with hyperpigmentation, 72 with hypopigmentation, 19 with keloids and 12 with scarring. Our patient demographics are as follows: 77% Latino, 9% Black, 7% White, 3% Multiracial and ≤2% each of Asian, American Indian/Alaskan Native, Native Hawaiian/Other Pacific Islander, and Other Race. We expect that there may be some correlation between darker Fitzpatrick skin type and increased frequency of adverse effects following laser tattoo removal as well as more treatments per tattoo.
Conclusion: Little research has been published on how to improve the safety and success rates of laser tattoo removal in people of color, particularly patients with skin colors of 4-6 on the Fitzpatrick scale. We hope that this data will help providers better understand how to appropriately and effectively treat this vulnerable population.

Implementation of Psychiatric Collaborative Care in an Internal Medicine Primary Care Clinic to Improve Depression Outcomes

Nicole Guillery, Dr. Joanne Suh, LAC+USC Primary Care Adult East Clinic

Introduction: Behavioral and psychosocial concerns are intimately tied to the experience and management of chronic disease and health, and primary care is uniquely positioned to use an integrated team-based model to address these needs. In 2016, the LAC+USC Primary Care Adult East Clinic (a residency-based primary care safety net clinic in Los Angeles County Department of Health Services) introduced a behavioral health integration (BHI) model to address the social and behavioral health needs of its approximately 19,000 empaneled patients by implementing universal screening for depression and social needs (transportation, housing insecurity, food insecurity), and increasing access to on-site psychiatrists, clinical social workers, substance use counselors, and medical case workers. While this model has increased important screening and referrals, its reactive nature comes with the risk of patients with depression falling through the cracks and not receiving the continuity of care that is necessary. Of ~ 9000 active primary care patients (of the ~19,000 empaneled patients), nearly 900 patients (~10%) met criteria for moderate to severe depression via the Patient Health Questionnaire-9 (PHQ-9).
Methods: In order to shift towards a proactive population health management model of BHI for the treatment of adult patients suffering from depression, the clinic implemented weekly psychiatry collaborative care (PCC) case conferencing in August 2019. In these conferences, patients with a PHQ-9 score of greater than 15 measured in the last 12 months were discussed individually by BHI staff (Clinical Social Worker and Medical Case Worker) and a consulting psychiatry PGY-5 fellow to determine next steps for their treatment.
Results: Of the ~900 patients with an elevated PHQ-9 score in the last 12 months, 216 met inclusion criteria to be discussed in weekly case conferences between August and December 2019. Of these 216 patients, 42 (19%) had follow-up PHQ-9 scores measured after the date they were discussed in a PCC case conference. An initial look at these 42 patients shows a decrease by 5.67 in PHQ-9 score. The most common recommendations made among these 42 patients were obtaining a new PHQ-9 score (93%), a medication recommendation (52%), or a referral to the integrated psychiatry team (21%), with varying success in carrying these actions out (100% , 27%, and 56% respectively).
Conclusions: From these initial results it can be concluded that there is a large discrepancy in the number of patients discussed in PCC case conferences and patient follow-ups. This is evidenced by the 42 patients out of 216 discussed (19%) who have follow-up PHQ-9 scores after their PCC case conference discussion. The biggest challenges identified were effective

methods of obtaining an updated PHQ-9 and communication of PCC recommendations with the rest of the care team. While the intervention is still in its infancy, the decrease in PHQ-9 scores for the patients who had robust follow-up is promising. The large number of patients discussed also reflects the increased capacity and engagement of social work and consulting psychiatric staff, highlighting the importance of team-based integrated care.

Comparison of Laser Tattoo Removal Settings and Treatment Outcomes between Higher and Lower Fitzpatrick Skin Types

Jennifer Kim, Jo Marie Reilly, MD MPH, Dept. of Family Medicine, KSOM

Goal: There is a scarcity in the literature describing the effectiveness of laser tattoo removal in patients with darker skin tones. Laser tattoo removal is often the first step for former inmates and gang members to reintegrate into society; visible traces of ineffective tattoo removal may be a threat to their safety and employment opportunities, impacting the psychosocial wellbeing of this uniquely vulnerable population. The majority of this population identify as Latino, Chicano or Hispanic both racially and ethnically (81% and 80% respectively). Ethnicity and race were essential to the study as a factor of skin color. Darker skin tones have a higher inherent risk of undesirable side effects such as scarring, hyper or hypopigmentation, and keloid formation with laser therapy. Therefore, clinicians must take extra precaution when determining laser settings for patients with darker skin tones. We investigated differences in laser settings and whether people with Fitzpatrick Skin Types III – VI (darker skin tone) have to receive more treatments in order to achieve the same level of results as those with lighter skin (Fitzpatrick Skin Types I & II).
Methods: A retrospective study was conducted at Homeboy Industries by analyzing data from over 800 paper charts that were manually converted into electronic records.
Results: We expect to detect some pattern in laser settings that is optimal for Fitzpatrick skin types III-VI versus types I-II and anticipate that lighter skin tones require fewer treatments than darker skin tones to achieve the similar results.
Conclusions: Since laser therapy affects skin with darker pigments differently and there is limited research on this subject, this research has meaningful implications for the Homeboy Industry clients by helping discover which laser settings will be the most effective at removing tattoos while preserving the integrity of patients' natural skin color and contributing to the body of knowledge of tattoo removal on patients with darker skin and other people of color for the larger community. It may have further implications for laser settings and laser therapy removal in other populations with darker skin tones.

Results of a Family Medicine Practice Redesign to Enhance Team-Based Care

Dr. Katherine Gibson, **Sophie Mahaney**

Goal A family medicine practice underwent a novel practice re-design in late 2018. The practice redesign involved the creation of three practice teams, each composed of two physicians, two medical assistants and a care coordinator (with one team also including a physician assistant). The teams were newly co-located in a shared physical space. The hypothesis for this study was that the redesign of the clinic would improve communication, coordination and efficiency within the team compared to the current office design. The goal of the study was to analyze the team members' response to the redesign both quantitatively and qualitatively.
Methods Anonymous surveys were created and distributed to all team members, results were analyzed with Qualtrics. Each individual was prompted to indicate their job title and perceived changes on the above categories (communication, coordination and efficiency). Additionally,

individual in-person interviews were conducted with 10 team members (3 MAs, 3 care coordinators and 4 providers). During these interviews employees were asked open-ended questions and were able to express their opinion on the office redesign. These results were also recorded anonymously.
Results Overall several trends were seen, both positive and negative. Positive responses included: the ability to communicate with team members quickly and informally, improved capability to find team members in order to discuss patient care and an overall better workflow. Negative results expressed by team members included: lack of physical space and overcrowding when extra personnel are in the clinic as well as a lack of privacy. Finally, some team members reported increased distractions due to a larger number of people located in the same area.
Conclusion The overall findings of the study were that all of the examined qualities were improved and team members were happy with the redesign. These findings support the original hypothesis and could offer a solution for better communication within team-based care clinics.

The role of religiosity and spirituality in advance care planning for older adults with HIV.
Lydia Nelson, Medical Student; Annie Nguyen, PhD, Assistant Professor; Dept. Family Medicine

Background: The aging population of people living with HIV (PLWH) has unique medical and social needs, yet evidence shows they are less likely than their HIV- counterparts to complete advanced care planning (ACP). We conducted cross-sectional surveys to examine factors associated with ACP in older PLWH. Specifically, we examined religiosity/spirituality as a factor, which we hypothesized would be associated with less complete ACP.
Methods: 80 older PLWH (ages 50+) were recruited from food banks at an AIDS Service Organization in Los Angeles, CA. Data analyses were performed using descriptive statistics and bivariate analyses to assess the relationship between ACP and demographic variables, measures of religiosity/spirituality, and physical health. ACP outcomes were measured using the Advance Care Planning Engagement Survey, which yields three composites (readiness, self-efficacy, process) where greater mean scores indicate higher levels of engagement.
Results: Participants' mean age was 59.4 (SD 7.05). 76% were male sex, 9% female. 72% identified as men, 9% women, 4% transgender women. The cohort was 33% latinx, 26% black, 11% NH white, 9% multi-race, 5% other. ACP engagement was not significantly associated with levels of religiosity or spirituality. There were no significant differences in mean ACP scores by relationship status, sex at birth, race/ethnicity, or self-reported health status. Adults with an AIDS diagnosis had higher means scores on ACP processes (p=.013), self-efficacy (p=.023), and readiness (p=.032). Those with currently undetectable viral loads had greater mean scores on ACP process (p=0.038) and readiness (0.041). Transgender women had lower ACP self-efficacy scores compared to cisgender males and females (p=0.041).
Conclusion: These findings suggest HIV specific clinical factors influence this population's mindsets and actions around ACP, perhaps due to education in clinical settings. It also supports the need for efforts to engage HIV+ trans women in ACP.

Impact of Age on Efficacy and Number of Laser Tattoo Removal Treatments: A Retrospective Study

Sneha Paranandi, Jo Marie Reilly, MD, Jessica Bogner
Keck School of Medicine, Homeboy Industries

Goal: Laser tattoo removal is a relatively common procedure – approximately 53,000 laser tattoo removals were performed in the U.S. in 2016. However, numerous barriers to access exist; complete removal requires multiple treatments over time. Removal can be painful and may cause complications in patients of color, presenting another barrier limiting how many treatments patients are willing to undergo. Such barriers may explain why current surveys of tattoo removal patients tend to skew toward young, non-Hispanic white, college-educated females.
The Ya'Stuvo clinic at Homeboy Industries in downtown Los Angeles offers tattoo removal services free of charge, increasing accessibility to patients in need. Many participants in this program are members of minority groups. Understanding what motivates patients to seek tattoo removal, the average number of treatments, and whether success is related to age at the time of the first visit is key to improving care and increasing efficacy of laser tattoo removal in this population.
This study aims to determine whether age at the time of tattoo removal is correlated with the total number of treatments received at the clinic. Older patients seeking to remove tattoos on the upper extremities may have required fewer sessions.
Methods: Tattoo, demographic, and medical data from a sample of 862 patients who received at least one laser tattoo removal treatment between 2016-2018 was transferred from paper files to an online database, organized by tattoo. After this round of data entry, records missing treatment dates or with fewer than 3 treatments were excluded from analysis. Data was analyzed using Microsoft Excel.
Results: Approximately 93% of patients receiving treatment at the Ya'Stuvo clinic were non-white, with 81% identifying as Latino. The number of treatments per tattoo ranged from 3–62, with an average of 11. Further analysis to determine the relationship between age and number of treatments is still underway.
Conclusion: Pending results of further data analysis.

Analyzing the Effectiveness of the Hands for Health Indigenous Oral Health Project within the Ngäbe-Buglé Community

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Background: The Ngäbe-Buglé indigenous population in Costa Rica faces numerous challenges such as extreme poverty, high rates of teenage pregnancies, and poor oral health. Hands for Health, a local non-profit organization, created the Indigenous Oral Health Project to address and alleviate the high burden of oral disease through education. Education sessions take place in multiple sites within the indigenous territory throughout the year. It is imperative to evaluate the effectiveness of the education sessions. Understanding the successes and limitations of the program can lead to the development of a more robust system and foster healthier behaviors.

Methods: Eighty-three pre- and post- tests have been administered in 2018 with the educational program to assess knowledge acquirement. We performed a retrospective study by systematizing and analyzing these tests using R to assess change in knowledge. The pre- and post-test scores were analyzed and compared between sex and age to delineate factors that influence effectiveness.
Results: The average score of pre-tests was 6.15 and post-tests was 7.69. The average pre- and post-test score for men was 6.19 and 7.59. The average pre- and post-test score for women was 6.13 and 7.73. The differences in total average pre- and post- scores($9.4x10^{-10}$) and by sex (0.003 in men and $1.16x10^{-7}$ in women) are significant. On average, older groups displayed the largest increase in knowledge acquirement. The total average rate of change between the pre-score and post-score was 35%.
Conclusion: The strong p-value illustrates the significant increase in knowledge due to the education session amongst participants. Therefore, the education sessions were effective in their goal to educate the Ngäbe-Bugle community. It will be interesting to assess knowledge retention and behavior change amongst attendees. Further work can be taken to standardize the project, expand resources offered, and improve data reporting to create a more efficient program.

Understanding Patient Perceptions of TeleCARE Video Visits in a Fee for Service Model: a Qualitative Study in an Academic Primary Care Setting

Sirisha Mohan MD, Wilson Lin PhD, **Francis Reyes Orozco BA**

Background: Previous research reveals that video visits have garnered a positive impression from patient and providers in a wide variety of specialties. Most of these studies (in specialties and primary care) have been conducted under settings where the video visit modality has been provided free of charge to the patient. The results of such studies might not be generalizable to a fee-for-service setting, where patients may need to pay a co-pay or out-of-pocket for their visits. Our study, center in a fee-for-service setting, helps bridge the gap on understanding patient perception of video visits in the context of the traditional fee-for-service model. We provide an appropriate framing for patients to evaluate their beliefs on video visits and can demonstrate whether the support being demonstrated in the literature will continue to hold in our setting.
Methods: Eligible individuals will be recruited and enrolled on a rolling basis over a 12 month period. Once participants provide informed consent, they will be scheduled for a TeleCARE follow up visit. Following the patient's TeleCARE visit, they will be immediately prompted to fill out a survey on their personal device. Follow-up will be conducted only when patients express an interest in being interviewed by USC Family Medicine research staff to discuss their experience more in-depth in a face-to-face setting.
Results: We do not have a complete data set yet, but the data we have collected thus far indicates a favorable and positive response to TeleCare services both in the quality of the service and the willingness to pay for the service.
Conclusions: Patients who view TeleCare services as equal to in person services are more likely to have a positive experience after the visit and more likely to be willing to pay for the service. In the future, TeleCare services may replace in person visits for a select population.

Evaluating the waiting room experience and needs of patients in a primary care adult clinic: a survey.

Wendy Silva, Medical Student; Joanne Suh, Clinic Medical Director

PURPOSE: In this study, we aim to evaluate the attitude of patients towards their waiting room experience and related health educational needs at the LAC+USC Outpatient Primary Care Adult East Clinic 4th Floor with basic descriptive statistics. We aim to use the results as a basis to create changes to the waiting room based on the needs of the patients.
METHODS: In order to conduct this evaluation, an anonymous survey will be given to approximately 100 patients or accompanying visitors of the LAC+USC Primary Care Adult East Clinic 4th floor while in the waiting room. The survey consists of 30 questions which the patient should be able to fill out within 10 minutes.
RESULTS: Data will be collected anonymously. General descriptive statistics will be used to create a baseline demographic of patients in the waiting room and their waiting room experience and needs.
SUMMARY: The waiting room plays a significant role in the patient's visit. Patients many times spend more time in the waiting room rather than in their doctor's office, especially in a primary care setting. Countless studies have shown that a patient's experience in the waiting room can significantly alter their satisfaction with their providers and their overall health care. However, these studies are primarily conducted in a hospital or emergency settings. Even with this information, the waiting room is often neglected. In our study, we hope to discover the patient's preferred method and preferred topics to receive health education material while in the waiting room. After conducting a basic descriptive statistical analysis on the patient's experiences and preferences we hope to enact changes to improve the waiting room experience at the LAC+USC Outpatient Primary Care Adult East Clinic--4th Floor.

Laser tattoo removal optimization: hypopigmentation in Fitzpatrick skin types III-IV

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Background: Research regarding laser tattoo removal has historically focused on Caucasian populations. As one of the largest tattoo removal clinics in the world, and with 91% of its patients identifying as persons of color, the Ya'Stuvo Clinic at Homeboy Industries presents a unique opportunity to investigate the dermatologic complications associated with tattoo removal in patients with higher Fitzpatrick skin types. The goal of this study was to characterize what factors contribute to the appearance of hypopigmentation post laser removal therapy in patients with Fitzpatrick skin types III-IV.
Methods: A sample of 452 patients with 2,216 discrete tattoos was selected based on the following criteria: patients were a) treated at Ya'Stuvo Clinic between 2016-2018 and b) received at least three laser treatments. Information from paper patient charts was input into Excel and merged with data from FileMakerPro (Homeboy Industries patient database). Data collected fell within two categories: patient demographics and tattoo-specific information (including tattoo characteristics, laser settings for each treatment, and appearance of any dermatologic complication).
Results: Data analysis ongoing.
Conclusion: Among Ya' Stuvo's patients, 46% reported that their main reason for getting a tattoo was gang-related. With the potential danger associated with disaffiliation from a gang, it becomes even more imperative for these tattoos to be removed without complication.

Understanding in what circumstances post laser therapy hypopigmentation occurs is vital to ensuring positive tattoo removal outcomes for patients of color.

Retrospective Chart Review of LTBI Positive Treatment Rates Among International Students at USC

Eduardo Torres, Kimberly Tilley, MD, Lindsey Victoria Dunn, MBBS, MRCGP, DRCOG, USC Student Health, Department of Family Medicine

Background: USC requires all incoming international students to be screened for active or latent tuberculosis infection (LTBI) at enrollment. Only a minority of students diagnosed with LTBI at USC Student Health initiate treatment. Due to this, new practices are being introduced in the 2019-20 academic year (consistent follow-up by training one physician assistant to see students with LTBI, 12 DOT option for treatment, and education from CDPH) in an attempt to increase LTBI positive follow-up and treatment initiation rates in this population. This study will evaluate whether these changes are effective at increasing LTBI treatment rates among international students.
Methods: A retrospective chart review of international students at USC who were tested for tuberculosis (TB) infection USC during the 2018-19 and 2019-20 academic years was completed. This study reviewed the charts of students who tested positive for LTBI for both these academic years to ascertain if the new standard of care caused an increase in the initiation of LTBI positive follow-up and treatments among the international student population.
Results: In the 2018-19 academic year, 3853 students were tested for TB from August-December 2018. Of the 126 who tested positive or borderline, 87.3% (n=110) received follow-up and 11.9% (n=15) received treatment. In the 2019-2020 academic year, 4427 students were tested from July-November 2019. Of the 137 who tested positive or borderline for LTBI, 87.6% (n=120) received follow-up and 8.0% (n=11) received treatment.
Conclusion: The data shows that the follow-up rate remains about the same despite the change in practices, and there was still a low rate and slight decrease of treatment initiation. This indicates that the policy changes made were not effective in encouraging students to initiate treatment. Other policy changes such as encouraging students to initiate treatment annually or increasing education about the importance of treating LTBI among students may be productive options to explore.

Efficacy of non-colored tattoo removal of amateur tattoos as compared to professional tattoos in patients with Fitzpatrick Type III+

Sarah Zhou, Jessica Bogner, and Jo Marie Reilly MD, Department of Family Medicine, KSOM

Background: To date, research on tattoo removal has been on professional tattoos on patients with lighter skin, leaving much unknown about tattoo removal in darker skinned patients with amateur tattoos. From 2016-2018, over 1,400 individuals visited Homeboys Ya'Stuvo Tattoo Removal and had medical histories recorded yielding a large volume of tattoo removal data with a high proportion of amateur tattoos in predominantly Fitzpatrick scale III+ patients, indicating a need for investigation into the efficacy of treatment for this patient demographic in order to guide future treatment methods. We aim to determine whether there are fewer numbers of treatments until a tattoo first starts fading and greater number of adverse reactions in removal of amateur tattoos in this population.
Methods: Of the 1,400 records, 452 patients representing 2403 tattoos were selected for analysis based on tattoos having 3 or more treatments and no missing treatment records.

Preliminary analysis was performed on a subset of currently available and processed data for non-colored professional and amateur tattoos.

Summary: Professional tattoos received significantly fewer treatments across the three-year treatment timeframe ($p=0.0065$). However, the number of treatments needed before a tattoo was designated “faded” was not significantly different ($p=0.99$). Within the sample, no professional tattoos had adverse reactions and 3 amateur tattoos had adverse reactions.

Conclusion: While preliminary data shows no difference in number of treatments needed to make a professional tattoo fade as compared to treatments needed for an amateur tattoo, the sample available currently must be expanded for further analysis and confirmation of preliminary analysis.

GERONTOLOGY

Prenatal air pollution exposure changes gene expression in the lungs of adult mice

Jenay Yuen, Todd Morgan, Caleb E. Finch, Henry Jay Forman, Changgong Li, Hongqiao Zhang

Background: Nearly half of pregnant mothers in USA and 85% in the world live in areas where traffic-related ambient particles (TRAP) level exceeding the safety limit. This is a concern, for epidemiological studies have demonstrated that prenatal exposure to TRAP increases the risk of pulmonary diseases including infections, asthma, and lung cancers in later life. Since the mechanism remains poorly understood, we aim to determine the global gene expression change in the lungs of mice caused by prenatal exposure to air pollution.

Methods: A total of 24 C57BL/6J female mice were mated and pregnancy confirmed. The pregnant mice were divided into control and nPM groups, 12 mice per group. The control group was exposed to filtered air, and nPM group was exposed to ambient nanoparticles (nPM <0.2 nm in diameter), 5 hrs/day, from day 2 of gestation until the birth of pups. The offspring in each group were housed under normal conditions for 4 months and then euthanized for isolation of lungs. Lung RNA was extracted and RNAseq assay was performed. Partek Flow was used for differential analysis and Ingenuity Pathway Analysis for functional analysis of the RNAseq data.

Results: Prenatal nPM exposure caused notable change (>1.5 fold) in the mRNA level of 389 genes in the lungs of 4-month-old-mice (equal to 26 years in human). The top canonical pathways that were significantly influenced include NFAT in cardiac hypertrophy (p-value 7.26E-05), α-adrenergic signaling (p=7.27E-05), relaxin (p=3.34E-04), and IL-1 (p=3.60E-04). The gene expression changes were associated with diseases and disorders including innate inflammatory response (p=1.63E-02), cancers (p=2.88E-02), and organismal injury and abnormalities (p=2.88E-02).

Conclusion: Prenatal exposure to air pollution changes gene expression and alters signaling pathways that last to adult life, which could increase the risk of various pulmonary diseases including cancers, infection, and asthma.

INTERNAL MEDICINE

Implementation and Evaluation of the Checkup Checklist App: Engaging Patients in Preventive Care

Amedi, Alind; Sinha, Kairav; Hendel, Chris; Hochman, Michael (all affiliated with Keck School of Medicine of USC)

Idea: We are developing a mobile and web application to promote patient engagement and increase utilization for preventive medical services.

Need/Rationale: 21.7 hours. That is the time that, by one estimate, primary care physicians would need to dedicate every day of the year to their practice in order to ensure that their patients receive all recommended preventative services and disease management (1). It is no surprise then that screening rates for maladies such as cancer remain low relative to goals set by the Department of Health and Human Services (2). This unmet healthcare need presents a severe challenge to the nation's primary care providers and creative methods of addressing this gap in care must be sought. Fortunately, patient engagement has emerged in recent years as a potential route towards enhancing quality of care (3). With this in mind, we have developed a mobile application to help engage patients in their preventive medical care. Our initial prototype is intended for patients scheduled for an annual wellness visit with their primary care physician. Users will enter key demographic and health information (e.g., age, gender, tobacco use). Based on user responses, the application will provide a summary list of recommended screening tests and services (e.g., vaccines, cancer screening, cholesterol testing). The patient will then be prepared to engage meaningfully in discussions about these services at their next medical visit. In total, the application is intended to take users no more than 15 minutes to complete and all recommendations are based on guidelines from the U.S. Preventive Services Task Force.

Methods: We have partnered with the USC Keck Health System in order to distribute our application to their patient base. The application will be advertised in primary care clinic waiting rooms and offices and will also be promoted through electronic communications between the health system and its patients via regular email and patient portal messages. After distribution, we will conduct research to 1) assess qualitative data to further refine our application prototype 2) analyze quantitative data regarding usage statistics within the application itself 3) monitor the effect of the application on cancer screening rates in the USC Keck Health System. To address the first aim, we will be conducting focus groups and interviews with around 250 volunteer participants, who will be offered gift cards and lunch in appreciation of their participation. To address the second aim, we will simply analyze data that is automatically collected within our own application. Lastly, in partnership with the USC Keck Health System we will monitor cancer screening rates amongst their patient base at different time points both pre- and post-application distribution.

Evaluation Plan: After focus group testing and patient interviews, we will better understand which aspects of the application patients found easy or difficult to use, as well which aspects that they found confusing and still others that they found helpful. We will incorporate this qualitative data to drive further refinement of the application. Our application's own internal data will allow us to analyze important items such as the average time spent within the application, percentage of users completing the entire preventive care module, percentage of users following-up for screening tests, and rates of discontinuation for the application as a whole. Finally, we will be able to correlate the timing of distribution of the application with any increases or decreases in cancer screening rates within the USC Keck Health System.

Potential Impact: The U.S. healthcare system faces critical challenges in primary care in the coming years. Our application may represent a useful and cost-effective tool in addressing this crisis by increasing patient engagement in their own preventive care.

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Radiologic Expression of PDL1 in Metastatic Melanoma

Karam Ashouri B.S., Gino In M.D., Kevin King M.D., Bino Varghese PhD

Background

Programmed cell death 1 (PD-1) is a transmembrane protein receptor expressed on lymphocytes that binds PD-L1, expressed on the surface of many tumor cells, leading to tumor cell survival and the inhibition of effector T-cells. While the clinical utility of PDL1 expression has been shown to be limited, it can provide some guidance when selecting immunotherapy for metastatic melanoma. Patients with tumors expressing high levels of PD1/PDL1 (greater than 50%) have been shown to respond well enough to PD1/PDL1 inhibitors that CTLA inhibitors, can be avoided in these patients leading to fewer side effects. In this study, we aimed to identify characteristics unique to PDL1 positive tumors that can be used to develop non-invasive methods for PDL1 expression analysis.

Methods

We developed a retrospective database of metastatic melanoma patients treated at the Keck Hospital and the USC Norris Comprehensive Cancer Center. Each patient had a diagnosis of metastatic melanoma with CT imaging, pathology, and genetic testing of the metastatic site. We collected data from 14 patients. PDL1 expression was determined via immunohistochemistry. Patients with 0% PDL1 expression were considered PDL1 negative, and those with ≥1% PDL1 PDL1 expression were considered PDL1 positive. We compared tumor stage, size, subtype, site of metastasis, and response to treatment between PDL1 positive and negative patients. Average tumor size was taken from the largest metastatic tumor measurement on CT imaging while the number organs involved was determined from CT indicated metastasis. These measurements were averaged among patients. M staging was determined based on CT and biopsy at the time of melanoma diagnosis

Results

	PDL1 Expression = 0% (N=7)	PDL1 Expression ≥ 1% (N=7)
Mean age - year ± s.d.	68.0 ± 20.1	65.3 ± 14.4
Sex - no.(%)		
Male	71.4	85.7
Female	28.6	14.3
M stage - no.(%)		
M0	57.1	57.1
M1a	14.3	0
M1b	0	0

M1c	14.3	28.6
M1d	14.3	14.3
Metastatic site of biopsy/excision - no.(%)		
Brain	14.3	14.3
Gastrointestinal	14.3	0
Liver	14.3	57.1
Soft tissue	57.1	28.6

Our data indicates that PDL1 expressing tumors were nearly twice as large as PDL1 negative tumors (8.3 cm vs 4.4 cm, p=0.036). Average tumor size was taken from the largest metastatic tumor on CT imaging and averaged among patients in the group. However, the number of organs involved did not vary significantly between PDL1 positive and negative patients.

	PDL1 Expression = 0% (N=7)	PDL1 Expression ≥ 1% (N=7)
Largest Average Tumor Size	4.4 cm	8.3 cm
Average Number of Organs Involved	2.4	2.3

Our data confirms that PDL1 positive expression alone is not a good marker for response to treatment with PD1/PDL1 inhibitors (do i need a p value even if it is not significant). However, we expect that those with greater than 50% PDL1 expression will respond better to treatment. Response to treatment was defined as a reduction in tumor size with partial response indicating a >30% decrease, stable disease indicating <30% increase or <20% decrease, and progression of disease indicating >20% increase.

	PDL1 Expression = 0% (N=7)	PDL1 Expression ≥ 1% (N=7)
Systemic treatment - PD1/PDL1 inhibitor (%)	71.4	71.4
Response to treatmemt -.(%)		
Partial response (PR, decr >30%)	14.3	0
Stable disease (SD, decr <30% or incr <20%)	57.1	28.6
Progression of disease (PD, incr >20%)	0	42.9
Unknown	28.6	28.6

Conclusions

We determined that tumors with high PDL1 expression tend to be significantly larger than those that for not express PDL1. Which indicates that it may play a role in tumor growth, however since there was no significant difference in organs involved it may not play a role in tumor metastasis. While further analysis needs to be done to identify other markers for PDL1 expression or response to treatment with PDL1 inhibitors, we expect that it is possible to identify PDL1 positive or PDL1 inhibitor-responsive metastatic melanoma via radiologic studies.

LACTATED RINGER'S SOLUTION VERSUS NORMAL SALINE IN THE MANAGEMENT OF ACUTE PANCREATITIS

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Background: Aggressive hydration is used for acute pancreatitis treatment, but there is conflicting data on outcomes using Lactated Ringer's Solution (LR) versus Normal Saline (NS). This trial compared if LR versus NS reduces Systemic Inflammatory Response Syndrome (SIRS) and other pancreatitis outcomes.
Methods: ED patients (n = 119) were prospectively randomized (1:1) to LR versus NS treatment within 8 hours of acute pancreatitis diagnosis. Patients received an initial bolus of 10 mL/kg assigned fluid followed by a maintenance rate of 3 mL/kg/hr. After 12 hours, patients with no decrease in BUN or had SIRS received an additional 10 mL/kg bolus. Patients with severe pancreatitis (Revised Atlanta Classification) and volume overload risk (NYHA Class >II heart failure, chronic kidney disease, or cirrhosis) were excluded. Primary outcome was change in SIRS prevalence from randomization time to 24 hours afterward. SIRS was defined by presenting a minimum 2 of 4 criteria (HR >90, RR >20, temperature >38 C or <36 C, WBC >12 or <4). Secondary endpoints included change in SIRS prevalence at 48 and 72 hours and change in prevalence of moderately severe pancreatitis. Additionally, ICU admission, hospitalization length, and adverse events due to fluid administration were compared. The double blind was maintained by use of a study physician for enrollment/randomization and a separate physician, blinded to the fluid assignment, to follow up evaluations at 24, 48, and 72 hours.
Results: No significant differences seen in baseline characteristics of NS and LR groups or fluid volume administered. No difference seen in baseline SIRS prevalence or change in SIRS prevalence between LR and NS groups at 24, 48, or 72 hours. At baseline 29.5% of patients randomized to LR had SIRS compared to 36.1% at 24 hours, while 27.6% of patients randomized to NS had SIRS compared to 32.8% at 24 hours (OR 1.29 [95% CI 0.60-2.79]). Nevertheless, there was a trend towards less ICU admission in the first 72 hours for LR versus NS, and shorter median length of stay, 3.5 (2.9-8) versus 4.6 (2-5.9) days.
Conclusions: LR does not reduce SIRS prevalence relative to NS when equivalent volumes are used. Trends toward less ICU admission and shorter hospitalization for LR opposed to NS require further study.

Social Isolation and Loneliness in the Safety Net Population

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Background: Social isolation and loneliness are two social determinants of health that affect many individuals. They have been linked to various negative health outcomes including cardiovascular and mental health disease as well as higher healthcare costs. Safety net risk factors such as ethnic minority status, low economic status and low education have been found to increase the risk of social isolation and loneliness; however, most prevalence research has focused solely on the elderly and insured. The purpose of this research is to unveil the prevalence of social isolation and loneliness within the safety net health system.
Methods: In August 2019 and November 2019, we conducted a point prevalence study of social isolation and loneliness within the adult inpatient wards at LAC+USC Medical Center, a 600 bed Level 1 County Trauma Center. We screened for social isolation and loneliness using a

short two-question screen of all willing and able patients in the medical-surgical wards of LAC+USC.
Results: We screened a total of 149 patients in the medical-surgical wards of LAC+USC. Of those, 62 (41.5%) patients screened positive for social isolation, while 38 (25.4%) patients screened positive for loneliness. Additionally, 30 (20.13%) patients screened positive for both social isolation and loneliness.
Conclusion: These results reveal that social isolation and loneliness are prevalent within our safety net hospital system. Next steps include interviewing our patients, in depth, to obtain a more comprehensive understanding of the driving factors and barriers that perpetuate these social determinants of health.

Social Isolation and Loneliness in a Safety Net Health System - Barriers to Social Participation and Potential Interventions

Alexandria Cantarero, Agnes Premkumar, Kaitlin Vick, Hayley W. Sayrs, Janine Cadet, Kariamu Cross, Charles E. Coffey Jr., LAC + USC Medical Center

Background: Social Isolation (SI) has been linked to various negative health outcomes including increased risk of cardiovascular disease, increased hospital readmissions, and higher health care costs. Despite being quite common, little is known about SI among hospitalized patients in safety net settings. We aimed to understand the barriers that contribute to SI in order to incorporate unique interventions that address SI and meet the needs of a large urban safety net health system.
Methods: From June through November of 2019, we conducted a series of focused interviews on adult patients hospitalized in the inpatient wards at LAC+USC Medical center that were identified by hospital nursing staff as having one or more psychosocial risk factors for SI. These interviews included: 1) a 2-question screen for SI and loneliness 2) an extended screening instrument adapted from the Berkman-Syme Social Network Index (BSNI), and 3) a series of open-ended questions investigating barriers to social participation and potential interventions for solving SI in hospitalized patients.
Results: To date, we have completed 60 focused patient interviews using the BSNI. Of these 60 patients, 38 (64.4%) screened positive for SI and/or loneliness. From these focused interviews, we learned that barriers to social participation included health status, lack of housing, lack of transportation, and financial constraints. We also learned that patients would be interested in resources including fitness activities, transportation assistance, group therapy, employment programs, and volunteering.
Conclusions: These results highlight the need for an intervention that addresses SI. In the near future, we hope to work with patients and community-based programs to develop and implement an intervention that would link patients with SI to existing community-based resources to improve individual patient outcomes and address and end social isolation within our safety net health population.

Community-based Patient Navigation Services in Los Angeles County Reduce Barriers to Primary Care

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Background: Though primary care is critical to providing high quality healthcare, many safety net patients struggle to get primary care. The Children's Health Outreach Initiative (CHOI) is a group of patient navigation agencies in Los Angeles County (LAC) that help clients obtain insurance and utilize health services. In this study, we examine the impact of the CHOI program on barriers and access to primary care among LAC safety net residents.
Methods: From April to October 2019, we conducted cross-sectional surveys of 301 Spanish and English speaking non-elderly adults clients at nine community-based CHOI agencies. Agencies assessed for eligibility and collected demographic information. Bilingual research assistants then conducted telephone surveys of two groups of clients: the "baseline" group was surveyed after their initial encounter with CHOI and the "post-CHOI" group was surveyed after receiving services for at least eleven months. The survey instrument included questions about healthcare access, utilization, barriers, and experience with CHOI services.
Results: Baseline and post-CHOI participants had a similar mean age and the majority were female, Spanish-speaking, and Latinx. Participants in the post-CHOI group were more likely to have a primary care clinic and had less difficulty obtaining medical care when needed. Post-CHOI participants also experienced fewer systemic barriers to care and were less likely to delay or avoid care for the following reasons: they did not have insurance, their insurance did not pay for the visit, they did not have a usual place of care, they did not know how to get care, and they could not afford the visit.
Conclusion: CHOI services improve access to primary care and reduce system-based barriers to care among LAC safety net residents. Our results demonstrate the importance of policies that promote the longevity of comprehensive navigation programs and the crucial role navigators play in helping patients traverse the complex health system.

Immunotherapy Outcomes in Patients with Advanced Melanoma

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Background
Metastatic or unresectable melanoma outcomes are significantly improving due to recent advancements in immunotherapy. Checkpoint inhibitors pembrolizumab, nivolumab, and ipilimumab, enhance the immune response against melanoma tumors by targeting programmed cell death receptor 1 (PD-1) and cytotoxic T-immune-associated antigen (CTLA-4). As these therapies are relatively new, their efficacy based on individual patient factors, as well as in combination with other treatment modalities including radiation, is not well understood.
Methods
This retrospective chart review evaluated patients with advanced melanoma who were treated with pembrolizumab, nivolumab, or ipilimumab, at Keck Hospital between 2017 and 2019. Immune related response criteria was used to interpret the response to immunotherapy. A total of 22 patients were included in the study.

Results
The mean patient age was 62 years and the gender distribution was 18 males and 5 females. The survival data, as of 9/2019, is as follows: 11 patients (50%) were alive, 7 patients (32%) were deceased, and 5 patients (23%) were lost to follow up. Based on the immune related response criteria, 8 patients (36%) showed a complete response to immunotherapy, 8 patients (36%) maintained stable disease, and 6 patients (27%) had disease progression.
Conclusion
The data showed that the response for advanced melanoma is promising in many patients. However, a significant proportion of patients did not yield benefits from these therapies. Analysis of patient factors that may lead to suboptimal immune response and greater overall mortality is ongoing.

Identifying Barriers to Colorectal Cancer Screening Rates at Keck Hospital

Advaita Kanakamedala; Rushabh Modi, Faculty Mentor

Introduction: Colorectal cancer is the third leading cause of cancer deaths for men and women in the United States. Despite having cost effective screening methods that we know are safe and effective in detecting cancer, screening rates across the country are still low. At Keck Hospital, screening rates could be improved but there is still some uncertainty about the best way to improve them. The goals of this project are to determine the current workflows and barriers for colorectal cancer screening and use this information to develop potential interventions.
Methods: In order to determine this information, we administered a survey and conducted semi-structured interviews with the providers at the Family Medicine clinic in HCC2 of Keck Hospital. Topics covered in the survey and interviews included general beliefs about CRC screening, knowledge and comfort level with individual modalities (FIT/FOBT, colonoscopy, and Cologuard), practices and policies within the clinic, and perceived barriers and possible solutions.
Results and Discussion: Semi-structured interviews with three (3) MDs and one (1) RN have been conducted so far. Preliminary results from the interviews reveal that procedures for recommending CRC screening vary from physician to physician, and the barriers vary largely between the different modalities of screening. We received sixteen (16) responses on our survey from a variety of clinical staff, including doctors, medical assistants, nurses, physician's assistants, and office staff. Results from both the survey and the interviews indicated difficulty in scheduling colonoscopies as a significant barrier, a lack of comprehensive EMR support, and a need for more patient education on the different modalities of screening. Previous literature in this subject has shown the need for interventions to be multi-modal if they are to be effective, so potential future interventions at Keck could include making changes to improve scheduling and increase EMR support as well as provide more educational materials in the clinics. However, we are still continuing to collect data and conduct interviews to gain a full understanding of the scope of this problem.

Immunotherapy Treatment Outcomes of AYA Patients with Melanoma

Lucas A. Kaplan and Gino K. In, MD, MPH, Keck School of Medicine

Background: Programmed death -1 (PD-1) checkpoint inhibitors have become the standard of care for treating metastatic melanoma, but little is known about the long-term survival outcomes of patients receiving these treatments. This is especially true of the adolescent and young adult (AYA) melanoma population, defined here as 18-49 years old. To better understand this patient

population, we sought to determine survival outcomes of AYA patients compared to older population groups that are more commonly studied in published melanoma clinical trials.
Methods: This study retrospectively analyzed clinical data—including demographics, medical history, cancer course, and treatment regimens—from patient charts (n=87) at the Norris Comprehensive Cancer Center in Los Angeles, California. Kaplan-Meier curves were used to analyze survival outcomes for different age groups receiving PD-1 therapy for metastatic melanoma.
Results: Overall survival was 85% after 50 months since diagnosis in the AYA population and 60% in the >49 years-old population, but this result was not statistically significant (p=0.489). The >49 group was broken down into smaller age groupings, and the 50-64 year-old group and the >79 year-old group both had overall survival of 70% after 50 months, and this was not significant. Notably, the overall survival of the 65-79 year-old group was 40% after 50 months, showing more difference from the AYA group compared to the other groups, but this was not significant (p=0.197). Intriguingly, when analyzing cutaneous melanoma alone, there was noted to be improved survival for the non-AYA group, compared to AYA melanoma patients.
Conclusions: Our findings suggest that the AYA melanoma population treated with PD-1 therapy has better survival outcomes compared to older melanoma patients overall, but this trend is reversed when considering only cutaneous melanoma. As such a finding is clinically relevant, this should be studied further with an increased number of patients, as the study population was somewhat small.

CCR5 Δ32 mutation and gene expression to predict outcome in patients (pts) with metastatic colorectal cancer (mCRC): data from FIRE-3 and MAVERICC phase III trials

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Background: Germline polymorphisms in CCR5 have been associated with treatment outcome in pts with mCRC receiving regorafenib and cetuximab-based treatment. CCR5 **Δ**32, a loss of function deletion, plays a key role in infectious diseases but data in CRC are scarce. We tested whether CCR **Δ**32 and CCR5 gene expression may be associated with outcome in mCRC pts receiving first-line treatment.
Method: The impact of CCR5 **Δ**32 was evaluated in 614 pts enrolled in the randomized FIRE-3 trial (FOLFIRI/cetuximab, cet, n=313; FOLFIRI/bevacizumab, bev, n=301). Gene expression was evaluated in 102 pts in the FOLFIRI/cet arm from FIRE-3 and 155 pts treated in the MAVERICC trial (FOLFIRI/bev, n=76; FOLFOX6/bev, n=79) from tumor tissue samples by HTG EdgeSeq Oncology Biomarker Panel and 800 genes NanoString expression panel, respectively. The association between CCR5 **Δ**32 and clinical outcomes was evaluated using Cox regression and log-rank tests. Gene expression was dichotomized using an optimal cutoff and *P*-values computed using a permutation-based approach.

Results: In FIRE-3, CCR5 **Δ**32 was significantly associated with worse PFS in patients with right-sided tumors (RT) receiving FOLFIRI/cet (n=32; median PFS 3.41 vs 7.84 mo; HR 4.39, 95%CI 1.12-17.24; *P* = .022;). These associations were not observed in left-sided tumors or pts treated with bev. Consistently, lower levels of *CCR5* expression trended to be associated with shorter PFS and OS in the same subgroup of RT treated in the cet arm (*P* = .096 and *P* = .063 for PFS and OS, respectively). In contrast, lower *CCR5* expression was associated with longer PFS in pts treated with FOLFIRI/bev in the MAVERICC trial, regardless of tumor side (mPFS 17.91 vs 11.04 mo; *P* = .03). Of note, a significant interaction between the impact of *CCR5* expression levels on PFS and chemotherapy backbone was observed (*P* = .019). Low *CCR5* expression was associated with worse PFS in pts with RT treated with oxaliplatin (11.10 vs 13.80 mo; *P* = 0.023).
Conclusions: Our results provide the first evidence that CCR5 **Δ**32 and *CCR5* gene expression levels may predict outcomes in mCRC pts receiving first-line treatment with a differential effect depending on tumor location, biologic agent and chemotherapy backbone.

Mitigating Tolvaptan-Induced Hepatocyte Injury in Vitro with INT-747: An Analysis of Mitochondrial Morphology

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Background: Tolvaptan is the only FDA-approved drug indicated for treatment of autosomal dominant polycystic kidney disease (ADPKD). It was demonstrated to slow progression of cystic growth and decline of GFR but causes hepatotoxicity in a small subset of patients. There is no medical therapy to mitigate tolvaptan-induced liver injury, but recent investigation into the effects of obeticholic acid (INT-747) suggest its role in reducing hepatic inflammation and fibrosis. INT-747 has been shown to decrease markers of inflammation, fibrosis, and apoptosis in cirrhotic liver cells of rat models. We hypothesized that mitochondria in human hepatocyte (Huh7) cells treated with tolvaptan will fragment while INT-747 given in combination with tolvaptan will convert mitochondrial morphology back to a more elongated, less fragmented profile.
Methods: Huh7 cells were treated with Mitotracker green, MitoSox red, and Hoechst 33342 to stain for mitochondria, mitochondrial superoxide, and nuclei, respectively. Cells were exposed to 25 μM tolvaptan (24 h) ± 10 μM INT-747 (48 h) vs. DMSO (vehicle control) prior to fluorescence imaging. Live-cell images were obtained and uploaded into a custom-built pipeline on CellProfiler™, where mitochondrial phenotypes were sorted along a continuum ranging from 0 to 1, (0 = perfect circle/ fragmented phenotype; 1 = straight line/ elongated phenotype). Histograms for each group were compared for differences in their distributions using the Kolmogorov-Smirnov test with XLSTAT.
Results: Preliminary results demonstrated that cells treated with tolvaptan displayed greater fragmentation of mitochondria compared to controls. Cells treated with INT-747+ tolvaptan, display a more elongated mitochondrial phenotype compared to tolvaptan alone.
Conclusion: Our findings implicate INT-747 as a potentially promising new therapy to reduce hepatotoxicity in ADPKD patients being treated with tolvaptan.

Introducing a Multimodal Curriculum on Undocumented Immigrant Health to Medical Students

Sneha Panganamamula, Benjamin Corona, Joseph Yoo, Alejandro Vasquez, **Alexa Rodriguez** and Andrew Young, DO; Stephanie Zia, MD

Goal: Given the growing density of undocumented immigrants in Los Angeles, there is a need for culturally competent care. This study investigated how medical students' attitudes, interest, and awareness regarding undocumented immigrant health were affected after implementation

of an additional component to the First-Year Professionalism and the Practice of Medicine curriculum.
Methods: A two-hour session addressing undocumented immigrant health was designed: one hour consisted of a lecture presented by a physician experienced with the undocumented patient population, the second hour was a discussion-based session where students discussed a sample patient and their barriers to care. A Google Form survey was administered to the MS1 class before and after the session as well as an MS2 control group, to assess awareness in undocumented immigrant health. The response data was analyzed using a Mann-Whitney U test for questions graded on a Likert scale and Chi-squared Test for knowledge-based questions in IBM SPSS.
Results: Intervention was associated with an increase in comfort and increased satisfaction with training provided to work with this population among the Post-MS1 student group compared to Pre-MS1 group ($p<0.001$) as well as the MS2 Control groups ($p<0.001$). Intervention was not associated with an increase in interest in immigrant health nor an increased sense of importance in training for the MS1 Pre and Post Groups ($p=0.330$ and $p=0.174$) and the MS1-Pre and MS2 Control ($p=0.910$ and $p=0.348$). Intervention did show an increase in knowledge for the metric assessing the number of undocumented immigrants in the United States ($p=0.007$) but did not show an increase in knowledge regarding Medi-Cal eligibility ($p=0.094$).
Conclusion: The goal of the session was to increase awareness about the immigrant population and the unique healthcare barriers they face. Intervention was associated with an increase in comfort regarding the subject of undocumented immigrant health including an increase in positive opinion regarding training provided by the medical school curriculum.

Addressing Disparities in the Experience of Digital Health: Understanding Challenges Related to Access, Design, and Support of Health Technology

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Goal: The objective of this study is to understand how and why patients use (or do not use) digital health technology in real-life clinical contexts as it would give valuable insights into the opportunities, challenges, and potential pitfalls facing the future of digital health and medicine.
Methods: This study will employ cross-sectional survey design to examine participant attitudes and experiences toward digital health technology in clinical contexts. Patients with chronic diseases will be recruited to understand current attitudes, experiences, and use of technology in a clinical setting. Eligible participants will be patients with self-identified chronic diseases seeking care at LAC + USC Medical facilities. All data collected will be analyzed for trends, correlations, and predictive observational data. This will include analysis of subject demographics and survey responses. Data will be analyzed using R statistical software.
Results: Collection of results has not begun yet. Suspected results would point towards identifying trends in individual patient attitudes and experiences regarding treatment and digital health technologies in a clinical healthcare setting.
Conclusions: This study could be one of the first to examine digital health needs and use within a clinical context among diverse and traditionally underserved populations such as non-English speaking, low-income, and minority groups. The end point of this study is to conduct a needs and readiness assessment to understand the barriers to care and challenges to adoption of digital health technologies among disadvantaged patient populations.

Demographic Trends in Hypoglycemia and Hyperglycemia

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Background
Hypoglycemic and hyperglycemic events are common in the inpatient setting and have been linked to a wide variety of adverse clinical outcomes including increased hospital stay and higher mortality. While prior research has focused heavily on the consequences or causes of inappropriate blood sugar, there is limited understanding on the role of demographics. Demographic disparities are important to assess, as potential interventions can be taken to improve patient outcomes. Thus, the present study aims to address this gap by examining how incidence of hypoglycemia and hyperglycemia differs among different races, ages, and genders.
Methods
The data gathered in this study comes from thousands of patients admitted to a large, 600-bed, urban public hospital between 2017 and 2018. All hypoglycemic (glucose level< 60) and hyperglycemic (glucose level >250) events were included in our analysis. Age, gender and race/ethnic categories were based on registration data. Rates of hypoglycemia and hyperglycemia were analyzed as a percentage of encounters where patients were given insulin while in the hospital.
Results
Between 2017 and 2018, there were 2,471 hypoglycemic and 30,347 hyperglycemic events. Of these, 120 hypoglycemic events and 1,066 hyperglycemic events were excluded because no race/ethnic category was available. Black patients were most likely to suffer from inpatient hypoglycemia (7.79%) and Hispanic patients were most likely to suffer from inpatient hyperglycemia (27.36%). Across all races, men generally suffered from hyperglycemia and hypoglycemia at greater rates than women. This disparity between men and women was especially prominent in white patients, who were nearly 70% male. White patients did not have the lowest or highest incidence of either hypoglycemia or hyperglycemia. Asian patients had among the lowest rates of inpatient hypoglycemia and hyperglycemia. These patients were also older on average and showed less variability between genders.
Conclusions
We found a variety of disparities in hypoglycemia and hyperglycemia when analyzing according to race, age, and gender. Asian patients had among the lowest rates of inpatient hyperglycemia and hypoglycemia. This was surprising, especially given the various language and cultural barriers that exist. Possible genetic, socioeconomic, and dietary factors may play a role and should be studied further. Black patients were found to have the highest rates of hypoglycemia, but the lowest rates of hyperglycemia. One explanation is that Black patients, who are also younger on average, tend to be sicker (or perceived as sicker) and thus preemptively given insulin at higher rates leading to more hypoglycemic events. In contrast, Hispanic patients show the highest rate of hyperglycemia and second highest rate of hypoglycemia. While the basis for this is unclear, Hispanic patients tend to present with more risk factors, including diabetes and tobacco use. Hispanic patients may also struggle with limited access to healthcare, leading to untreated health problems like diabetes. Finally, white patients in this study show the most notable gender gap in inpatient hypoglycemia and hyperglycemia. Although it is unclear why such a gap exists, it may be due to differences in health attitudes/behaviors, genetics, and health utilization between white males and females. Further research could delineate why demographic disparities in hypoglycemia and hyperglycemia exist, as well as possible interventions that could lower the disparities.

Table 1

Hypoglycemia Patient Statistics

	Black	Hispanic	Asian	White
Incidence of Inpatient Hypoglycemia (% of encounters on insulin)	7.79%	5.74%	4.15%	5.25%
Average # of Hypoglycemic Events per Hypoglycemic Encounter (# of events per hypoglycemic encounter)	2.80	2.16	2.30	2.70
Average Age of Hypoglycemic Patients (age)	55.93 years	52.97 years	67.83 years	51.02 years
Average Blood Glucose of Hypoglycemic Patients (mg/dL)	46.24	46.10	48.86	45.55
Percentage Male Percentage Female	59% Male 41% Female	54% Male 46% Female	49% Male 51% Female	68% Male 32% Female

Table 2

Hyperglycemia Patient Statistics

	Black	Hispanic	Asian	White
Incidence of Inpatient Hyperglycemia (% of encounters on insulin)	22.14%	27.36%	23.8%	23.8%
Average # of Hyperglycemic Events per Hyperglycemic Patient (# of events per hyperglycemic encounter)	6.87	6.30	6.70	8.16
Average Age of Hyperglycemic Patients (age)	53.06 years	55.96 years	61.99 years	55.17 years
Average Blood Glucose of Hyperglycemic Patients (mg/dL)	320.84	311.56	304.59	318.16
Percentage Male Percentage Female	69% Male 31% Female	57% Male 43% Female	58% Male 42% Female	73% Male 27% Female

Evaluating barriers to patient adoption of a preventive healthcare mobile application in a safety-net setting

Kairav Sinha and Michael Hochman, MD

Background

The **Checkup Checklist app** is a quality improvement project spearheaded by the Gehr Center at USC. On the app, which is available for iPhone and Android, patients answer a few basic demographic questions and are given a personalized list of preventive healthcare screenings

which are recommended for them, as laid out by the United States Preventive Services Task Force. The application's goal is to improve preventive screening rates and engage patients in their own care. The initial rollout of the app is taking place at Keck Hospital. The goal of this proposal is to develop a strategy for rolling out the app to LAC-USC patients. More broadly, I aim to develop a framework for deploying new technology in a way that mitigates existing health inequities and engages diverse populations. My research question is: How can we deploy the Checkup Checklist app to appeal to diverse patient populations and to target health inequities?

Methods

At LAC-USC primary care clinics, advertise a brief survey evaluating barriers and facilitators to using the mobile app. The survey would be advertised through posters as well as through setting up tables in clinics a few mornings a week. Patients who complete the survey will receive a Starbucks gift card. The results of the survey will be used to develop a rollout proposal.

Survey: These survey prompts were adapted from:

- "Barriers and Facilitators to Online Portal Use Among Patients and Caregivers in a Safety Net Health Care System: A Qualitative Study" (Tieu et al)
- "Interventions to increase patient portal use in vulnerable populations: a systematic review" (Grossman et al)

The survey will be available in both English and Spanish, and patients will be given background information about the app prior to completing the survey.

1. How much do each of the following factors stop you from using this app? Rate from 1 (doesn't stop me at all) to 5 (stops me a lot).
    - Worried about privacy
    - Not understanding medical terms
    - Not being able to use a smartphone
    - Not owning a smartphone

2. How much would each of the following make you more likely to use this app? Rate from 1 (not likely at all) to 5 (much more likely).
    - Spanish language translation
    - A video explaining how to use the app
    - A video explaining your results
    - Meeting with a health navigator to explain your results
    - A group session to use the app for the first time
    - Meeting with a clinic staff member to use the app prior to an appointment

Results

Results have not yet been collected, but will be presented in the form of a white paper to the app's development team to guide development of the application using best practices for equity.

Summary

Little research exists on how new technology in healthcare can be deployed with vulnerable and marginalized populations with an eye towards equity. These data will serve as a starting point for both this mobile application and other deployments of health tech around the country.

Does Global Longitudinal Strain Predict In-Hospital Mortality in Patients with Takotsubo Cardiomyopathy?

Harry Trieu, BS, Peter Xu, MD, Edward Lin, MD, Jina Sohn, MD

Introduction

Since its first description in the literature in 1990, Takotsubo cardiomyopathy has been increasingly recognized worldwide as a condition that is associated with mortality risk. Global longitudinal strain (GLS) assessed via speckle tracking may be more sensitive than left ventricular ejection fraction (LVEF) in quantifying systolic function and thus could be useful in early identification of Takotsubo patients likely to clinically deteriorate.

Methods

We identified 37 patients from our institutional database with a diagnosis of Takotsubo cardiomyopathy and an adequate transthoracic echocardiography (TTE) study at time of diagnosis. Patients with wall motion abnormalities due to ischemia were excluded. A multiple logistic regression was performed to determine whether GLS measured at baseline predicts in-hospital mortality while controlling for baseline creatinine and age.

Results

37 subjects (mean age 61$\pm$14 years; 78.4% women) were diagnosed with Takotsubo cardiomyopathy and subsequently had a TTE study performed. 21/36 (58.3%) had a history of hypertension, 9/36 (25.0%) had a history of hyperlipidemia, 12/36 (33.3%) had a history of diabetes, and 10/36 (27.8%) were smokers. Median troponin level and creatinine measured at baseline were 0.89 (IQR 0.31 to 2.98) and 1.01 (IQR 0.73 to 1.38) respectively. Median LVEF at baseline was 36.7% (IQR 31.8 to 48.9) while median GLS measured at baseline was -9.2 (IQR -14.3 to -7). 8/37 (21.6%) patients died during hospitalization. GLS measured at baseline was not significantly associated with in-hospital mortality.

Discussion

We believe that GLS may aid clinicians in identifying Takotsubo cardiomyopathy patients at increased risk for in-hospital mortality, however a larger sample size is necessary to control for other confounding variables and achieve statistical significance.

Volumetric Reduction in Prolactinomas using DA Cabergoline Therapy

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Goal: Dopamine agonists have been show to reduce the size of cystic prolactinomas. The goal of this study is to establish a dose-response relationship between the amount of cabergoline and the % reduction in tumor volume in patients with prolactinomas. The treatment outcomes between patients receiving a low or high dose of cabergoline will also be assessed.

Methods: The design of the study is a retrospective review. 28 individuals were selected based on serum prolactin levels greater than 200 ng/mL, a diagnosis of pituitary prolactinoma greater than 5 mm, availability of MRI data before and after initiating treatment, and treatment using cabergoline therapy. The individuals are assigned to high dose and low dose groups. The software Horos is being used to calculate the volume of the prolactinomas before and after treatment among the high and low dose groups.

Interventions: The intervention being used is the dosage of cabergoline.

Main Outcome Measure: %tumor volume reduction in each treatment group.

MEDICAL EDUCATION

The Efficacy of Diversity Pipeline Programs on Increasing URM Medical School Matriculation

Betsega Awelachew, Joyce Richey, MD

Background: Historically, there has been a disparity between the composition of the patients served and the doctors who serve them. Beyond the language barriers, the lack of diversity in health care can result in decreased quality of care, implicit bias, and decreased patient adherence. According to the U.S. Census Bureau, African Americans make up about 13.4% of the total population and Hispanics are 18.3% of the total population. In contrast, roughly 4.1% of American doctors are African-American and 4.4% were Hispanic or Latino. The only way to begin to close the gaps between patients and the healthcare system is by increasing the diversity of the physician workforce. Increasing physician workforce begins with medical school admissions and increasing URM matriculation. For the purposes of this study, we define underrepresented in medicine (URM) minorities as students who identify as Black/African-American, Hispanic, American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander. Statistics of current medical school enrollment by AAMC show that 7.12% of medical students are African American and 6.43% are Hispanic or Latino medical students. We posit that underrepresented in medicine (URM) students who have attended a pipeline program will not only have higher confidence in their own application, but there will also be an increased desire to attend the medical school in which the program was held.
Methods: A survey-based study was conducted using data gathered from undergraduate minority pre-medical students (n=42) who participated in the new pipeline program at USC called “Medical Student for a Day”. The students were given a survey before they participated in the program to assess their current level of confidence applying to medical school. They were given another survey after the program was complete to see if their confidence levels changed. The survey also assessed if the students felt more attached to the Keck School of Medicine after the program ended.
Results: We found that there was a significant increase in the confidence levels between the questionnaire before and after the program. On the pre-questionnaire, the students rated their confidence on a scale of 1 to 10, with an average answer of 3.87. On the post-questionnaire, the average answer was 7.59. Out of the 42 students in the program, 38 of them consider Keck as one of their top choice schools.
Conclusions: The data suggests that pipeline programs can lead to an increase in confidence levels of URM students on their application. As such, we believe that an increase in pipeline programs would help increase the diversity in medical school matriculation.

Differential effects of surgery and chemotherapy on children with posterior fossa brain tumors

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Background Few neuroimaging studies of children with posterior fossa brain tumors treated with chemotherapy without radiation exist, and the neuropsychological effects of chemotherapy on this population are unclear. We aimed to determine the differential effects of surgery and chemotherapy on brain microstructure and cognition.
Methods Twenty-eight children with a history of posterior fossa tumor (17 treated with surgery alone and 11 treated with surgery and chemotherapy), and 21 healthy sibling controls (n=49) underwent neuroimaging and neuropsychological assessment a mean of 4.5 (surgery group) to 9 years (surgery + chemotherapy group) after treatment. Neuroimaging included diffusion tensor imaging (DTI), and psychometric measures focused on general intelligence, executive functions, processing speed, learning and memory, and social-emotional functioning. Age at diagnosis and time since diagnosis were covariates in the analyses. Group differences in DTI findings and psychometric scores, and correlations between psychometric scores and DTI results were examined.
Results Mean fractional anisotropy (FA) in the prefrontal cortex, large white matter tracts, hippocampus, putamen, globus pallidus, thalamus, and pons were significantly lower in children in the surgery + chemotherapy group compared to the children treated with surgery alone, indicating additional damage to these structures. In neuropsychological evaluation, children treated with chemotherapy scored lower in receptive vocabulary. Both patient groups scored lower than healthy sibling controls on visuoconstructional reasoning and visual-spatial memory, as well as on behavioral measures of aggression and externalizing problems. Higher FA in white matter tracts associated with better performance in nonverbal reasoning, memory, and processing speed.
Conclusions Our findings suggest chemotherapy impacts the microstructure of both white and gray matter structures and is associated with neuropsychological deficits not seen in children with pediatric posterior fossa tumors treated with surgery alone.

A Multidisciplinary Community-Based Participatory Research Approach to the Implementation of a Protocol for Incorporating HIV-Positive Patients' Life Narratives into the Electronic Health Record

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Background
In this study, we explore the potential of the electronic health record (EHR) as a platform for integrating narrative medicine into clinical practice. With a multidisciplinary community-based participatory research team of clinicians, medical students, and patients, we piloted a protocol for uploading HIV-positive patients' life narratives to the EHR. We hypothesized that this life narrative protocol could help health providers practice patient-centered care and facilitate dialogue about patients living with HIV, reducing stigma and improving care and outcomes.
Methods
Medical students conducted interviews with patients, wrote patients' life narratives, and uploaded them to the EHR. From follow up interviews, feedback was collected from patients, clinicians, and students on the experience and perceived impact of the life narrative protocol and on the execution of the protocol itself. Qualitative data analysis, including descriptive coding and thematic analysis, was conducted in an iterative fashion. Data triangulation was achieved across data sources.
Results
We expect that participation in the life narrative protocol improved clinicians' ability to practice patient-centered care, increased patients' trust in providers, and helped students practice empathy and patient interviewing skills.

Conclusion

The life narrative protocol helps providers better understand their patients, makes patients feel seen and heard, and trains students to be better clinicians. As an innovative application of the EHR as a medium for narrative medicine, the life narrative protocol has the potential to enhance patient care in any clinical setting.

NEUROLOGY

Optimal Definition of Prehospital Deterioration in Stroke

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Background: Many patients with stroke exhibit signs of deterioration between evaluation by EMS and emergency department arrival. As stroke therapies are developed for the prehospital setting, prehospital deterioration must be defined. Previous studies have defined prehospital deterioration as a decrease of ≥2 points on the Glasgow Coma Scale (GCS). Combining change in GCS with change in Los Angeles Motor Scale (LAMS) may more accurately predict prehospital deterioration and poor outcome than either scale alone.
Methods: During the Field Administration of Stroke Therapy-Magnesium (FAST-MAG) trial, GCS and LAMS were administered at two time points: by paramedics and after arrival at the ED. Poor outcome was determined by a score of 3-6 on the Rankin Scale at 3 months. The change in score between the two time points as measured by GCS, LAMS, and GCS+LAMS combined were compared in relation to the poor outcome score measured by the Rankin Scale through receiver operating characteristic.
Expected Results: Among 1700 patients (69±13 years, female 42.6%) 73.3% had a diagnosis of cerebral ischemia, 22.8% intracranial hemorrhage, and 3.9% stroke mimic. Time from onset to prehospital LAMS was median 30 minutes (IQR 20–50). It is expected that change in GCS+LAMS combined will more accurately predict prehospital deterioration and poor outcome in patients at 3 months compared to LAMS alone or GCS alone, especially in patients with intracranial hemorrhage.
Conclusions: Previous analysis has shown that adding GCS to LAMS in the prehospital assessment does not improve its ability to identify patients who are likely to have poor outcomes but may be a better measure of stroke severity in ICH cases. Our analysis will expand on this by examining the change in GCS, LAMS, and GCS and LAMS combined between time seen by paramedics and arrival in ED. Using the change in scores may be more predictive of stroke deterioration prior to hospital arrival which may have important implications for prehospital stroke treatment.

Perivascular Space Alteration in Idiopathic and Familial Parkinson's Disease

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Parkinson's Disease is the second most prevalent neurodegenerative diseases today [1]. Although the motor symptoms of Parkinson's Disease are thoroughly researched, other important pathological manifestations of this disease are not well understood. As a result, these manifestations are poorly managed and treated. Understanding the vascular impact in patients with Parkinson's Disease can provide new insight on pathological progression and treatment options [2]. Dilation of perivascular spaces has been an important measure of vascular insult in the context of neurodegenerative diseases [3]. Volumetric analysis of dilated perivascular spaces of Parkinson's Disease, particularly in the familial form, is heavily understudied. Differences in perivascular spaces among patient with idiopathic and familial Parkinson's Disease can provide novel insight on the implications of the genetic components pertaining to Parkinson's Disease. To study the impact of brain glia-lymphatic pathway pathology on the clinical status of idiopathic and familial Parkinson's disease, total perivascular space volume was compared between these patient populations using a newly developed technique[4]. Our findings showed that individuals with symptomatic Parkinson's disease have more enlarged perivascular spaces compared to clinically intact controls independent of their genetic predisposition. It suggests that

microvascular changes and particularly perivascular spaces might contribute to the neurodegenerative symptoms through parallel pathways additional to the primary pathological process. These results are very similar to the effect of perivascular spaces in Alzheimer's disease. More interestingly, our data showed that presence of Parkinson's genetic factors, does not increase the risk of glia-lymphatic impairment while in the later stages this impairment can contribute into the clinical picture.

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Evaluating Stroke Diagnosis Algorithms in a Los Angeles Patient Registry

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Background: 90% of strokes are preventable and the top risk factor for stroke is a previous stroke. As recurrent stroke prevention methods vary based on the etiology of the initial stroke, subtyping strokes accurately is vital to determine the best management approach. Historically, the subtyping algorithm from the Trial of Org 10172 in Acute Stroke Treatment (TOAST) has been used, but it ignores certain diagnostics such as newer imaging methods like magnetic resonance angiography and diffusion-weighted magnetic resonance imaging. These imaging studies and more laboratory findings are considered in the modified TOAST (mTOAST) subtyping algorithm.
Objective: To compare the modified TOAST stroke subtyping algorithm against the TOAST algorithm to see which yields more insight.
Methods: Retrospective analysis of 222 out of 1439 prospectively collected stroke patients at Rancho Los Amigos National Rehabilitation Center transferred from the LAC+USC Emergency Department between 10/07-7/14. Patient data contained labs and imaging studies. Key elements for subtyping included CT, MRI, DWI, MRA, carotid ultrasound, TEE, Holter EKG, and toxicology screen. Chart review and the mTOAST and original TOAST algorithms were deployed to diagnose patients and compare the two algorithms.
Results: 222 patients had their strokes subtyped by both algorithms so far (Table 1). The two algorithms disagreed for 42 patients with 6 cases of mTOAST subtyping when TOAST did not, and 30 cases of mTOAST saying more than one etiology is likely when TOAST generates an undetermined etiology.

	Large Artery	Cardioembolic	Small Artery	Other	Undetermined	>1 Cause	Total
TOAST	45	14	76	4	83	N/A	222
Modified TOAST	42	21	75	3	46	35	222

Conclusion: The mTOAST algorithm had fewer undetermined etiologies than the TOAST algorithm and better identified complex patients with more than one stroke etiology, better aiding

stroke prevention. Thus, mTOAST seems superior to the TOAST stroke subtyping algorithm. Further study in the larger patient set is warranted.

Quantifying Time of Neuroprotection Exposure in Prehospital Stroke Research

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Background: Time from stroke symptom onset to initiation of neuroprotection (NP) and duration of exposure prior to recanalization are important time metrics in studies of neuroprotective agents targeting ischemia. We aimed to characterize time metrics in a large study of prehospital stroke and compare these times to other prehospital and post-hospital arrival studies.

Methods: We provide descriptive analysis of data from the NIH Field Administration of Stroke Therapy Magnesium (FAST-MAG) clinical trial. We searched the public library of medicine to obtain other phase 3 research studies of neuroprotection in stroke and determined time from stroke onset to NP initiation and duration of NP exposure from research papers, if needed we contacted authors to obtain this data.

Results: Time from symptom onset to NP start was shorter with prehospital administration of NP. Duration of NP exposure prior to recanalization therapy was longer in prehospital studies compared to post-hospital arrival.

Conclusions: We provide descriptive analysis of two important time metrics for NP in stroke. Prehospital administration of NP allows both earlier time from symptom onset to initiation and exposure prior to recanalization, and comes with the disadvantage of lower rates of target enrollment of ischemic stroke.

NEUROSURGERY

Fibrinogen contributes to white matter injury following experimental chronic cerebral hypoperfusion.

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Introduction: Chronic cerebral hypoperfusion (CCH) leads to white matter ischemic injury and subsequent neurocognitive decline. Our lab has demonstrated increased blood-brain barrier (BBB) permeability and subsequent white matter injury in mice following experimental CCH. Histologic analysis indicates leakage of fibrinogen into the parenchyma at the time of increased BBB permeability. The present study aims to utilize fibrinogen alpha-chain deficient mice to determine if fibrinogen contributes to white matter injury following CCH.
Methods: Wild type ($Fga^{+/+}$; n=10) and heterozygous fibrinogen deficient ($Fga^{+/-}$; n=10) mice underwent bilateral carotid stenosis surgery (BCAS). Fibrinogen immunostaining on postoperative day 3 was used to confirm decreased fibrinogen in the corpus callosum (CC) in $Fga^{+/-}$ mice (n=5) relative to $Fga^{+/+}$ (n=5). MRIs were performed on postoperative days 0, 3 and 30. T2w-MRI, dynamic contrast-enhanced (DCE)-MRI and dynamic susceptibility protocols were used to characterize anatomical changes and BBB permeability, respectively. Diffusion MRI tractography was used to evaluate CC tract length and volume.
Results: BBB permeability in the CC was increased on postoperative day 3 compared to postoperative day 30 in both $Fga^{+/+}$ and $Fga^{+/-}$ mice but the extent of BBB permeability did not differ between groups. CC fibrinogen levels were decreased in $Fga^{+/-}$ mice compared to $Fga^{+/+}$ ($P<0.01$). $Fga^{+/-}$ mice had preserved tract volume ($p<0.01$) despite similar tract length. Anterior CC volume was significantly decreased in $Fga^{+/+}$ compared to $Fga^{+/-}$ mice($p<0.05$).
Conclusion: Fibrinogen deficient mice have less fibrinogen leak through the BBB during times of increased BBB permeability and obtain less white matter damage following CCH induced by BCAS. Fibrinogen contributes to white matter injury following CCH and may play a role in the pathogenesis of neurocognitive decline in patients experiencing CCH.

Mortality and Poor Short-Term Outcome Rates after Severe Traumatic Brain Injury in Patients over 40

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Background: In middle-age and older patients with severe traumatic brain injury (TBI), treatment decisions often rely on prognostication. We assessed rates of mortality and poor outcome stratified by decade of life and initial GCS in a large institutional dataset to provide data to aid in early discussions with families.
Methods: We performed a nine-year retrospective review of our institutional trauma database from 2010-2018. Patients 40 years and older were studied. Poor outcome was defined by hospital discharge to long-term care facility or mortality. Patients were stratified by initial Glasgow Coma Scale (GCS 3 versus GCS 4-8) and decade of life. Linear regression was performed using Microsoft Excel.
Results: There were 635 patients aged 40 years and older meeting criteria for severe traumatic brain injury. Strong linear relationships were present in both GCS 3 and GCS 4-8 cohorts for both mortality and poor outcome.
For patients with initial GCS 3, mortality in the fifth decade was 55% and increased at a rate of 9%/decade (R-squared = 0.913, p=0.003). Poor outcome in the fifth decade was 75% and increased at a rate of 7%/decade (R-squared = 0.996, p = 0.002).

For patients with initial GCS 4-8, mortality in the fifth decade was 15% and increased at a rate of 16%/decade (R-squared = 0.989, p = 0.001). Poor outcome in the fifth decade was 45% and increased at a rate of 14%/decade (R-squared = 0.879, p = 0.018).
Conclusions: We developed estimates of mortality and poor outcome stratified by decade of life and initial GCS to guide family discussions for patients with severe TBI.

Transcranial Magnetic Stimulation (TMS) For Schizophrenia Meta-Analysis

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Purpose: Antipsychotic medications have limited efficacy in controlling the negative symptoms and cognitive impairment of schizophrenia, necessitating novel treatment options that operate via alternative mechanisms.[1] Transcranial magnetic stimulation (TMS) has gained favor in clinical practice due to its low rate of adverse effects and ease of implementation in outpatient settings[2,3]. In past trials of TMS for schizophrenia, parameters for location and frequency have remained relatively consistent, but other variables including length of treatment have been heterogeneous from study to study. We aim to provide a comprehensive review that synthesizes the published data regarding the efficacy of TMS for schizophrenia and provide sub-group analyses in order to determine the ideal stimulation parameters for the treatment of negative, cognitive and positive symptoms.
Methods: An online search was conducted reviewing PubMed, Google Scholars, and clinicaltrials.gov using the terms “transcranial magnetic stimulation,” “TMS,” “schizophrenia,” “psychosis,” and “psychotic disorders.” The primary outcome recorded was the Positive and Negative Syndrome Scale (PANSS). Additional outcomes recorded include Auditory Hallucination Rating Scale (AHRS), Scale for the Assessment of Negative Symptoms (SANS), Clinical Global Impression (CGI), and General Assessment of Functioning (GAF).
Results: 39 studies were assessed for eligibility, and 25 of the 39 studies then were included in accordance with our inclusion and exclusion criteria. This meta-analysis demonstrates that TMS augmentation improves multiple outcome measures including PANSS positive, PANSS negative, PANSS total, and AHRS.
Summary: Current data suggests there may be clinal utility in the use of high frequency TMS targeting the DLPFC for the short-term treatment of negative and cognitive symptoms; however, more definitive clinical trials are necessary. Moreover, it remains to be seen whether TMS can provide sustained improvement in the treatment of schizophrenia beyond the acute to subacute treatment period.

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Transcranial Magnetic Stimulation (TMS) for Schizophrenia

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Purpose: Schizophrenia is a disabling mental disorder that affects up to 1% of the population worldwide and usually requires long-term follow up and expensive lifelong treatments[1]. Current treatments are effective at treating positive symptoms; however, the negative and cognitive symptoms are largely untreated. Transcranial magnetic stimulation (TMS) uses electromagnetic induction to modulate cortical neurons[2]. TMS has been approved and studied for use in conditions such as OCD, treatment-resistant MDD, and obsessive-compulsive disorder. In this pilot study, we hypothesize that TMS targeting the left DLPFC as an adjunct to antipsychotics will improve the negative and cognitive symptoms of schizophrenia and normalize electrophysiology and functional connectivity.
Methods: Fifteen adult patients with schizophrenia will receive a total of 30 TMS treatment sessions. Treatment will target the left DLPFC with TMS parameters set at 120% of motor threshold (trains consisting of 40 pulses repeated 75 times for a total of 3000 pulses per treatment session). The primary outcome measure is the change in PANSS scores over time. Secondary outcome measures include changes in the Brief International Functional Capacity Assessment, Cognitive Neurocognitive Battery, and Quality of Life Scale. Tertiary outcomes include changes in fMRI, mismatch negativity, and EEGs pre- and post- treatment.
Results: We are approaching the subject recruitment phase. We hypothesize that PANSS scores will improve as will scores of other neurocognitive scales. We also expect TMS to increase resting-state fMRI activation of the frontal cortex and functional connectivity and reduce EEG mismatch negativity deficits.
Summary: Schizophrenia can be a very debilitating disease for patients that severely impacts quality of life. Treatment for schizophrenia is lifelong and many schizophrenic patients are considered treatment resistant. Therefore, it is important to evaluate new treatments to reduce suffering from patients and their families.

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Efficacy of novel small molecules LHMR18 and LHMR26 for triple-negative breast-to-brain metastases

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Goal: Triple negative breast cancers (TNBC) lack therapeutic targets like ER/PR/Her2 receptors and unfortunately tend towards brain metastasis. In TNBC, treatment is restricted to radiation and non-selective chemotherapies like 5-flurouracil, temozolomide, and cisplatin. Our goal was to determine the efficacy of novel retinoic acid (ATRA) conjugates LHMR18 and LHMR26, synthesized in our lab for a targeted response in TNBC. We sought to determine whether

LHMR18 and LHMR26 modulated the expression of Her2 and DNA protectors BRCA2 and MLH1, which could lead to new interventions or combination therapies for TNBC.
Methods: Primary human TNBC MB-MDA-231 and patient-derived 3.1 breast-to-brain metastasis (BBM) cell lines were treated *in vitro* with increasing concentrations of LHMR18 and 26 at 24h, 48h, and 72h. The expression of Her2, BRCA2, and MLH1 were measured using RT-qPCR. In order to determine any changes in cellular localization, the cells were stained using immunocytochemistry and visualized with a confocal microscope.
Results: LHMR18 and 26 were both shown to increase Her2 mRNA expression and translocate Her2 protein out of the nucleus in the BBM-3.1 cell line. LHMR 26 initially increased BRCA2 and MLH1 mRNA expression in the BBM-3.1 cell line which then decreased at higher concentrations. In the BBM-3.1 line, LHMR18 increased mRNA expression of BRCA2. LHMR 26 showed increased BRCA2 mRNA expression at higher concentrations, and an increase in MLH1 mRNA. Both LHMR18 and 26 led to increased cytoplasmic BRCA2 protein but no translocation. In the primary TNBC MB-MDA-231 line, LHMR18 and 26 increased Her2, MLH1, and BRCA2.
Conclusions: Our preliminary results show that LHMR18 and LHMR26 are able to translocate Her2 out of the nucleus, which may create a potential for combination therapy with existing Her2+ cancer therapies.

Mechanism of all-trans retinoic acid as an adjuvant therapy in triple negative breast cancer cells

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Goal: While therapeutic advances in breast cancer treatments have led to improved outcomes for many patients over the last few decades, a diagnosis of the triple-negative subtype still confers a relatively poor prognosis as compared to the Her2 and hormone receptor-positive subtypes. Furthermore, development of breast-to-brain metastases in these patients results in an even poorer outcome. Therefore, it is imperative to find novel therapeutic agents that can effectively target triple-negative breast-to-brain metastases. All-trans retinoic acid (ATRA), a molecule that has shown promise as an effective therapeutic agent against primary breast cancer cells, has not had the same success in the clinical setting. This suggests a need for a greater understanding of ATRA and its interactions with breast cancer cells—including brain metastasis. We hypothesize that ATRA sensitizes primary and brain-metastatic triple negative breast cancer cells to targeted chemotherapeutic agents through alteration of Her2 and DNA damage repair proteins.
Methods: To test our hypothesis, we investigated the effect of ATRA in primary TN (MDA-MB-231) and patient-derived brain-metastatic TN cell-lines (BBM 3.1) *in vitro*. We treated both cell lines with ATRA at various concentrations and time points and analyzed the expression and cellular localization of Her2, BRCA2, and MLH1 by quantitative real-time PCR (rt-qPCR) and Immunocytochemistry (ICC) relative to an untreated control condition.
Results: We found that after RA treatment, the patient-derived brain metastatic TN line showed an increase in Her2 mRNA levels, as well as a decrease in both BRCA2 and MLH1 mRNA on qPCR. In primary TN cell lines, treatment with ATRA showed no change in Her2 mRNA levels and an early increase in BRCA2 and MLH1. There was no change in protein expression or cellular localization of Her2 after ATRA treatment in the brain-metastatic line after ICC analysis. In the primary cell line, a decrease in nuclear Her2 was observed at a later time point. In both cell lines, an increase in nuclear MLH1 but decrease in nuclear BRCA2 expression was observed following ATRA treatment.

Conclusion: This data suggests a role for ATRA as a modulator of Her2 and DNA damage repair proteins in both primary and brain-metastatic triple negative cells. Therefore, ATRA may have therapeutic significance when combined with other targeted chemotherapies, such as Her2-targeted therapies, to combat triple negative breast cancer.

Complementary and Alternative Medicine for the Treatment of Gliomas: Scoping Review of Clinical Studies

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Introduction*:* Complementary and alternative medicine (CAM) is widespread in its use amongst cancer patients and has a particularly high prevalence amongst patients diagnosed with glioma. The efficacy of these therapies requires further evaluation, however. It is important for the field of neuro-oncology to clearly delineate CAM practices that are unproven, disproven, or promising for future research and implementation.
Methods: A systematic, scoping review was conducted to identify all articles that investigate the effect of any CAM therapy on survival of patients with newly diagnosed or recurrent glioma.
Results: A total of eleven papers and three conference presentations were found. These were broken down into the following categories: dietary modification, carbogen breathing, and overall CAM usage. Ketogenic diets appear to be safe and well tolerated by patients, and preliminary studies demonstrate an effect of the diet in shrinking tumor and increasing progression-free survival when combined with standard of care therapies. Conversely, carbogen breathing was found to have no effect on survival of glioma patients, with significant toxicity to patients. Similarly, hypocupremia does not appear to be an effective adjunctive therapy. Other CAM strategies that warrant further investigation include melatonin, antiangiogenetic, and antioxidant therapies. Still, many commonly used modalities under the CAM umbrella have not been appropriately studied and require further investigation.
Conclusion: Despite widespread use, Level I evidence for the usage of CAM for the treatment of glioma is sparse. This represents an important need for future research in order to optimally counsel and treat glioma patients.

Neuropsychological Outcomes after Resective Surgery for Epilepsy

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Background: The efficacy of resective epilepsy surgery has been well-established; however, evidence for neuropsychological changes remains mixed, with some studies demonstrating no change or even improvement while others exhibiting decline. Our study aims to investigate cognitive and neuropsychological changes in patients undergoing resective surgery for epilepsy.
Methods: Patients that underwent surgical resection for temporal lobe epilepsy at a single university hospital between 2008 and 2014 were retrospectively identified. Neuropsychology data from patients tested by a single neuropsychologist were obtained. Age, education and language-controlled percentiles were compared preoperatively versus one year postoperatively.
Results: In total, eighteen patients were identified. Overall, postoperative scores improved by an average of 2.4 deciles compared to preoperatively ($p<0.05$). Post-hoc analysis revealed no significant differences in individual domains or neuropsychological tests after correction for multiple comparisons ($p>0.05$). There were no significant patterns when comparing side of resection ($p>0.05$).

Conclusions: Our data corroborates studies demonstrating small improvements in neuropsychological outcomes after resective epilepsy surgery. However, larger, controlled studies are needed, as well as comparisons to newer neuromodulation techniques.

Effects of Long Non-Coding RNA Repression on the Invasiveness of Glioblastoma

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Intro: Long non-coding RNAs (lncRNA) are gene transcripts greater than 200 nucleotides long, with aberrant expression of specific lncRNAs shown to affect tumorigenicity of glioma tumor cells. The lncRNA H19 is well understood to influence tumor invasiveness in glioma. The present study assesses the ability to repress the action of the lncRNA H19 in U87 (primary human glioblastoma) cells using CRISPRi technology, a recently developed technology that suppresses lncRNA function at the transcriptional level. This CRISPRi H19 repression will then serve as a model for an ideal lncRNA target in future studies investigating novel lncRNAs that we believe contribute to GBM tumor invasiveness.
Methods: Specific H19-targeting sequences of single guide RNAs (sgRNA) for recruitment of dCas9-KRAB were designed and subsequently delivered to U87 cells using a Lentivirus. RT qPCR was then used to assess H19 repression efficiency.
Results: Two sgRNAs were successfully cloned for H19 targeting. CRISPRi achieved an 85% knockdown efficiency of H19-1 with +6.5%/-11.5% SE and 74% knockdown of H19-2 with +10.0%/-16.2% SE. Our lab saw >70% decrease in invasion for CRISPRi H19 suppressed cells. Furthermore, the first of the novel screen candidates assessed by our lab have mirrored the knockdown results of this study and successfully showed a decreased in invasion.
Conclusion: The present study illustrates the ability of CRISPRi technology to precisely and effectively repress lncRNA genes that impact the invasiveness of glioma cells. H19 can now be utilized as a benchmark in our future studies as we identify novel lncRNA targets involved in GBM.

Comparative Preoperative Characteristics and Postoperative Outcomes at a Private versus Safety Net Hospital Following Endoscopic Endonasal Transsphenoidal Resection of Pituitary Adenomas

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Background: Sociodemographic disparities in health outcomes are well documented, but the effect of such disparities on preoperative presentation of pituitary adenomas (PA) and surgical outcomes following resection is not completely understood.
Methods: Retrospective review of patients with PAs undergoing endoscopic endonasal transsphenoidal surgery by one neurosurgeon at a single academic medical institution consisting of one private hospital (PH) and one safety-net hospital (SNH) over a 36 month period.
Results: A total of 92 PH patients and 69 SNH patients were included. SNH patients were more likely to be uninsured or have Medicaid (88.4% vs 10.9%, p <0.0001). A larger percentage of SNH patients were Hispanic (98.7% vs 32.6% p<0.0001), while PH patients were more likely non-Hispanic white (39.1% vs 4.3%, p<0.0001). SNH patients had larger mean PA diameter (26.2 vs 22.4mm, p=0.0347) and a higher rate of bilateral cavernous sinus invasion (13% vs 4.3%, p=0.0451). SNH patients were more likely to present with headache (68.1% vs 45.7%,

p=0.0048), vision loss (63.8% vs 35.9%, p<0.0005), panhypopituitarism (18.8% vs 4.3%, p=0.0031) and pituitary apoplexy (18.8% vs 7.6%, p=0.0334). Compared to PH patients, SNH patients were as likely to undergo gross total resection (73.9% vs 76.1%, p=0.7499). SNH patients had similar rates of postoperative improvement in headache (80% vs 89%, p = 0.14) and vision (82% vs 84%, p =0.74), but had higher rates of postoperative panhypopituitarism (23% vs 10%, p=0.04) driven by preoperative endocrinopathies.
Conclusions: SNH patients were more often uninsured or on Medicaid, and presented with larger, more advanced pituitary tumors. SNH patients were more likely to present with headaches, vision loss, or apoplexy, likely translating to greater improvements in headache and vision observed after surgery. These findings highlight the association between medically underserved populations and more advanced disease state at presentation, and underscores that academic tertiary multidisciplinary care teams and endoscopic PA resection may somewhat mitigate sociodemographic factors known to portend poorer outcomes.

DNA Methyltransferase Inhibitor 5-aza-2'-deoxycytidine Inhibits Meningioma Cell Proliferation in Vitro, Yet Does Not Exhibit Synergism with Vitamin C

Marisa Penn, Gabriel Zada, M.D., Dept. of Neurosurgery, KSOM

Goal: Recent evidence suggests that DNA methyltransferase inhibitor (DMTI) 5-aza-2'-deoxycytidine (AZA) induces apoptosis and inhibits cell proliferation through activation of viral recognition pathways in the cell. L-ascorbic acid (vitamin C), which is often deficient in many cancer patients, has been shown to synergistically enhance the effects of AZA in multiple human cancers, including colorectal carcinoma, acute myeloid leukemia, breast carcinoma and hepatocellular carcinoma cell lines. Thus, we undertook the current study to examine if this synergistic effect is also seen in human meningioma cells.
Methods: Human meningioma cell line CH157 was seeded in a 96-well plate at a concentration of 1,000 cells/well with DMEM F12 culture medium with 10% FBS. After 24 hours, cells received 24 hours of AZA and Vitamin C treatments of concentrations ranging from 0-20 μM and 0-1000 μM respectively. The cells then received Vitamin C doses every 24 hours for 4 days, and cell viability was measured as a function of absorbance of each well at 490nm in a 96-well plate reader.
Results: AZA treatment alone reduced cell populations to a maximum of 52% viable at the highest dose of 20 μM. Regression analysis showed that AZA was a significant predictor of cell viability ($p < 0.001$). Vitamin C was not found to have a significant potentiating affect with any concentration of AZA ($p = 0.08$) and did not appreciably reduce cell viability on its own ($p = 0.26$).
Conclusions: These data show promising findings for the future treatment of meningiomas with AZA. While meningiomas have been shown to be highly methylated tumors, making them susceptible to DMTIs like AZA, this effect is not potentiated by the addition of Vitamin C, unlike other highly methylated cancer cell lines. These data suggest more research is needed to develop stronger, more targeted therapies for meningiomas.

Volumetric Effects of Resective Surgery and Vagus Nerve Stimulation for Epilepsy

Runi Tanna, Jordan Lam, Darrin Lee, M.D.

Introduction: Resective surgery and vagus nerve stimulation (VNS) are effective treatments for medically refractory epilepsy, but with varying impacts on cognition. There is limited data on anatomical changes, especially following VNS, to correlate with cognitive changes. This study aims to assess postoperative volumetric changes in patients who received temporal lobe resections (TLR) or VNS.

Methods: We conducted a retrospective study of 24 patients (12 TLR, 5 ETLR, 7 VNS) from 2005-2019 with thin-slice noncontrast MRI imaging both pre and at least two months post-operatively. Volumes of temporal lobe structures and anatomically connected regions of interest were calculated using automated computer analysis. Contralateral structures were assessed for TLR. Average volumes of bilateral structures were assessed for VNS.
Results: A significant effect of time following TLR was seen for ipsilateral volumetric increases in superior ($p=0.02$) and caudal middle frontal gyri ($p=0.002$), and decreases in the nucleus accumbens ($p=0.01$) and putamen ($p<0.001$). A significant effect of time was found for contralateral increases in lateral orbital frontal gyri ($p=0.05$) and decreases in parahippocampal gyrus ($p=0.003$), amygdala ($p=0.04$), pallidum ($p=0.009$), caudate nucleus ($p=0.02$) and hippocampus ($p=0.02$). A significant effect of time following VNS was seen for increases in the pericalcarine ($p=0.05$) and superior parietal gyri ($p=0.03$), and decreases in cerebellum ($p=0.001$) and thalamus ($p=0.02$).
Conclusion: Our data correlates with previous studies showing decreases in hippocampal and temporal lobe volumes following TLR. It also elucidates volumetric changes following VNS. Further investigation is needed to determine the cause of these differences and the impact on clinical decision-making. It would also be beneficial to determine whether post-operative volume changes are associated with neuropsychiatric decline or if they should be attributed to compensatory mechanisms following surgery.

Intraoperative neuronavigation: Development of a fast brain MR imaging protocol for pediatric ventricular shunt placement

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Objective: Ventricular shunting is an effective and widespread operative treatment for hydrocephalus. Intraoperative neuronavigation combines pre-operative medical images and a known reference frame in the surgical suite, which facilitates accurate shunt placement. These images are often head CTs which expose children to radiation and raise the risk of radiation-induced malignancy. MRI provides suitable images without radiation, but due to slow image acquisition it is more costly and can require anesthesia. In this study, the authors test the feasibility of reducing MRI scan time using modern MR features including compressed SENSE (CS), while maintaining sufficient data for accurate intraoperative neuronavigation.
Methods: 5 target markers were applied to the head of one healthy human subject prior to scanning with 13 MRI sequences designed to reduce scan time. In the operating room, surface features of the face and scalp were used to register the subject to each image series. After registration, a probe was placed at the center of each target marker, and the physical marker coordinates were recorded. Using the navigation software, the imaging marker coordinates were recorded for each MRI sequence. Registration accuracy was reported as target registration error (TRE), the Euclidian distance between the physical and imaging marker coordinates.
Results: The standard neuronavigation imaging protocol (Stealth Baseline) required 5:06 minutes for image acquisition, while the fastest scans required 25 seconds and 22 seconds (Stealth CS 3 mm and T1 Limited 3 mm Spiral, respectively). A significant difference in TRE was found between Stealth Baseline (2.43 ± 0.24 mm), and 3 scans (Stealth Half- Scan 3 mm, 14.87 ± 1.03 mm; T1 Limited CS 3mm, 6.45 ± 0.76 mm; T1 Limited 3 mm Spiral, 13.31 ± 2.85 mm). No significant difference in TRE was observed between Stealth Baseline and CS applied

to Stealth Baseline (1.86 ± 0.19 mm), or an isotropic 3 mm iteration of Stealth Baseline (2.77 ± 0.25 mm). We present a Bland-Altman analysis to compare error distances that span the skull, and provide sample axial, sagittal and coronal to highlight the ventricular system in select sequences.

Conclusion: We provide evidence that it is possible to reduce MRI scan time as compared with the standard neuronavigation sequence, while conveying ventricular morphology and maintaining sufficient surface feature data for accurate neuronavigation. Two scans in particular meet these criteria. While further refinement may be required prior to clinical translation in pediatric shunt placement, our study moves a step closer towards the ideal fast-scan MR sequence: one that is compatible with image-guidance technology and also allows for shunt surveillance.

OBSTETRICS & GYNECOLOGY

Molecular and Cellular Response to Intrauterine Device (IUD) Placement

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Background: Recent meta-analysis has shown that cervical cancer prevention may be a non-contraceptive benefit of IUD use. Immune response to minor wounding that could accompany IUD placement is a postulated mechanism whereby an IUD may clear persistent cervical cancer-causing human papillomavirus (HPV) infections. To assess this hypothesis we wish to learn whether immune response in the upper reproductive tract follows IUD placement, and if such response is influenced by type of device.
Methods: From women 18-40 years of age who have elected IUD placement, we collect vaginal swabs, cervico-vaginal lavage, and questionnaire data at three time points: immediately before IUD placement, and 2-7 days and 6-8 weeks later. To indicate immune response, we will assess differences in concentrations of cytokines, chemokines, and immune cells in the samples from all three visits. We will summarize these differences within groups defined by type of IUD placed, using questionnaire data as potential confounders and modifiers. In the pilot phase, presented here, we evaluate feasibility of study procedures and estimate parameters needed to estimate desired sample size.
Results: Eight women meeting inclusion criteria completed all three visits, and IUD placement was contraindicated in one more. Most women invited to participate chose to do so, all participants readily completed all questionnaires and procedures, and use of both hormonal and non-hormonal devices was documented.
Conclusions: Preliminary data demonstrate acceptability of the protocol and feasibility of the design. Following planned measurement of analytes, differences in levels from pre- and post-placement samples will be used to determine target size of an informative study to be carried out in the same population.

Perspectives on and willingness to use a novel male hormonal contraceptive – a qualitative study of Asian males in Los Angeles, California, USA

Emmy Jin, Brian T. Nguyen, MD MSc

Introduction: As Asian men have not routinely been involved in clinical trials, an assessment of their priorities and preferences for male hormonal contraceptives (MHCs) is needed.
Methods: We performed a qualitative study using in-depth interviews to better understand the perspectives of sexually active, heterosexual, Asian-identifying men in Los Angeles, California. Men were excluded if desiring a pregnancy in the next year. Participants were interviewed regarding attitudes and expectations towards MHC development. All interviews were digitally recorded and transcribed verbatim.
Results: 24 men were interviewed with a median age of 28. The majority of interviewees did not have children and 19 interviewees desired children in the future. Interviewees were concerned about potential side effects and recalled that sexual and reproductive health, considered taboo subjects among their families, were not discussed at home. Interviewees expressed frustrations with existing male options for birth control, yet suggested that gender roles, masculinity, and the idea that birth control is a woman's responsibility prove to be a barrier to more widespread interest in MHCs. Using a 5-point Likert scale, interviewees agreed that men should use male birth control (4.00) and that they would definitely use a male method of birth control (3.87).
Conclusions: Asian men who reported not wanting to become involved in a pregnancy generally support and would be willing to use MHCs, yet concerns remain about potential side effects. They are also interested in sharing the responsibility of birth control with their partners,

and would like to have control over their own fertility and family planning. Cultural factors have impacted the beliefs and behaviors of Asian men regarding sex and birth control. Ultimately, Asian men have a high level of interest in using MHCs

OPHTHALMOLOGY

Electric Fields Direct Optic Nerve Regeneration in a Dose Dependent Manner

Basheer Alas BS, Kimberly Gokoffski MD PhD, USC Department of Ophthalmology

Goal: The optic nerve is composed of axons of specialized neurons called retinal ganglion cells (RGCs), which transmit visual stimuli from the eye to the brain. Optic nerve injury due to degeneration, such as from glaucoma, leads to irreversible blindness. A major obstacle to optic nerve regeneration is directing axon growth of surviving cells or axon growth of transplanted RGCs to grow out of the eye and into the brain. The approach we are taking to overcome this obstacle is to use electric fields (EFs) to direct axon growth. Recently, we have shown that RGCs demonstrate robust growth when exposed to an EF in vitro. Here, we test various EFs and their ability to direct RGC regeneration after optic nerve injury in vivo.
Methods: Rat optic nerves were crushed followed by electrode placement, one behind the eye and another behind the optic chiasm. Two weeks after injury, after 50% of RGCs degenerated, charge balanced EFs with anodic: cathodic amplitude ratios of 1:2, 1:4, and 1:8 were applied 5hrs/day x 10 days.
Results: Ten days of EF exposure directed robust RGC axon regeneration after optic nerve crush injury. 3.5 fold increased regeneration was seen 250um past the crush site in rats exposed to an EF with an anodic:cathodic ratio of 1:4 (n=5) and 1:2 (n=1) over 1:8 (n=5) and control (n=5) rats ($p < 0.001$).
Conclusions: Preliminary data suggest that EFs direct robust regeneration of RGC axons after optic nerve crush injury, in vivo. This suggests that EFs may serve as a viable therapeutic modality to regenerate the optic nerve and restore vision in patients blinded by optic neuropathies.

Prevalence of Pediatric Keratoconus in the Los Angeles Country Area

Rishi Bommannan, Bibiana Reiser, Department of Ophthalmology, CHLA

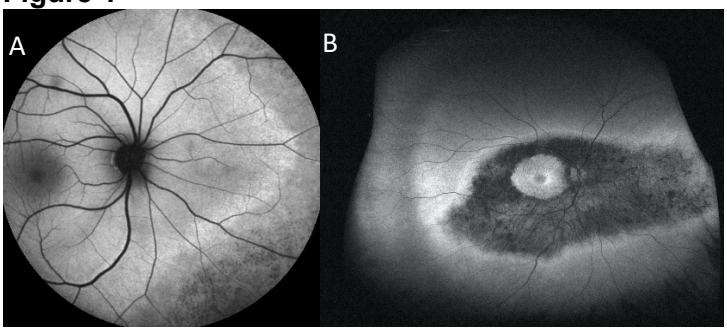
Goal: Keratoconus is a progressive ectatic disease of collagen organization in the cornea that can lead to severe, irregular, myopic astigmatism. In addition to environmental factors, research indicates that genetics plays a significant role in the disease process. Given the multivariate etiology of keratoconus, it is not surprising that the reported prevalence varies greatly. Los Angeles county is likely to have a different prevalence of keratoconus in the pediatric population than previously studied areas; Los Angeles county is a very diverse, densely populated urban environment. The purpose of this study is to use Pentacam imaging technology to establish the prevalence of keratoconus in the pediatric population of Los Angeles county.
Methods: This prospective, cross-sectional, observational study collected data from children and adolescents ages 4-21. The study participants were recruited at the Children's Hospital of Los Angeles from the emergency department, those with ophthalmological related complaints or significant past surgeries were excluded. Study participants had bilateral corneal images taken using the Occulus Pentacam by trained individuals.
Results: Results pending: we expect that the prevalence of keratoconus in the pediatric population will be higher than previously reported.
Conclusions: Establishing the prevalence of pediatric keratoconus is of significant clinical interest. Early intervention may stop the progression of disease, alleviate symptoms, and reduce medical costs. Our results (pending) can influence vision screening programs for pediatric patients in both the clinic and in schools.

Autofluorescence in Inherited Retinal Degeneration

Tyler Dowd-Schoeman, Jake Rosenbloom, Hossein Ameri, USC Roski Eye Institute, KSOM

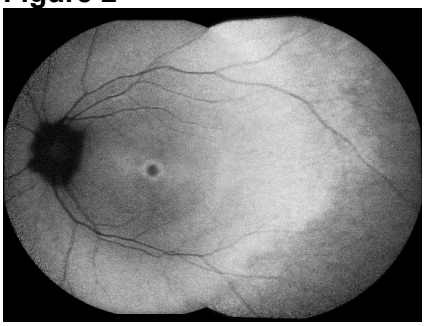
Purpose: To date, 50 genes have been implicated in the pathogenesis of retinitis pigmentosa (RP). However, specific patterns of fundus autofluorescence (FAF) in RP still remain largely unknown. Our study analyzed FAF images from a large database to test the hypothesis that certain genotypes of RP have characteristic FAF patterns that may aid in clinical diagnosis.
Methods: The NIH EyeGene database was used to gather FAF images and clinical data from 45 patients with RP. The FAF images were sorted based on genotype and reviewed by multiple investigators for autofluorescence patterns. In total, 17 genotypes were studied, all having either autosomal dominant, autosomal recessive or X-linked recessive patterns of inheritance.
Results: No unique FAF patterns were observed in genes *BBS1, EYS, HK1, IMPDH1, KLHL7, PRPF3, PRPF8, PRPF31, TOPORS, RP1, RP2, USH2A, RPGR,* or *PRPH2*. Four out of six FAF images of *CYP4V2*-linked RP demonstrated a large area of hypoautofluorescence. Two out of seven FAF images of *RHO*-linked RP demonstrated a band of hyperautofluorescence in the mid-periphery, with one of these two images exhibiting a double hyperautofluorescent ring. The single FAF image of *NR2E3*-linked RP demonstrated a double hyperautofluorescent ring.
Conclusions: Previous studies have described the double concentric hyperautofluorescent ring as a possible pathognomonic marker of *NR2E3*-linked RP. The presence of the double hyperautofluorescent ring in one out of seven patients with *RHO*-linked RP indicates that while it may not be a reliable phenotypic marker for *RHO*-linked RP, it is likely not pathognomonic for *NR2E3* either.

Figure 1



(A) FAF of *RHO*-p.T58R-linked RP demonstrating a mid-peripheral ring of hyperautofluorescence.
(B)FAF of *RHO*-p.P23H-linked RP demonstrating an inner perifoveal hyperautofluorescent ring and an outer mid-peripheral hyperautofluorescent ring circumscribing an area of hypoautofluorescence.

Figure 2



FAF of *NR2E3*-p.G56R-linked RP demonstrating a double concentric ring of hyperautofluorescence.

Expansion Study Measuring Parkinson's Disease with Tear Fluid

James Gibson, Srikanth Janga, Maria Edman, Daniel Freire, Danielle Feigenbaum, Mark Lew, Sarah Hamm-Alvarez

Purpose: Early identification of Parkinson's Disease (PD) is limited by current diagnostic tools, which are based on observation of developed symptoms. Previous study in this lab has found an increase in levels of oligomeric □-synuclein in the tear fluid of PD patients compared to healthy controls. We anticipate that these levels rise as disease progresses, serving as a potentially useful biomarker of PD. The purpose of this study is to examine how levels of □-synuclein vary with state of disease, as measured by time since PD diagnosis.
Methods: Reflex tear fluid were collected on Schirmer's strips from healthy controls (HC, n=80), early PD patients (6 months-3.11 years since diagnosis, n=80), intermediate PD patients (4-7.11 years since diagnosis, n=80), and late PD patients (8+ years since diagnosis, n=80). Tear fluid was analyzed by ELISA for total □-synuclein concentration, oligomeric □-synuclein concentration, and total tear fluid concentration.
Results: An interim analysis was conducted showing that early PD (mean=4.450 ng/mL, n=52), intermediate PD (2.662 ng/mL, n=33), and late PD (2.016 ng/mL, n=33) patients all had significantly higher levels of oligomeric □-synuclein in reflex tear fluid than HC (0.490 ng/mL, n=51). However, the levels of oligomeric □-synuclein were found to be highest in the tear fluid of patients with early disease, compared with those at intermediate and later stages of disease.
Conclusions: These results support our previous findings that tear fluid oligomeric □-synuclein is correlated with PD. The data suggests that oligomeric □-synuclein may be most elevated in early stages of PD, tapering off as disease progresses. This characteristic is desirable for a potential biomarker for early stages of PD, which currently are most difficult to diagnose. Further study should be conducted to further classify the potential of this protein as a reliable biomarker for PD.

Internuclear Ophthalmoplegia Characterizes Multiple Sclerosis Rather Than Neuromyelitis Optica

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Background: Neuromyelitis Optica (NMO) and Multiple Sclerosis (MS) represent two major forms of demyelinating diseases. Demyelination, or immune destruction of the fatty coating on neurons, leads to neurologic dysfunction and significant morbidity in patients. In the clinic, it is

challenging to distinguish between NMO and MS, yet this distinction is critical for determining long term treatment regimens. Notably, MS treatment can worsen NMO progress. In clinical practice, we have observed that MS patients can present with internuclear ophthalmoplegia (INO), an eye coordination disorder, while this finding is rarely observed in NMO patients. Here, we conducted a retrospective chart review to test this hypothesis.
Methods: We conducted a retrospective chart review of patients seen at a neuro-ophthalmology practice at tertiary care centers (Keck and LAC+USC hospitals) from 2000 to 2020. Patients with NMO and MS were identified from billing codes G35 (MS) and G36 (NMO). 80 patients with NMO, and 80 patients with MS, matched by age, gender, and duration of symptoms were included in the study. Information collected included ethnicity, gender, age, diagnosis (NMO vs MS), presence of NMO and MOG antibodies, treatment, and history of symptoms, including: Optic neuritis, transverse myelitis, and INO.
Results: Preliminary data demonstrate that among 80 cases of NMO, only 1 patient showed signs of INO (1.25%), whereas among the 62 MS patients evaluated thus far, 7 showed INO symptoms (11.29%). Additional MS patients will be looked at, and the two groups of patients (NMO and MS) will be matched by age, gender, and duration of disease.
Conclusions: These preliminary data demonstrate that there is higher incidence of INO in MS patients when compared to that of NMO patients. These data, if shown to be consistent after further analysis, could potentially inform diagnostic criteria and help physicians more readily distinguish between these two demyelinating diseases in clinical practice.

Transcriptomic and genomic profiling of retinoblastoma at the single-nucleus level

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Background: Retinoblastoma is a rare intra-ocular cancer initiated by RB1 loss or MYCN amplification. The tumor can progress to more aggressive and therapy-resistant stages in association with recurrent somatic DNA copy number alterations (SCNAs) such as 1q+, 2p+, 6p+, or 16q-. However, transcriptomic and cell signaling effects of each SCNA are poorly understood. Efforts to define SCNA effects by comparing transcriptomes from multiple tumors overlook each tumor’s variable mixture of SCNAs, microenvironments, and genetic background. Integrated single-cell RNA and DNA sequencing enables comparison of transcriptomes with or without specific SCNAs within an individual tumor, yet cell membrane lysis during freezing renders frozen cells incompatible with single-cell protocols. Therefore, we aim to: 1) develop and optimize single-nucleus RNA and DNA sequencing methods, and 2) compare nuclei within a tumor to identify transcriptomic effects of recurrent SCNAs and ultimately, characterize retinoblastoma progression.

Methods and Results: Seventy-five patient-derived retinoblastoma samples were sectioned and subjected to shallow whole genome sequencing to select SCNA-heterogeneous tumors for single-nucleus genome and transcriptome one-tube sequencing (snGTO). Briefly, snGTO flow-sorts single nuclei on the basis of DNA and RNA content, produces cDNA from RNA, amplifies cDNA and genomic DNA, and constructs a library for sequencing. Reads mapping to known or de novo exons were designated transcriptome, and reads mapping to introns or intergenic sequences were designated genome. We identified cells with and without specific SCNAs that will be used to compare gene expression, gene ontologies, and signaling activities attributable to each differentially present SCNA.
Conclusions: snGTO can simultaneously produce transcriptomic and genomic profiles of single nuclei from archived frozen retinoblastoma cells. This result suggests that snGTO can help identify transcriptomic effects of recurrent SCNAs and further link phenotype to genotype in retinoblastoma progression.

Prevalence of Keratoconus in the Los Angeles Pediatric Population

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Background: Keratoconus is a progressive disease in which the cornea becomes cone-shaped due to thinning of the corneal stroma, which can be seen in children. In this study, we hope to find a more accurate prevalence of keratoconus in the population using the Oculus Pentacam, since the current most frequently cited study of prevalence (0.054%) is from 1986. This project is important because finding the true prevalence can help to catch the disease earlier in life to prevent the aggressive progression, which will improve quality of life. We hypothesize that the prevalence of keratoconus is higher than current estimates based on data collected before current corneal imaging.
Methods: Patients in the Emergency Room at the Children's Hospital of Los Angeles (n=206) between the ages of 4-21 were scanned using the Oculus Pentacam. At least one scan was taken from both eyes, unless the patient opted out. A survey for demographic data was given to each patient as well. The scans will be read using diagnostic criteria for suspicious keratoconus (corneal thickness less than 500 micrometers centrally and/or an axial/sagittal curve value of more than 40).
Results: We collected data from 206 patients. We will classify patients as normal or suspicious for keratoconus using the diagnostic criteria. More analysis can be done by creating a model to stratify these categories with demographics as well. We will analyze the data soon and expect to see a higher prevalence of keratoconus than previously studied.
Conclusion: I will update this section when we have results. Either the hypothesis will be true, showing a higher prevalence, which will have impacts on diagnoses and treatments, or the hypothesis will be false, in which case we will work on collecting more data.

Sensitivity Analysis after Retinal Pigment Epithelium Transplant for Age-Related Macular Degeneration

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Background: In non-neovascular age-related macular degeneration, vision loss is associated with retinal pigment epithelium (RPE) loss. Implanting a nonbiodegradable substrate with human embryonic stem cell-derived RPE is a novel treatment approach. Postoperative changes in retinal sensitivity can be assessed by microperimetry testing. In this case, a subject underwent testing on 4 dates after receiving a transplant. Our goals were to 1) develop a

protocol to determine whether sensitivity points correlated with one other in location and 2) assess changes in mean sensitivity in the control and implant eyes.
Methods: This was a retrospective study of a subject's microperimetry images acquired on 4 postoperative visits (Nidek MP1S, Nidek Technologies). Adobe Photoshop CC was used in image analysis to resize, overlay, and compare images. Sensitivity values were included if corresponding values at later time points were present. Statistical analysis involved performing paired, Wilcoxan signed rank tests to assess changes in mean sensitivity.
Results: In the implant eye, the mean sensitivity was 5.04, 10.17, 10.48, and 8.65 dB on days 42, 180, 270, and 365. Mean sensitivity increased from day 42 to days 180, 270, and 365 ($p<0.05$). Over the implant, mean sensitivity increased from day 42 to days 180 and 270 ($p<0.05$). Outside the implant, mean sensitivity increased from day 42 to days 180, 270, and 365 ($p\leq0.05$). There were no significant differences in mean sensitivity in the control eye.

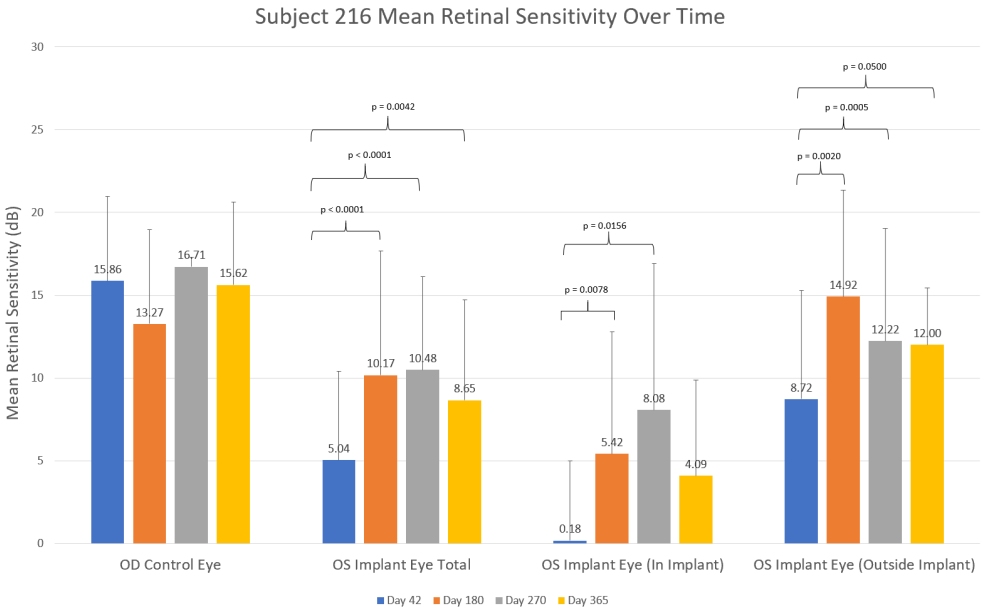

Fig 1. Mean sensitivity increased from day 42 to days 180, 270, and/or 365 in the implant eye overall, over the implant, and outside the implant. There were no significant changes in mean sensitivity in the control eye.

Summary: In this subject, visual function as measured by microperimetry testing improved in the eye with the hESC-RPE implant, not only over the area of the implant, but also outside of the implant. Conducting sensitivity testing is warranted in additional subjects who receive RPE implants.

The Effect of Electric Field Waveforms on Retinal Ganglion Cell Axon Regeneration in Vivo

Micalla Peng BS, Kimberly Gokoffski MD PhD, Dept of Ophthalmology, KSOM

Background/Purpose/Goal/Hypothesis: Damage to the optic nerve, a collection of retinal ganglion cell (RGC) axons, occurs in conditions like glaucoma and is responsible for permanent vision loss in millions worldwide. A critical obstacle to developing therapies to regenerate the optic nerve and restore vision is directing the growth of RGC axons out of the retina, into the optic nerve, to the brain. Here we employ electric fields (EFs) to direct axon growth. Many

groups have shown that EF stimulation can direct long-distance axon growth. These therapies failed to translate to the clinical arena because of use of direct current, which is unsafe. Here, we examine the efficacy of charge balanced biphasic EF waveforms (negative:positive phase amplitude of 4:1 with phase duration of 1:4 followed by an isoelectric period) to direct RGC axon regeneration in rats after optic nerve crush (ONC) injury.
Methods: Ten male rats underwent ONC followed by electrode implantation behind the globe (stimulating) and optic chiasm (ground). Two weeks after ONC, after 50% of RGC degenerated, group A (n=4) received 10 days of stimulation with the balanced biphasic waveform at 5V, group B (n=1) was stimulated with the reversed waveform, while group C (n=5) received no stimulation. Regenerating axons were labeled with cholera toxin B and quantified on ImageJ.
Results: In group A, axon regeneration was 6.5-fold greater at 1000 um compared to group C. In group B, there was no growth past 250 um.
Summary/Conclusion: These findings demonstrate that cathodic-directed charge balanced biphasic EFs direct robust RGC axon growth after 10 days of stimulation in contrast to anodic-directed stimulation or no stimulation. EFs may be an effective therapy for directing optic nerve regeneration.

Ophthalmologic characteristics and outcomes of children with cortical visual impairment (CVI) and cerebral palsy (CP)

Michael R. West, Mark S. Borchert, Melinda Y. Chang

Introduction: Cerebral palsy (CP) occurs in 26-82% of children with cortical visual impairment (CVI). The ophthalmologic characteristics and outcomes of children who have both conditions have not been previously described.
Methods: The medical records of children with CVI examined in our ophthalmology clinic between 2013 and 2019 were reviewed. Visual acuity (VA) was assessed using a previously published 6-level scale (1=normal vision) and was considered improved if increased by at least one level. Horizontal strabismus surgery outcomes were analyzed in patients with at least 6 months post-operative follow-up. Good outcomes were defined as no manifest deviation, or intermittent or constant tropia less than 10 PD.
Results: 304 patients with CVI were identified, 156 (51.3%) of whom had co-morbid CP (CVI+CP). The mean age at first ophthalmology visit was 4.1 years, and average follow-up was 2.7 years. Strabismus occurred in 83.3% of CVI+CP patients and 72.3% of CVI patients without CP (CVI-CP, p=0.02). There was no difference in presenting VA between groups (CVI+CP 3.9, CVI-CP 3.8, p=0.72). The rate of VA improvement was similar (CVI+CP 51.5%, CVI-CP 43.8%, p=0.29). Post-strabismus surgery outcomes were good in 63.6% of CVI-CP patients, compared to 28.6% of CVI+CP patients (p=0.055).
Discussion: CVI+CP patients were more likely to be diagnosed with strabismus than CVI-CP patients. Presenting VA and VA outcomes did not differ, but CVI+CP patients had worse alignment after strabismus surgery.
Conclusion: Children who have both CVI and CP have similar VA outcomes, but possibly worse oculomotor outcomes, compared to children with CVI without CP.

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ORTHOPAEDIC SURGERY

Delayed Open Reduction and Internal Fixation of Closed Ankle Fractures

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Goal: Evaluation of whether managing closed ankle fractures after 2 weeks of injury have adverse effects to patient recovery. The goal of this study is to evaluate the clinical outcomes and the reduction of closed ankle fractures >2 weeks from injury.
Methods: Patients evaluated underwent ankle fracture surgery >2 weeks after injury between the years 2005 and 2016. Senior orthopedic surgery residents evaluated appropriate reduction. Status of the tibiofibular syndesmosis, fibular length, talo-crural angle, talar tilt, and abnormality of the medial clear space >4mm was used to determine whether there was appropriate reduction. Wound complications, re-operation, ambulatory status, and other complications were reviewed through patient charts. The functional status of patients was assessed using the Olerud-Molander Questionnaire form.
Results: 72 patients were included in this study. Average age was 38.1 years (range 19-76). 65.3% (n=47) of patients were male. No fixation failure was seen on the 2-week radiograph in any patient. There was a 9.7% wound complication rate, 2.8% reoperation rate, and 5.6% all-cause readmission rate. There were a total of 36 patients with completed PROMIS scores, ambulatory status, time to weight bearing, etc. Of this group, 14 patients belonged to the <2 weeks time to surgery group, and 22 belonged to the >2 weeks time to surgery.
Discussion and Conclusion: Despite the commonly-held belief that radiographs should be obtained in all acute postoperative clinic visits; our results do not support the routine obtaining of 2-week radiographs after ankle ORIF. No patient in our series had clinically relevant findings on initial 2 week post-operative radiographs, with no interval loss of reduction or failure of hardware. Given the time, cost, and radiation to patients, surgeons should carefully consider whether radiographs are necessary 2 weeks after ankle ORIF. Currently further statistical analysis is needed to evaluate validated clincial outcomes.

The Effect of Exploratory Laparotomy on Pelvic Ring Fracture Outcomes

Emmett Cleary, Geoffrey Marecek, Assistant Professor of Clinical Orthopedic Surgery

Background: Traumatic pelvic ring fractures are typically caused by high-energy mechanisms and often exhibit complex, unstable patterns. Furthermore, patients with these fractures often have other injuries, including intra-abdominal bleeds and visceral organ injury, which in severe, emergent cases may necessitate exploratory laparotomy. This investigation seeks to assess whether exploratory laparotomy, and the attendant structural disruption of the abdominal wall musculature, has any effect on clinical outcomes for pelvic ring fracture.
Methods: Patients with pelvic ring fracture presenting at LAC+USC from January 2015-October 2019 were identified from the orthopedic surgery pass-on list. The pelvic ring injuries were then categorized based on fracture type. Those patients who underwent exploratory laparotomy (N=28) were matched using fracture classification and Injury Severity Score (ISS) with controls who did not undergo exploratory laparotomy (N=127). Clinical outcomes such as time to discharge, ICU time, and rates of infection, aseptic loosening, and general complication will be compared.
Results: Data have not yet been analyzed
Conclusions: Conclusions have not yet been drawn

Differentiating Upper Extremity Necrotizing Soft Tissue Infection from Serious Cellulitis

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Introduction:
Necrotizing Fasciitis (NF) of an upper extremity (UE) is a limb- and life-threatening emergency. It requires urgent operative management including thorough debridement and an appropriate intravenous antibiotic regimen. On initial presentation, it is challenging to differentiate NF from serious cellulitis and/or abscess. The clinical distinction is important because these entities have different, time-sensitive treatments. While the Laboratory Risk Indicators for Necrotizing Fasciitis (LRINEC) score was designed for evaluating patients with potential NF, multiple studies have reported low sensitivities using LRINEC scores, resulting in delayed diagnosis with increased morbidity/mortality. The purpose of this study is to identify predictive data on initial patient presentation that can accurately differentiate NF from clinically similar infections.

Methods:
A retrospective series of 40 consecutive surgically confirmed cases of UE NF was reviewed at an urban safety-net hospital. A control population of 40 consecutive cases of UE cellulitis and/or abscess patients with equivalent LRINEC scores was also evaluated. Data was collected for 25 continuous variables (lab values and vital signs) and six categorical variables (H&P and social history). Continuous variables were compared with Mann-Whitney U, whereas categorical variables were compared with chi-squared or Fisher exact tests. A binary logistic regression was also performed.

Results:
Multivariate analysis revealed that four factors were associated with NF diagnosis: gender (OR = 7.916, p=.037), patient-reported fever (OR = 15.625, p<.001), homelessness (OR = 14.352, p<.001), and lactate (OR = 3.316, p=.011).

Conclusion:
This analysis is the first to find an association between social factors – including gender and homelessness – and NF diagnosis. This underscores the importance of a patient's social history when considering NF diagnosis versus clinically similar infections. Multivariate analysis also points to patient-reported fevers and elevated lactate as strongly associated with UE NF diagnosis. Appreciation of these factors can contribute to timely, accurate diagnosis of limb- and life-threating NF infections.

Tables:

Table 1 – Control vs NF Population Demographics: Mann-Whitney U

	Control Group		Necrotizing Fasciitis		
Continuous Variables	mean ± std dev	Range	mean ± std dev	Range	p value
LIRNEC Score	5.16 ± 2.18	(3 - 10)	6.09 ± 3.15	(0 - 12)	0.667
Age	48.70 ± 12.95	(26 - 91)	46.08 ± 13.83	(23 - 88)	0.205
Time to Presentation (days)	5.69 ± 4.19	(0 - 14)	7.43 ± 8.82	(0.1 - 50)	0.669
Tmax (maximum temperature in ER)	37.49 ± 0.71	(36.1 - 39.5)	37.72 ± 0.91	(36.4 - 39.7)	0.364
HRmax (maximum heart rate in ER)	103.16 ± 17.38	(66 - 145)	111.50 ± 19.67	(73 - 149)	0.042
RRmax (maximum respiratory rate in ER)	22.68 ± 11.54	(18 - 94)	23.03 ± 5.93	(10 - 39)	0.179
SBPmax (maximum systolic blood pressure in ER)	149.50 ± 15.98	(118 - 194)	139.18 ± 20.76	(104 - 198)	0.014
DBPmax (maximum diastolic blood pressure in ER)	86.27 ± 13.43	(55 - 114)	85.75 ± 13.95	(46 - 117)	0.654
MAPmax (maximum mean arterial pressure in ER)	107.35 ± 12.86	(83 - 140)	103.56 ± 13.85	(77.3 - 129.3)	0.207
SBPmin (minimum systolic blood pressure in ER)	112.66 ± 17.59	(57 - 151)	111.35 ± 17.71	(73 - 144)	0.560
DBPmin (minimum diastolic blood pressure in ER)	67.98 ± 12.08	(35 - 96)	67.60 ± 12.46	(46 - 95)	0.837
MAPmin (minimum mean arterial pressure in ER)	82.87 ± 12.98	(58.3 - 112.3)	82.18 ± 13.50	(60 - 114.3)	0.648
dSBP (delta systolic blood pressure)	36.84 ± 14.71	(5 - 100)	27.83 ± 22.07	(0 - 80)	0.031
dMAP (delta mean arterial pressure)	24.48 ± 10.93	(3 - 43.3)	21.38 ± 15.78	(0 - 68.7)	0.202
WBC (white blood cells)	14.94 ± 6.03	(3.8 - 25.9)	21.23 ± 9.94	(6.8 - 61)	0.002
Hb (hemaglobin)	11.49 ± 2.73	(4.9 - 16.6)	12.05 ± 2.05	(7.3. - 15.9)	0.446
Na (sodium)	134.09 ± 5.41	(117 - 151)	134.93 ± 7.01	(120 - 163)	0.418
Cre (creatinine)	2.06 ± 1.43	(0.39 - 5.17)	1.34 ± 1.68	(0.47 - 9.15)	0.264
Glc (glucose)	226.30 ± 186.57	(83 - 1,005)	172.49 ± 152.14	(74 - 785)	0.030
CRP (c-reactive protein)	148.77 ± 93.89	(1.6 - 356.2)	211.14 ± 128.70	(12.6 - 559.7)	0.046
ESR (erythrocyte sedimentation rate)	59.45 ± 35.23	(15 - 115)	54.00 ± 28.71	(8 - 102)	0.581
Lactate	1.41 ± 0.72	(0.4 - 3.5)	2.06 ± 1.43	(0.5 - 8.7)	0.003
INR (international normalized ratio)	1.14 ± 0.13	(0.86 - 1.46)	1.24 ± 0.24	(0.95 - 2.26)	0.048
PPmax (maximum pulse pressure)	63.23 ± 13.44	(39 - 92)	53.43 ± 19.16	(20 - 92)	0.001
PPmin (minimum pulse pressure)	44.68 ± 11.99	(18 - 71)	43.75 ± 10.74	(25 - 68)	0.943

Table 2 – Control vs NF Chi-Squared Analysis

Categorical Variable	Total n = 84		Control Group n = 44		Necrotizing Fasciitis n = 40		χ2	p-value
	n	%	n	%	n	%		
Gender:								
- Male	68	81.0%	40	90.9%	28	70.0%		
- Female	16	19.0%	4	9.1%	12	30.0%	5.94	0.015
Laterality:								
- Right	52	61.9%	27	61.4%	25	62.5%		
- Left	32	38.1%	17	38.6%	15	37.5%	0.01	0.915
Homeless								
- Yes	36	42.9%	9	20.5%	27	67.5%		
- No	48	57.1%	35	79.5%	13	32.5%	17.66	< .001
IV Drug Use								
- Yes	37	44.0%	11	25.0%	26	65.0%		
- No	47	56.0%	33	75.0%	14	35.0%	13.6	< .001
Subjective Fever								
- Yes	23	27.4%	3	6.8%	20	50.0%		
- No	59	70.2%	39	88.6%	20	50.0%	18.65	< .001
Objective Fever								
- Yes	19	22.6%	6	13.6%	13	32.5%		
- No	65	77.4%	38	86.4%	27	67.5%	4.26	0.039

Table 3: Control vs NF -- Binary Logistic Regression

Factor	B	S.E.	Wald	df	Sig.	Exp(B)
Gender	2.069	0.994	4.336	1	0.037	7.916
Subjective Fever	2.744	0.852	10.384	1	0.001	15.625
Homeless	2.664	0.772	11.892	1	0.001	14.352
Lactate	1.199	0.472	6.457	1	0.011	3.316
Constant	-1.689	1.151	2.154	1	0.142	0.185

Analysis of Trends in Severe Lumbar Disc Degeneration Using Kinematic MRI

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Background: Lumbar disc degeneration is a primary factor in the development of low back pain, which is the leading cause of disability worldwide. Degeneration of the lumbar discs has been shown to increase with age and has been studied histologically, with radiographs, and with non-weightbearing MRI. The aim of the current study is to report on trends in severe lumbar disc degeneration across age, sex, and disc level using weightbearing MRI.
Materials and Methods: Between January 2019 and July 2019, 1250 cases (patients older than 20 years old, with no history of spine surgery) were retrospectively analyzed with kMRI. Patients were divided into 5 groups based on age (20-29, 30-39, 40-49, 50-59, 60+). A total of 1,250 cases, divided equally between age groups, were evaluated using the Pfirrmann classification to assess for disc degeneration at 5 vertebral levels: L1-L2, L2-L3, L3-L4, L4-L5, and L5-S1. Trends in degeneration were analyzed with regression and time series.

Results: The L5-S1 vertebral disc had the highest mean Pfirrmann grade across all age groups. Group 5 had the highest mean Pfirrmann grade across all vertebral levels. All vertebral levels showed significant difference between the age groups ($p<0.001$ at all levels), and at all vertebral levels age showed a positive correlation with Prirrmann grade ($p<0.001$ at all levels). Statistically significant differences between males and females were found only in age groups 1 and 2, in which males showed more degeneration.
Conclusion: Our findings using kinematic MRI corroborate prior studies with radiographs and non-weightbearing MRI in showing that degeneration increases with age and is most severe in the L5-S1 disc. Young males were more likely to have severely degenerated discs than young females, but there was no significant difference from the fifth decade on. Explanation for why young males have more degeneration is speculative, while the accelerated degeneration in women in later life is likely attributable to post-menopausal changes.

Comparison of Hemorrhagic Complications and Postoperative Outcomes using Heparin as Routine Deep Vein Thrombosis Prophylaxis after Lumbar Spine Procedures. Christian Jimenez, R. Kiran Alluri, MD, Raymond Hah, MD. Department of Orthopedic Surgery, KSOM

Background: The North American Spine Society states that chemoprophylaxis for deep vein thromboses (DVT) after elective spine surgery is controversial and that the risk of complications may outweigh the low risk of thromboembolism. Currently, spine surgeons at the Keck School of Medicine provide routine chemoprophylaxis to all elective lumbar spine surgery patients who do not have a contraindication. We hypothesize that heparin chemoprophylaxis does not increase the risk of emergent bleeding complications, such as epidural hematomas.
Methods: A retrospective evaluation of 385 elective lumbar spine surgeries is being performed from surgeries ranging from November 2015 to December 2018. Surgeries in this analysis include laminectomies, minimally invasive laminectomies and foraminotomies, as well as laminectomy corpectomies and fusions. Patient demographics such as prior medical and medication history are being recorded. Operative information including surgical approach and intraoperative complications are being recorded. Lastly, post-operative information including DVT prophylaxis, presence or absence of hematoma, DVT, and pulmonary embolism (PE) as well as outpatient complications are being recorded too.
Results: Review of past surgeries is ongoing. Preliminary results seem to show a low incidence of epidural hematomas with a majority of patients having minimal to no complications during their surgery, hospital course, and outpatient experience. Thus far, there have been no cases of DVT or PE.
Conclusions: Early results show that routine heparin use after elective spine surgery does not increase the risk of emergent epidural hematomas. If final results continue to support this statement, this research could help clear the debate over the safety of DVT chemoprophylaxis in elective spine surgery.

Routine Early Post-Operative Ankle Radiographs: Are They Relevant?
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Background: Recently, there have been several studies assessing the utility of early post-operative radiographs for various fracture types that have found that early radiographs have no impact on fracture management, and thus the discontinuation of the routine use of these radiograph studies has been recommended. Despite this finding, there are no prospective studies to date that assess the clinical impacts of eliminating early post-operative plain

radiographs from the routine management of ankle fractures. In light of these findings, a quality-improvement (QI) protocol was implemented in 2019 to eliminate post-op imaging at 2 weeks following ankle fracture fixation. We undertook the current study to examine whether the elimination of early radiographs had an effect in complication rates and time spent in the clinic.
Methods: Post-op ankle fracture patient (pt) records from a 3 month (m) period in 2017, pre-QI, (n=43) and in 2019, post-QI, (n=47) at 2 week (w) and 12 w post-op were reviewed to assess weight bearing status (WB), image findings, clinical signs of complication, need/reason for re-operation, and time spent in clinic. Chi-squared test was used to compare complication rate between pre-QI and post-QI cohorts ($p<0.05$) and t-test will be used to compare time spent in clinic ($p<0.05$).
Results: The complication rate between the pre-QI and post-QI cohorts was not statistically significant ($p=0.41352801$). Additionally, all of the complications in pre-QI pts (n=4) were related to infection whereas the complications in post-QI pts (n=2) were related to hardware removal due to pain. Time spent in clinic has not been analyzed, but it is speculated that the time spent in clinic will be significantly shorter for post-QI patients because of the elimination of imaging.
Conclusions: The data provides evidence that attaining radiographs at 2 weeks post-op does not make a significant difference in complication rates and decision making, indicating that attaining early imagining, unless clinically indicated, does not favor fewer complication rates.

Post-operative Narcotic Use in Blunt and Ballistic Orthopedic Trauma Patients

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INTRO Blunt and ballistic injuries are common mechanism of injury encountered by orthopedic traumatologists. However, these injures may have differences in operative management and post-operative care. Given the evolving opioid crisis in medicine, there has been considerable attention given to appropriate management of pain. The purpose of this study was to evaluate the immediate post-operative use of narcotic medications in blunt injuries compared to ballistic injuries in orthopedic trauma patients.
METHODS We conducted a retrospective review of orthopaedic consults from our level 1 trauma center in 2016. Patients were propensity match given age sex and injury severity. All opioid pain medication dosages were converted to morphine equivalents (MEU). The total MEU during the following time periods was calculated: 24 hours post-operative, 24-48 hours post-operative, 48 hours -7 days post-operative, and 24 hours prior to discharge. Differences in means were assessed using a chi square test for categorical variables and a student's t-test for continuous variables. Significance was set at $p<0.05$.
RESULTS Twenty three age-matched patients were evaluated in each group. Blunt injuries had higher MEU compared to Ballistic injuries in the first 24 hours post op (35.72 ± 21.55 vs 24.67 ± 14.88). Patients with blunt injuries did not differ from ballistic with opiate consumption at 24-48 hours post op (30.97 ± 23.17 vs 27.72 ± 20.53) and from 48 hours-7 days per 24 hours post op (29.39 ± 24.54 vs 23.50 ± 17.17). There was no difference in rate of return-to OR (1.26 ± 0.88 vs 1.48 ± 0.67) or rate of admission to ICU (13% vs 22%).
CONCLUSION Blunt injuries required an increased post-operative narcotic consumption during the first 24 hours of inpatient stay following orthopedic fracture fixation. However there was no difference at other time points. Post-operative pain medication regimens may need to increase for patients with blunt injuries during the immediate post-operative time compared to those with ballistic injuries.

Accuracy of Plain Radiographs in Detecting Lumbar Pseudoarthrosis

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Goal: The quality of life in patients who develop pseudoarthrosis of the lumbar spine is greatly diminished, placing a great importance on diagnosing the condition with minimal burden to the patient. The diagnosis of lumbar pseudoarthrosis on plain radiography compared to the current gold standard of CT, has not yet been evaluated. The purpose of our study was to confirm that plain radiography is sufficient to diagnose the condition.
Methods: Five orthopaedic surgeons were presented with the imaging of 32 patients, which included static and dynamic plain radiographs, and cross-sectional CT images. Each surgeon was asked if they were able to make a diagnosis of lumbar pseudoarthrosis. The accuracy of plain radiographs was calculated using responses to CT imaging as the control.
Results: Static plain radiographs demonstrated a specificity of 93%, sensitivity of 66.7%, negative predictive value (NPV) of 31.6%, and positive predictive value (PPV) of 92.3% for the diagnosis of lumbar pseudoarthrosis. The interobserver correlation coefficients for static x-rays and CT images were 0.725, and 0.770 respectively. The sensitivity, specificity, positive predictive value, and negative predictive value for dynamic radiographs were 63%, 50%, 83%, and 75% respectively.
Conclusions: Static x-rays are accurate in diagnosing lumbar pseudoarthrosis, but not accurate in ruling out the disease. Furthermore, dynamic radiographs were shown to have limited diagnostic utility. Based on the results of our study, we believe that a positive diagnosis of lumbar pseudoarthrosis in a patient with a high pretest probability would be sufficient, and that a CT scan would be unnecessarily exposing the patient to radiation and cost burden. However, CT would be recommended to definitively rule out pseudoarthrosis.

Cervical Spine Intervertebral Disc Degeneration: A Kinematic MRI Study

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Background: Cervical intervertebral disc (IVD) degeneration is a common cause of neck and arm pain in adults and a frequent finding in imaging studies. Magnetic resonance imaging (MRI) is the most useful tool for evaluating IVD degeneration. This study aimed to assess age-related degenerations of cervical IVDs at each cervical spinal level in different age groups using kinematic MRI (kMRI) in a population of symptomatic patients in the United States.
Methods: This study was a retrospective analysis of 1300 patients who had undergone cervical spine kMRIs from February to July 2019. Patients were divided into five equal groups each of 260 patients based their ages. Group 1 included patients from 20 to 29 years, group 2 from 30 to 39 years, group 3 from 40 to 49 years, group 4 from 50 to 59 years, and group 5 were patients 60 years and above. On T2-weighted sagittal MRI, Pfirrmann grading system was used to grade the IVD degeneration into five grades. Significant disc degeneration was considered when the disc had grade IV or V, with IVDs from C2/3 to C7/T1 being evaluated.
Results: The most common degenerated level was C3/C4 (18.30%). The most common grade was grade III (41.28%). In groups 1, 2, & 3 the most common degeneration grade was grade III (37.63%, 52.50%, 49.10%, respectively). In groups 4 & 5, the most common degeneration grade was grade IV (48.91% & 60.32% respectively). The most common degenerated level in groups 1 & 2 was C3/C4 (21.14% and 19.98% respectively).The most common degenerated level in group 3 was C5/C6 (18.65%) and in group 4 were C4/C5 and C5/C6 (17.25% each). Approximately, all levels were degenerated equally in group 5 (ranging from 16.29% to 16.80%).

Conclusion: IVD degeneration of the cervical spine is more common at the C3/C4 level. Cervical IVD degeneration tends to become more severe after 50 years. Future steps include development of predictive models of disc degeneration based on level and age.

K-wire Size has No Effect on Outcomes of Percutaneous Pinning of Supracondylar Humerus Fractures in Children Age > 5 years old or Weighing > 20 kg

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Introduction: There is little information in the literature on the effects of weight, age, and K-wire size on supracondylar humerus (SCH) fracture outcomes. The purpose of this study is to investigate the effect of K-wire size on SCH fracture outcomes in patients age > 5 years old or weighing > 20 kg.
Methods: Retrospective review was conducted on patients with SCH fractures from 2010 to 2014 in a tertiary care pediatric hospital. Patients aged < 18 years with a Gartland type III or IV SCH fracture who underwent closed or open reduction with percutaneous pinning were included. Medical charts were reviewed for demographics, injury characteristics, and complications. Patients were subdivided into two groups for analysis (weight > 20 kg and age > 5 years old). Outcomes within each group (age > 5 years old; weight > 20 kg) were compared between patients treated using 2 mm versus 1.6 mm K-wires.
Results: One hundred seventy-eight patients with 178 SCH fractures met inclusion criteria for age (> 5 years old). Sixteen percent (28/178) of patients were treated using 2 mm K-wires and 84% (150/178) were treated using 1.6 mm K-wires. There were no differences in the incidence of reoperation ($p = 0.29$) or complications including compartment syndrome ($p > 0.999$) and pin tract infection ($p = 0.40$) between groups; with no incidence of cubitus varus in either group. There was also no difference between groups in the percent of patients with full range of motion in elbow extension ($p > 0.999$) and elbow flexion ($p = 0.56$) at final follow-up.
In the second group, 158 patients with 158 SCH fractures met inclusion criteria for weight (> 20 kg). Sixteen percent (26/158) of patients were treated using 2 mm K-wires and 84% (132/158) were treated using 1.6 mm K-wires. There were no differences in the incidence of reoperation ($p = 0.17$) or complications including compartment syndrome ($p > 0.999$), pin tract infection ($p = 0.52$), and cubitus varus ($p > 0.999$) between groups. There was also no difference between groups in the percent of patients with full range of motion in elbow extension ($p = 0.83$) and elbow flexion ($p = 0.83$) at final follow-up.
Discussion and Conclusion: In children age > 5 years old or weighing > 20 kg, K-wire size (2 mm versus 1.6 mm) had no effect on outcomes of type III or IV SCH fractures.
Summary: Children age > 5 years old or weighing > 20 kg with supracondylar humerus fractures can be safely and effectively treated with percutaneous pinning using either 2 mm or 1.6 mm K-wires.
Keywords: humerus; supracondylar; fracture; weight; complications; K-wire

Assessing Predictors of Morbidity and Mortality in Patients with Pulmonary Atresia with Intact Ventricular Septum

Krishan Patel, Arash Sabati, MD, Jon Detterich, MD

Background/Hypothesis: Pulmonary atresia with intact ventricular septum (PAIVS) is a rare congenital heart defect that affects nearly 7 in 100,000 live births. PAIVS has been treated using various surgical options that may result in: 1. Biventricular repair where continuity between the right ventricle (RV) and pulmonary artery is established, 2. One and a half ventricle palliation

that establishes continuity between the RV and pulmonary artery in addition to a Glenn procedure where the superior vena cava is connected to the right pulmonary artery, or 3. Single ventricle palliation utilizing a Fontan completion, connecting the inferior vena cava to the pulmonary arteries after a Glenn with no continuity between the RV and pulmonary artery established.
Though several authorities in the field have advocated for a balanced approach that uses initial tricuspid Z-scores to predicate the type of repair, there has been an innate bias towards biventricular repairs due to the belief that it maximizes long-term functional health status. Several studies have demonstrated the advantages of single ventricle and 1.5 ventricle palliations in patients with borderline degrees of right-sided hypoplasia, with benefits including decreased mortality and increased exercise capacity. However even z-score methods can be imperfect, as the scores can be derived from different data sets, leading to inappropriate surgical pathway allocation. To our knowledge, there has not been a comprehensive review of echocardiogram and cardiac catheterization data comparing the different treatment groups and their pre- and post-surgery anatomies and physiologies. This project aims to determine risk factors for mortality in patients with pulmonary atresia with intact ventricular septum and determine predictors of successful two ventricle repair versus single ventricle palliation versus 1.5 ventricle palliation.
Methods: Between January 2003 and December 2015, 161 patients were treated for PAIVS at our heart center with catheter-based interventions and/or surgery. Echocardiogram and cardiac catheterization data was retrospectively collected and reviewed. We will use multivariate logistic regression to determine predictors for survival, area under the curve analysis to determine the importance of the variables for survival, and Kaplan Meyer curves to determine whether survival is different in the different groups (single ventricle palliation, 1.5 ventricle palliation, and two ventricle repair).
Results: We are still currently in the process of collecting and analyzing data. We expect that right ventricular (RV) morphology and tricuspid Z-score will be the best predictors of mortality across all groups. We expect patients with higher tricuspid Z-scores will fare better in the single ventricle palliation and 1.5 ventricle palliation groups rather than the two-ventricle repair group.
Summary/Conclusion: This project will give insight on the management of patients with PAIVS based on imaging findings. In the future, we hope to expand the end points of this study beyond mortality to include exercise physiology data, which objectively conveys the functional status of PAIVS children.

Surgical Outcomes of Methamphetamine Users With Orthopaedic Hand Lacerations

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Background: Methamphetamine (MA) is an illicit stimulant that causes both release and reuptake inhibition of dopamine within the CNS. The drug characteristics predispose MA users to orthopedic injuries and poor outcomes. Hand lacerations can present with complex neurovascular injuries, leading to worse outcomes than other hand injuries. In this study, we present a cohort of patients from an urban level one trauma center with comparison of patients with and without MA use. We hypothesized that patients with MA use would have worse injuries, more complications, and worse outcomes.
Methods: We identified 3,787 patients with a orthopaedic consult note; patients without a completed consult note were excluded. After data collection, patients were classified as MA users if they tested positive for amphetamines on urine toxicology or endorsed MA use on social

history. Degree of hand injury was determined via the Hand Injury Severity Score. Statistical analysis was performed using Microsoft Excel or Prism 8.
Results: In both cohorts the most common mechanism was stab wounds, though there was no statistical difference between the cohorts for any of the mechanisms ($p>0.05$). We then analyzed the rates of neurovascular injury between the two cohorts. The ulnar nerve was damaged in 11 in the MA group, while 0 patients had this injury in the non-MA group ($p=0.0016$). The most common zone of injury in both cohorts was flexor zone V and there was no difference in zone distribution between the cohorts.
Conclusion: We found an increased rate of multiple surgeries within the MA group compared to the non-MA group ($p=0.0342$). PFS to second surgery for the MA group was significantly decreased compared to the non-MA group. Additionally, the MA group had decreased overall follow up compared to the non-MA group. Overall, there was a significant increase in the number of patients with complications within the MA cohort ($p=0.0043$). The MA cohort also had an increased incidence of prolonged pain following surgery compared to the non MA group.

Complication Rates after Elective Lumbar Fusion Procedures in Patients with Oral Pre-operative Corticosteroid Use

Sidney Roberts, Jon Kimball, Blake Formanek, Jeffrey Wang, Zorica Buser

Purpose: The goal of this study was to understand the association between oral corticosteroid use and lumbar fusion surgery, as well as elucidate any differences in complication rates between various fusion surgeries in patients taking oral corticosteroids.
Methods: Using the PearlDiver patient record database we identified adult patients who had undergone either Anterior Lumbar Interbody Fusion (ALIF), Posterior Lumbar Interbody Fusion (PLIF), or Posterior Lumbar Fusion (PLF). Those patient cohorts were divided based on the presence or absence of prior diagnosis of osteoporosis or osteopenia and based on corticosteroid usage. Incidence of post-operative complications, including revision rates, hospital re-admission, and post-operative SSI was analyzed for each group at various time points.
Results: Patients in the PLIF cohort who had taken oral corticosteroids 6 months prior to surgery had significantly higher rates of revision at 1 year odds ratio ($p=0.017$) than those who had never taken corticosteroids. 6-month corticosteroid users were more likely to be readmitted by 6 months post-op had (OR: 1.27, 95% CI, 1.07 - 1.49) compared to non-corticosteroid users. There was no statistically significant difference in SSI or sepsis between the groups in the PLIF cohort. There was no statistically significant difference in terms of complications between patients in the PLF or ALIF cohorts.
Conclusion: Patients who underwent PLIF and took oral corticosteroids within 6 months of surgery had higher rates of revision at 1 year. Patients who underwent ALIF and PLF who had taken oral corticosteroids prior to surgery did not have significantly higher rates of complications.

The Effect of Modifiable Risk Factors on 30, 60, and 90-Day Readmission Rates in Patients Following Lumbar Spine Fusion

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Category: Surgical Outcomes

Background/Introduction: The increasing prevalence of lumbar spinal fusion has been accompanied by an increase in costly and untimely readmissions - a concern shared among hospitals, physicians, and patients alike. Many studies emphasize perioperative and intraoperative care, few highlight the autonomy and control of patients over their own outcomes. Therefore, this study explores the impact of modifiable risk factors on 30, 60, and 90-day readmission rates following lumbar spine fusion.

Methods: In a retrospective cohort analysis, patients with lumbar spine fusions who were non-electively readmitted within 30 (n=5,179), 60 (n=7,122), and 90-day (n=9,678) periods were identified within the 2016 Nationwide Readmissions Database (NRD) using ICD 10 codes. Patients were then stratified by the following modifiable risk factors: Alcohol use, tobacco or nicotine use, malnourishment, and hyperlipidemia. Routine follow-ups were excluded. Statistical analysis was conducted using Welch's paired two sample t-test to compare differences in 30-, 60-, and 90-day readmissions in patients diagnosed with the identified modifiable risk factors versus those without.

Results: 30-day readmission rates were significantly higher in patients with malnourishment ($p=0.0488$) and hyperlipidemia ($p<0.0001$) compared to those without. No significant differences in 30-day readmission, however, were found between patients with tobacco/nicotine ($p=0.0596$) and alcohol ($p=0.0907$) usage compared to those without. 60-day readmission rates were significantly higher in patients with malnourishment ($p<0.0001$), hyperlipidemia ($p<0.0001$), tobacco or nicotine use ($p=0.011$), and alcohol use ($p=0.0007$) compared to those without each respective comorbidity. At 90-days, readmission rates were significantly higher in patients with malnourishment ($p<0.0001$), hyperlipidemia ($p<0.0001$), tobacco or nicotine use ($p<0.001$), and alcohol use ($p<0.0001$) compared to those without each respective comorbidity.

Conclusion: Malnourished or hyperlipidemic patients were readmitted significantly more at 30 days than patients without those comorbidities, though tobacco/nicotine and alcohol were non-significant. However, all modifiable risk factors demonstrated a significant difference in readmission rates at 60 and 90 days compared to patients without those risk factors. Future studies should investigate the impact of these modifiable risk factors on long-term outcomes for lumbar spine fusion patients.

OTOLARYNGOLOGY

Failure of Office-Based Laser Management of Primary Laryngeal Pathology Requiring Subsequent Operating Room Intervention

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Importance: Management of primary laryngeal pathologies such as recurrent respiratory papillomatosis, vocal cord polyps, and leukoplakia in adults has evolved to include office-based laser techniques as opposed to the traditional operating room interventions. Some patients are better able to tolerate the awake office-based laser treatments, while others require treatment under general anesthesia in an operating room setting.
Objective: To determine whether demographic, comorbidity, and/or disease characteristics differ between patients who tolerated office-based laser treatments vs patients who failed to tolerate office-based laser treatments and had to be subsequently treated in an operating room setting.
Design, Setting, and Participants: This study involved a medical record review of adult patients with primary laryngeal pathologies treated at Keck Hospital of USC via office-based flexible laryngoscopy KTP (potassium-titanyl-phosphate) laser between December 2014 and December 2019.
Main Outcomes and Measures: Demographic, comorbidity, and disease characteristics were compared between patients who tolerated office-based laser treatments vs patients who failed to tolerate office-based laser treatments and had to be subsequently treated in an operating room setting. A modified Derkay score was utilized to rate disease characteristics and severity, while a 100mm visual analog scale was utilized to rate vocal cord movement, swallowing, aberrant lasers, and overall tolerance of the most recent procedure for those who tolerated office-based treatment or the procedure prior to operating room intervention for those with office-based failures.
Results: Of the 63 patients (46 male and 17 female, with a mean [SD] age of 60.8 [17.5]) treated during the 4 year period, 10 (mean age 54.2) experienced a failure of office-based treatments and required subsequent intervention in the operating room. Sex, age, and weight were not statistically significantly different between the two groups. However, patients requiring operating room treatment had a significantly higher modified Derkay score. No statistically significant differences in primary pathology or comorbidities were observed between the two groups.
Conclusions and Relevance: There were no sex, age, or comorbidity differences between patients who tolerated office-based treatment vs those who required subsequent operating room intervention after office-based treatment intolerance. However, patients with greater disease severity were more likely to require management in the operating room.

Creation of an Evidence-based Educational Tool for Families of Patients Sustaining Severe Traumatic Brain Injury

Bonney PA, Donoho D, Bajouri Z, **Castellanos C**, Amar A

Background: Blunt head trauma accounts for thousands of Emergency Department visits per year at LAC+USC Medical Center. By virtue of the suddenness events, patient families have difficulty processing the immediate decisions, including whether to pursue aggressive interventions including surgery. From a surgeon's standpoint, what is often lacking is a knowledge of basic estimates of prognosis to help inform decision making.
Methods: The LAC+USC Trauma Registry from 2010 - 2018 contains over 25,000 patients for this 9-year period. We chose adult patients at risk for severe traumatic brain injury using the Glasgow Coma Scale (GCS). A score from 3 to 8 indicates severe injury. In total, 988 met study criteria from traumatic brain hemorrhage. Two variables were the primary drivers of patient

outcome: patient age and patient GCS. We then stratified the probability of (1) mortality and (2) poor outcome by these predictors. A poor outcome was defined as morality or discharge to long-term care facility. Linear regression was used to analyze data.
Results: For patients over the age of 30 presenting with GCS 3, the percent chance of mortality is equal to the patient's age + 10. The percent chance of poor outcome is equal to the percent chance of mortality + 20. When the value is greater than 95% for either term, the appropriate interpretation is >95%. For patients less than 30 years of age, use the value for age 30 (40%). For patients presenting with GCS between 4 and 8 over the age of 40, the percent chance of mortality is equal to (age - 40) * 1.5 + 10. The percent chance of poor outcome is equal to the percent chance of mortality + 30. When the value is greater than 95% for either term, the appropriate interpretation is >95%. For patients less than 40 years of age, use the value for age 40 (50%).
Conclusions. Using nearly 1000 cases from our institution, we created an easy rule to help determine probabilities of mortality and poor outcome to be used to guide initial encounters with patient families.

Trends in Operative Maxillofacial Trauma Among the Incarcerated Population

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Introduction: Over 3 million incidents of facial trauma occur each year in the US. Public health interventions are aimed at reducing traumatic events and improving management for these patients. The trauma center within Los Angeles County, LAC+USC Medical Center treats patients who present with an array of facial trauma pathologies including patients from a nearby detention center. Understanding the etiology and nature of maxillofacial injuries that the incarcerated population present with is important for improving the public health of this at-risk population.
Objectives: To determine factors related to operative facial trauma in the incarcerated population.
Study Design: A retrospective chart review of all operative facial trauma from July 2015 to June 2019 presenting to a level I trauma center in a large urban setting.
Methods: All operative facial trauma presenting to a level I trauma center in a large urban setting from 2015-2019 were evaluated and a subset analysis was performed on patients who were identified as incarcerated at the time of admission. Demographic data, mechanism of injury, fracture location, and complications were evaluated and compared to the non-incarcerated population.
Results: From 2015-2019, 107 incarcerated patients and 583 non-incarcerated patients presented with operative facial trauma. The mean patient age for the incarcerated population was 33.5, compared to 34.3 for the non-incarcerated population. The most common mechanism of injury for incarcerated and non-incarcerated patients was assault (84% vs 66.5%, $P < 0.0001$) followed by fall (7% vs 14%, $P < 0.014$). Incarcerated patients sustained a similar frequency of orbital floor fractures and mandibular (43% and 42.6% respectively), followed by midfacial/zygomaticomaxillary (ZMC) complex fractures (10%). Non-incarcerated patients most commonly sustained mandibular fractures (59%) followed by Orbital floor fractures (21.6%), and midfacial/zygomaticomaxillary complex fractures (12%). Post-operative complications were limited in both populations (9% incarcerated vs 14% non-incarcerated, $P < 0.10$).
Conclusions: Incarcerated patients experience a significantly higher rate of operative maxillofacial trauma secondary to assault than non-incarcerated patients. This population does not experience higher rates of complications or readmission, however, more safety resources should be allocated to prevent assault in for the at-risk incarcerated population.

Trends in Nonphysician Clinician Utilization in Otolaryngology from 2012 to 2017

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Background: Nonphysician clinicians (NPCs), including physician assistants and nurse practitioners, have experienced an ever-expanding scope of practice in recent years. While this trend initially served to ameliorate the shortage of primary care providers, NPCs have begun to increase their presence in procedural specialties as well. This study aims to investigate the role of NPCs in otolaryngology by analyzing the trends in services they provide over a study period.
Methods: This study employed a retrospective review of the Medicare Physician and Other Supplier Public Use File (PUF) database for 2012 and 2017. Ten of the most common Current Procedural Terminology (CPT) codes in otolaryngology were analyzed with respect to provider type.
Results: The procedures with the most significant increase in NPCs over the five-year period analyzed were stroboscopy (307%), canalith repositioning (143%), mastoid cavity debridement (126%), and sinus debridement (118%). For balloon sinuplasty (BSP), while physicians were the sole providers in 2017, NPCs represented 3% of the providers of this procedure by 2017. Tympanostomy was the one procedure evaluated that experienced a decrease in NPC providers (7.2%).
Conclusions: Overall, there is an increase in NPC billing for common otolaryngology procedures, which aligns with the initial hypothesis and trends reflected in other procedural specialties. Like other medical specialties, otolaryngology has a growing demand for physicians that greatly surpasses its current supply and is only projected to increase. The utilization of NPCs could be one potential aid in addressing this deficit, though there is a need for more standardization across regions regarding their scope.

Detection of Secretory Leukocyte Protease Inhibitor as a potential salivary biomarker of head and neck squamous cell carcinoma

Franklin Wu BA, Margaret Nurimba BA, Suma Gudipati BA, Diane DaSilva PhD, Martin Kast PhD, Uttam Sinha MD

Background: Salivary biomarkers are an emerging diagnostic tool for the detection of head and neck squamous cell carcinomas (HNSCC). Secretory Leukocyte Protease Inhibitor (SLPI) is a neutrophil elastase expressed by squamous epithelium and a key component of the innate immune response to viruses, including the human papilloma virus (HPV). Previous studies show that SLPI is downregulated in oropharyngeal squamous cell carcinoma (OPSCC) tissue and may be associated with an increased risk of developing HNSCC. This study aims to demonstrate the feasibility of detecting SLPI as a salivary biomarker for HNSCC.
Study Design: Prospective case-control study at a single academic institution between October 2018 - December 2019.
Methods: Saliva samples were collected from patients with OSCC (n=10), OPSCC (n=7) and healthy controls (n=9). Saliva samples were assayed for SLPI protein by indirect enzyme-linked immunosorbent assay (ELISA). Bradford assays were conducted to determine total protein concentrations in saliva for normalization.
Results: The median normalized SLPI levels were greater in healthy controls (2089 ng/mL,range: 263.3 - 15157 ng/mL) compared to patients with OSCC (1685 ng/mL, range: 70.80 - 10365 ng/mL), and OPSCC (957.0, range: 229.5 - 5575 ng/mL). Despite this, no statistically significant differences in SLPI levels were noted between healthy controls and

cancer patients (p=0.171, Mann-Whitney U), regardless of the type of cancer (p = 0.445, Kruskal-Wallis).
Conclusion: Salivary SLPI levels in this pilot study were not predictive of disease status. However, the study sample size is limited. Over 30 additional patient samples have been collected and further testing will be performed. Future analysis will also control for other variables shown to affect SLPI expression levels such as smoking status and age. Additionally, laryngeal and pharyngeal cancer patients must also be examined for SLPI expression. These studies will clarify the utility of SLPI as a potential salivary biomarker for head and neck squamous cell cancer.

The Effects of Various Demographics Characteristics and Complications After a Thyroidectomy on Hospital Length of Stay

Ryan Ziltzer, BS; Liyang Tang, MD; Shane Zhou, MD; Daniel Kwon, MD; Tamara Chambers, MD

Background: Historically, total thyroidectomies are done on an inpatient basis to monitor for hypocalcemia and hematoma post-operatively. In recent years, there has been a push for decreased length of hospital stay, including outpatient thyroidectomies. Our goal is to identify factors associated with increased length of hospital stay post-thyroidectomy. The hypothesis is that patients who have larger thyroid weight have higher complications rates and therefore longer length of hospital stay.
Methods: This is a retrospective cohort study. The charts of patients who have undergone thyroidectomies at Los Angeles County Hospital and Keck USC Hospital in the past 6 years are being reviewed. Primary measures include thyroid volume and weight, perioperative complications, and hospital length of stay. Secondary measures include age, co-morbidities, intraoperative blood loss, post-operative parathyroid hormone levels (PTH), calcium gluconate (IV calcium) usage, and recurrent laryngeal nerve injuries. Of 103 charts reviewed so far, 85 charts met inclusion criteria and were analyzed.
Results: Preliminary analysis shows thyroid weight was not associated with increased length of hospital stay. Low post-op PTH, low calcium nadir, need for IV calcium, and more extensive surgery (including lateral neck dissection) were associated with increased length of stay. Age at surgery and CCI were also significantly associated with increased length of stay, but was no longer once multivariate was done. Data collection and analysis are still in progress.
Conclusions: While the current data does not support an association between thyroid weight and increased length of hospital stay, other factors are demonstrating an association. These preliminary findings show promise for identifying characteristics that may help anticipate increased or decreased length of hospital stay post-thyroidectomy.

PATHOLOGY

Characterizing the effect of Manuka honey and methylglyoxal on C. difficile infection

Lillian Wu, **Reynal Palafox-Rosas**, Brian Luna, Rosemary C. She

Background

Clostridioides difficile infection (CDI) accounts for 0.5 million infections and 29,000 deaths annually in the U.S. CDI recurrence is up to 25% despite antibiotic therapy. Treatment failure is attributed to organism factors such as spore formation. Manuka honey with its main antibiotic component, methylglyoxal (MGO), is a potential alternative agent for the treatment of CDI. Here we investigated the antibiotic activity of Manuka honey against *C. difficile* and its spore formation.

Methods

TcdB+ *C. difficile* from stool specimens was isolated on CCFA agar. Minimum inhibitory concentrations (MIC) for 4 Manuka honeys (MGO 30^+, 100^+, 250^+, 400^+) against the isolates were determined by broth microdilution using honey concentrations of 4-30% (w/v). MICs were read after 48 hr of anaerobic incubation. Minimal bactericidal concentrations (MBC) were determined by colony counts of wells showing no growth. Sporicidal activity was tested using the isolate with lowest MIC and MBC against MGO 400^+ honey at ¼ X, 1X, and 4X the MIC value, and no drug control. Total viable and spore-only counts were followed each day for 4 d.

Results

MICs of *C. difficile* isolates (n=20) ranged from 4% to >30%. MIC_{50} for MGO 30+, 100+, 250+, and 400+ were 12%, 13%, 10%, and 10% respectively. Similarly, MIC_{90} were 22%, 22%, 18%, and 14%. Bactericidal activity was observed within 2-fold dilution of the MIC in 5 isolates, 4-fold dilution of MIC in 5 isolates, not observed in 9 isolates, and remains to be determined in 1 isolate. Cell and spore count data collection is currently in progress.

Conclusion

Manuka honey demonstrated variable levels of growth inhibition against C. difficile isolates. MGO concentrations had a mild impact on overall MIC distributions for C. difficile. Results for the cell and spore count are in progress and will further help us elucidate the effect of Manuka honey on C. difficile spore formation. Ultimately, studies on the in vivo effect of Manuka honey are needed to assess its impact on the gut microbiome in CDI.

***HER2* Gene Amplification and Overexpression in Breast Cancer: Evaluation of "HER2-Equivocal" Cases for Treatment Decision-Making**

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Background. Women whose breast cancers have amplification of the human epidermal growth factor receptor type 2 (HER2) gene (aka *ERBB2*), causing overexpression of the HER2 protein product, have aggressive disease behavior in the absence of HER2-targeted therapies. HER2-targeted therapies significantly improve disease-free and overall survival in women with this alteration in breast cancer. Since patients whose breast cancers lack this alteration derive no significant benefit from HER2-targeted therapy, accurate assessment of *HER2*-amplification / overexpression status is critically important for selection of breast cancer patients to this treatment. However, ASCO (American Society of Clinical Oncology)-CAP (College of American Pathologists) guidelines identify approximately 4% to 12% of breast cancers as "HER2-equivocal", with poorly defined criteria for making the distinction between "*HER2*-amplified" and "*HER2*-not-amplified".

Materials and Methods. Fluorescence in situ hybridization (FISH) is an FDA-approved method for clinical assessment of *HER2* gene status in breast cancer. 2013/2014 ASCO-CAP guidelines for HER2 testing by FISH defined "*HER2*-equivocal" as having an average of 4.0 to <6.0 *HER2* gene copies per tumor cell nucleus and an average *HER2*-to-chromosome 17 centromere (CEP17) ratio of <2.0. The 2013/2014 ASCO-CAP guidelines indicated that the use of alternative control genomic sites on chromosome 17 could be used to resolve "*HER2*-equivocal" breast cancers as either "positive" (*HER2* / control gene ratio ≥2.0) or "negative" (*HER2* / control gene ratio <2.0). In order to determine the frequency of *HER2*-amplification "positive" and "negative" breast cancers among "*HER2*-equivocal" cases referred to our laboratory, we retrospectively reviewed our referral practice between November, 2013 when the guidelines were initially published and July, 2018 when the guidelines were changed.

Results. Among 143 "*HER2*-equivocal" breast cancers analyzed with alternative chromosome 17 control probes at the USC Breast Cancer Analysis Laboratory (BCAL), 4 had been reported as "*HER2*-positive". All 139 others were evaluated as "*HER2*-negative" for *HER2* gene amplification. In contrast, 56, or 39%, of the 143 cases were evaluated at outside laboratories by FISH and reported to be "*HER2*-positive". Following a case-by-case comparison 24 of the 56 cases reported to be "*HER2*-positive" by outside laboratories were considered to have heterozygous deletion of at least one genomic 17p site as the basis for the increase in *HER2*/control ratio above 2.0. Of the 80 cases deemed "*HER2* -equivocal" by outside laboratories, 32 were considered to have heterozygous deletions of at least one 17p site as the basis for the increase in *HER2*/control ratio above 2.0.

Discussion. Although several studies published prior to May, 2018 have reported that more than 40% of "*HER2*-equivocal" breast cancers are "positive" for *HER2*-amplification, based on the use of alternative control chromosome 17 genomic sites for assessment of the *HER2* /control ratio in the "*HER2*-equivocal" or "ASCO-CAP FISH group 4", none of these studies have alluded to a potential role for heterozygous deletion of the control site as a possible cause for false-positive results. The current data from our consultation practice, as well as our previously published data from clinical trials (*JAMA Oncology* 5: 366 - 375, 2019), demonstrate the role for heterozygous deletion of control genomic sites in mis-classification of "*HER2*-equivocal" breast cancers as "*HER2*-positive". FISH ratios in "*HER2*-equivocal" breast cancers were greater than 2.0 solely related to heterozygous deletions of the denominator control gene copy numbers, not increases (amplification) in *HER2* gene copy number. This leads to the conclusion that "*HER2*-equivocal" breast cancers should be considered predominantly "*HER2*-not-amplified" as a group.

PEDIATRICS

Prospective Evaluation of the Prevalence of Sucrose Malabsorption in Pediatric Patients Referred for Testing for Small Intestinal Bacterial Overgrowth

Arya Anvar, Amanda Tran, and Tanaz Danialifar, MD

Background: Congenital sucrase-isomaltase deficiency (CSID) has classically been considered a rare disorder characterized by failure to thrive and diarrhea[1]. Recent data suggests a frequency of up to 21% in children with abdominal pain. Data also supports a relationship between sucrase-isomaltase genetic variants and unexplained abdominal symptoms[2]. Other studies have demonstrated the efficacy of low starch and sucrose diet in relieving symptoms of irritable bowel syndrome[3]. The purpose of this study is to evaluate the prevalence of CSID in pediatric patients with symptoms such as bloating, pain, and diarrhea referred for testing of small intestinal bacterial overgrowth (SIBO).

Methods: Pediatric patients referred for lactulose hydrogen and methane breath testing were evaluated in this study. Breath test results were interpreted based on consensus statement from American Journal of Gastroenterology.

Patients completed a 13C-Sucrose Breath Test (13C-SBT) after a minimum of 4 hours fasting. Symptom data was collected via a sucrose malabsorption questionnaire and demographic and clinical data collected via chart review.

Results: A total of 32 participants (19 females, 13 males) were included in this study. 6 patients (19%) had sucrose malabsorption. A statistically significant difference between female gender and malabsorption was noted (p=0.0246). No clinical characteristics were associated with sucrose malabsorption in a statistically significant manner. 3 patients were found to have both SIBO and malabsorption.

Conclusion: Our results confirmed prior findings of the prevalence of sucrase deficiency in symptomatic patients. The novel association of sucrase deficiency among females was identified. The lack of consistent symptomatology among patients with sucrase deficiency further demonstrates variable clinical presentations.

Clinical Variable	Sucrose Malabsorption Number (%)
Total	18.75%
Age	12.17
Female	100%*
Pain	100%
Bloating	60.00%
Diarrhea	40.00%
SIBO	50.00%

* p=0.0246

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Weight gain in pediatric patients treated with MEK inhibitors: a retrospective cohort study

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Background

MEK inhibition is an emerging treatment strategy in tumors characterized by activation of the Ras-Raf-MEK-ERK pathway, including a number of important pediatric tumors such as sporadic low grade glioma and NF1-associated tumors. Anecdotal clinical experience suggests that MEK inhibition may be associated with significant, abnormal weight gain in some children. The primary aim of this study is to characterize the incidence of weight change in children and young adults treated with MEK inhibitors (MEKi).

Methods

Subjects $\geq$1 and $\leq$21 years old treated at CHLA with MEKi between 1/1/2001 and 5/14/2019 were identified from an extant clinical database of children seen in the CHLA neuro-oncology clinic. Clinical data including height, weight, body-mass-index (BMI), BMI percentile, and Z-score were extracted at various time points. Weight gain was calculated as change in Z-score compared to baseline, and categorized as none (ΔZ-score $\leq$0.25), mild (ΔZ-score >0.25), moderate (ΔZ-score >0.5), and severe (ΔZ-score >1.0). Conversely, subjects who exhibited weight loss were categorized as mild (ΔZ-score < -0.25), moderate (ΔZ-score < -0.5), and severe (ΔZ-score < -1.0). Primary endpoint was change in weight from t=0 to t=6 months on MEKi therapy.

Results

23.3% (95% CI 8-38%) of children and young adults had moderate or severe weight gain after 6 months of MEKi therapy. In contrast, 16.7% demonstrated moderate or severe weight loss. Additionally, between t=0 to t=6 months, 5 patients (16.7%) increased at least one weight status category (2 underweight to normal, 2 normal to overweight, and 1 overweight to obese), and 3 patients (10%) decreased at least one weight status category (1 obese to overweight, 1 overweight to normal, 1 normal to underweight).

Discussion

This retrospective cohort study has revealed elements of both weight gain and weight loss in pediatric patients treated with MEK inhibitors. Potential mechanism is unknown, but an important area for future research.

Evaluating Fontan Conduit Dimensions Over Time

A. Cheng, **C. Friedman**

Background

The Fontan is a palliative procedure for children with congenital heart conditions. The Fontan conducts venous blood from the SVC and IVC to pulmonary arteries. Small Fontan conduit sizes are thought to contribute to worse patient outcomes. The goal is to understand possible pathophysiologic variables contributing to Fontan failure by analyzing change in conduit dimensions over time.

Methods

207 data sets from 183 patients obtained at a mean time of 9.4 years since the Fontan procedure (range 0-21 years) were retrospectively analyzed using follow up MRI and Cardiac Catherization results. The Nakata index (a global measure of branch pulmonary artery size), Fontan minimum cross-sectional area (CSA), minimum CSA/body surface area (BSA), and percentage decrease in Fontan CSA were variables measured with time in order to identify correlation. Fontan size was also measured against cardiac output (CO) and cardiac index (CI).

Results

The following variables in Table 1 were plotted with Time from Fontan to analyze correlation with time. The Nakata Index has a mean of 174.50 ± 56.59 with no significant correlation or change in size over time. Fontan min CSA/BSA correlated negatively (R-squared 0.34) with Time from Fontan. Cardiac CO correlated weakly and negatively with Fontan min CSA/BSA, whereas, CI showed no significant correlation to Fontan min CSA/BSA.

Table 1

Standard Distribution	Time from Fontan (yrs)	Nakata Index (mm/m2)	Fontan min CSA	Fontan min CSA/BSA	% decrease in Fontan CSA	CO	CI
Mean	9.40	174.50	170.71	131.88	0.35	3.75	2.73
Standard Error	0.28	5.06	3.65	3.36	0.01	0.10	0.05
Median	9.41	167.43	171.44	122.81	0.33	3.64	2.66
Standard Deviation	4.00	56.59	52.05	47.76	0.15	1.41	0.70
Minimum	0.02	48.29	11.47	15.08	0.09	0.90	1.34
Maximum	21.04	393.42	467.85	284.59	0.95	8.99	5.93

Conclusion

The cross-sectional area of the Fontan conduit decreases significantly shortly after the procedure is performed, however, generally does not decrease further over time. Fontan conduit size is not associated with pulmonary artery size or resting cardiac output. Further studies evaluating the relationship between conduit size and physiologic parameters during exercise are warranted.

Impact of Diagnosis in High Risk Infants on Frequency of Early Intervention Connection

Tejal Ghadiali Medical Student, Dr. Ashwini Lakshmanan Advisor, Dr. Christine Mirzaian Advisor, Nicole Vestal Medical Student, Yijie Li PhD Student

Goal: While survival and short-term outcomes have improved for infants previously hospitalized in the NICU, these infants are still at increased risk for neuro-developmental consequences. Early Intervention (EI) services have been shown to positively impact cognitive and behavioral outcomes in children up to preschool age. Infants may be connected to these resources via Regional Center (RC) referral upon NICU discharge, yet this opportunity is frequently missed. The goal of this chart review was to analyze if the specific diagnosis qualifying the infant for High Risk Infant Follow-Up (HRIF) referral was associated with success of RC connection by the time of their HRIF visit post-NICU discharge.

Methods: Using a retrospective chart review, we identified 185 infants referred to HRIF at CHLA within 6 months of NICU discharge between July 2017 and June 2019 and recorded sociodemographic information, diagnosis qualifying infant for HRIF referral, and regional center contact status. A chi-square test was conducted to determine the relationship between diagnosis and RC connection (contact with RC with application in process or successful completion).

Results: Of 185 patients, 40% (n=74) were connected to the RC, 55.14% (n=102) were not connected, and 4.86% (n=9) were unknown. Of 15 diagnoses that were analyzed, with patients able to be assigned 1 or more diagnoses, infants most frequently qualified for HRIF due to gestational age (n=116), birth weight <1000g (n=30), and other problems that could result in a

neurological abnormality (n=54). Of 74 patients connected to the RC, 50 patients were diagnosed with gestational age as a qualifying diagnosis (p=0.2653), 15 had birth weight <1000g (p=0.3608), and 15 had other problems that could result in a neurological abnormality (p=0.0759). Many patients had more than 1 diagnoses.
Conclusions: The association of diagnosis with frequency of RC connection was not statistically significant for any of the diagnoses studied. The 40% incidence of RC connection demonstrates a missed opportunity for referral to EI services. Together, these findings suggest that solutions to increase RC connection should be more general and need not be stratified by diagnosis.

Medication adherence and health status of adolescent and young adult solid organ transplant recipients

Deborah Im, Moss IK, Urquiza R, Sayegh CS, Thomas D.

Background/ Purpose/ Goal/ Hypothesis
Evaluating medication adherence and the health status of adolescent and young adult solid organ transplant recipients provides a basis of understanding the needs of this population. Monitoring immunosuppressant drug levels standard deviation, appointment adherence and adverse health outcomes can help detect high-risk patients. By identifying measures that can easily be calculated from standard-of-care data, there is little burden on the physician and patient. High-risk patients can be identified from this patient population to find appropriate and effective intervention to reduce adverse health outcomes and long-term graft survival. Literature has suggested that nonadherence rates are four times higher in youth than in adult transplant recipients (Burra, 2011). Despite this important health concern, little is known about effective interventions for improving adherence among post-transplant adolescents.
Materials and Methods
Study population
Children and adolescents were recruited from Liver Transplant Clinic at CHLA. Adolescent LT recipients between ages 13 – 21 years, have access to their own working cell-phone, have undergone a liver transplant and are currently followed at CHLA for post-transplant care were eligible to participate.
Data Collection and Analysis
Each participant's data from 1 year prior to study participation was coded onto Redcap, a HIPAA-compliant on-line platform. A total of 39 participant's data was coded by one coder, a second coder independently abstracted data from 20 of the 39 to allow for calculation of reliability statistics. EMR data was compared with paper charts and any data that was not entered into the EMR was added to the data set.
Immunosuppressant trough levels SD as indicators of nonadherence
To measure adherence to post-transplant immunosuppressant medications, data from routine monitoring of tacrolimus or sirolimus levels were obtained from the participants medical records. A standard deviation (SD) was calculated by consecutive trough tacrolimus or sirolimus blood levels of 3 or more. The use of SD of tacrolimus blood levels as a valid measure of adherence to immunosuppressive levels have been demonstrated by previous studies (Shemesh, 2004). In this study, adherence was defined as an immunosuppressant SD <2 (Bucuvalas, 2005).
Health status
Measures of pediatric and adolescent health status included frequency of hospital admissions, days spent admitted to the hospital and liver biopsy evidence of rejection for the year prior. Adherence to clinic visits was assessed for the year prior to study participation through the participants medical record scored under an overall Appointment Adherence Ratio (AAR) and Overall Liver Transplant Clinic AAR. In accordance to pediatric adherence literature, adherence

was defined as a clinic attendance rate of ≥ 90% (Rapoff, 2009). If there was evidence of at least one biopsy-proven episode of rejection during study period it was entered as either “Acute rejection” or “Chronic rejection.” Liver biopsy pathology reports were coded based on clinical pathologists notes and on the Banff Rejection Activity Index (RAI).

Results

39 participants are enrolled in the study. Overall AAR had a mean of .70 with a SD of .20 and overall liver transplant clinic AAR had a mean of 0.81 with a SD of .22 among participants. The mean of days admitted to hospital was 6.79 with a SD of 16.49, however the median days admitted to hospital was 0 among our participants. 13 of 39 participants (33%) were ever admitted to hospital. 7 of 39 participants (17.9%) had at least one incidence of biopsy confirmed acute rejection, and 1 of 39 participants (2.6%) had evidence of chronic rejection.

Summary/ Conclusion

The results of this research are consistent with previous research, that adolescent LT recipients are at risk for non-adherence and subsequent poor health outcomes. By finding multiple valid non-adherence measures that correlate significantly, pediatric and adolescent at-risk patients can be identified. The next step in this research is to find appropriate interventions that will improve health outcomes for this patient population.

Impact of MALDI-ToF on the Clinical Management of Pediatric Patients with Multi-Drug Resistant Gram-Negative Bloodstream Infection

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Background/Hypothesis: Infections by multi-drug resistant organisms (MDRO) cause increased mortality in pediatric patients. Matrix-assisted laser desorption and ionization time-of-flight (MALDI-ToF) spectrometry provides faster identification and susceptibility testing of gram-negative organisms. We hypothesized that MALDI-ToF will yield shorter time to effective therapy (TTET) and time to optimal therapy (TTOT) for patients with MDRO gram-negative bloodstream infection (GN-BSI) than for patients with non-MDRO GN-BSI.

Methods: Retrospective cohort study of 246 pediatric patients 0-18 years with GN-BSI at Children’s Hospital Los Angeles from 2012 to 2016. Polymicrobial BSI was excluded. Patients divided into 3 cohorts: pre-MALDI (n=78), MALDI with direct susceptibility testing (AST) (n=76), and MALDI without direct AST (n=92). Primary outcomes are TTET (first dose of antimicrobial with known susceptibility from time culture collected) and TTOT (narrowest therapy per AST and infection site from time culture collected). Primary outcomes analyzed using a proportional hazards model. Clinical outcomes between patients with and without MDRO infections compared using chi-square or Kruskal-Wallis test.

Results: Of 246 patients with GN-BSI, 26 were caused by MDRO. Compared to non-MDRO patients, MDRO patients were more likely to be in ICU, have an ID consult, not be on effective empiric therapy, and have increased mortality within 30 days of GN-BSI. MDRO groups had significantly shorter TTET than non-MDRO groups ($p<0.001$). Within the MDRO group, the median TTET for pre-MALDI, MALDI without AST, and MALDI with AST were 9.38 hours, 9.22 hours and 4.27 hours respectively ($p=0.7859$; n=16).

Conclusion: MALDI with AST reduced the median TTET for MDRO groups by more than half that of the pre-MALDI times. A larger sample size is needed to explore whether this changes outcomes for patients with MDRO GN-BSI.

Pediatric post-tracheotomy bacterial tracheostomy associated respiratory infection hospitalizations

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Background: In children with a tracheostomy, bacterial pneumonia is the most common reason for hospitalization. Previous retrospective studies demonstrate that certain characteristics are associated with differential odds of bacterial tracheostomy-associated infections (bTRAIN) readmission; we aim to identify risk factors for bTRAIN hospitalizations post-tracheotomy.
Methods: We conducted a prospective cohort study of children who underwent tracheotomy at CHLA. We conducted chart review for the initial tracheostomy placement and subsequent bTRAIN admissions. We used bivariate analysis and logistic regression to identify associations between our predictors and primary outcome of readmission with bTRAIN treated with antibiotics.
Results: Of the 52 patients who underwent tracheotomy and met inclusion criteria, 60% (n=31) were male, 69% (n=36) identified as Hispanic/Latino ethnicity, 38% (n=18 of 48) were born full term, and 79% (n=41) had public insurance (n=52). Median age at hospital admission for tracheostomy placement was 24 days (IQR: 0-748 days). 54% (n=27 of 48) of patients were discharged with HMV. Out of 48 patients with complete data, 52% (n=25) had at least one bTRAIN readmission. Currently, admission age at tracheostomy placement isn't associated with increased odds of bTRAIN readmission (OR=1.16; 95% CI: 0.95-1.4; p=.15). Odds of bTRAIN readmission were similar whether discharged on HMV or not (48% vs 57%; χ^2=0.4, p=0.54). Prematurity wasn't associated with increased odds of bTRAIN readmission (46% vs 56%; χ^2=0.4, p=0.82). Hispanic ethnicity doesn't increase odds of bTRAIN readmission (56% vs 54%; χ^2=0.002, p=0.97).
Conclusion: Preliminary results suggest that prematurity, older age, HMV, and Hispanic ethnicity do not affect odds of bTRAIN readmission. Next steps are to achieve adequate power and analyze other associations with bTRAIN readmission such as comorbidities, presence of a gastrostomy tube, and *Pseudomonas aeruginosa* colonization.

Variation in Family Centered Rounds between English-Speaking Families and Limited English Proficiency Families

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Background: Family Centered Rounds (FCR) facilitate collaboration between the healthcare team and patients/families in shared decision making during hospitalization. Differences in FCR for English-speaking vs limited English proficiency (LEP) families may contribute to healthcare disparities.
Methods: A prospective observational single center study was completed to examine the current state of FCR among English-speaking vs LEP families. A Qualtrics audit tool captured metrics during rounds including 1) family preferred language, 2) interpretation compliance, 3) rounding location, and 4) discharge discussions. Interpretation compliance was defined as the use of a certified interpreter, who has received training in medical interpretation and passed an

oral and written test. Rounding location was compliant if most of rounds occurred in the patient's room. Aspects of successful FCR such as introducing the care team, asking families for input at the beginning of rounds ("Families First"), and use of a whiteboard to facilitate communication were also included in the audit tool. A convenience sample of patients on hospitalist and resident teams on our medical surgical floors were audited. Compliance for English vs. LEP encounters was compared using chi-squared tests.
Results: From June-December 2019, 739 patient encounters were audited, and families were present 57% of the time. Of the families present, 31% (n=131) required interpretation during FCR, with the most common language being Spanish. However, compliant use of interpretation services occurred in only 69% of LEP encounters, with the most common reason for non-compliance being ad-hoc interpretation by an uncertified care team member. At the beginning of rounds, 50% of English-speaking families were asked if they had questions or concerns, vs. 41% of LEP families (p=.07). Rounds were conducted in the patient's room in 71% of encounters with English-speaking families vs 62% for LEP families (p=.07). No difference was found in team introductions, discharge discussions, or use of a whiteboard (Table 1).
Conclusion: Variations exist in FCR for English encounters compared with LEP encounters. In all seven process measures analyzed, compliance was lower in LEP vs English encounters, but this difference was not statistically significant (Table 1). Further research with larger sample size is needed to better understand reasons for the variation.

Impact of viral testing on treatment outcomes of pediatric tracheostomy-associated acute respiratory infections

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Goal: Children with tracheostomy are at increased risk of developing acute respiratory infections (ARI). Respiratory viral (RV) testing is associated with decreased antibiotic treatment in otherwise healthy children, yet remains inconclusive in children with tracheostomy. Our goal is to assess the association between RV testing and continued antibiotic treatment in children with suspected tracheostomy-associated ARI.
Methods: We performed a single-center prospective chart review of children with a pre-existing tracheostomy who had a respiratory culture obtained on hospital admission day 0 or 1. We used bivariate analyses to evaluate the association between RV testing and continued antibiotic treatment, defined as three or more days of antibiotics. We hypothesize that a positive RV test will be associated with decreased odds of continued antibiotic treatment.
Results: A total of 58 unique patients and 71 discharges met inclusion criteria. Respiratory viral (RV) tests were performed in 68% of admissions (n=48), of which 40% (n=19) were positive. On bivariate analysis, admissions associated with a positive RV test had similar odds of receiving continued antibiotic treatment when compared to those with a negative RV test (53% vs 41%; χ^2=0.6, p=0.44). Those with a positive bacterial respiratory culture result were more likely to receive continued antibiotic treatment when compared to those with a negative bacterial respiratory culture result (72% versus 45%; χ^2=15.2, p<.001).
Conclusions: Preliminary data suggest that RV testing is not associated with continued antibiotic treatment in patients with suspected tracheostomy-associated ARI. Continued recruitment of our full cohort and analysis of confounding variables, such as respiratory comorbidities (e.g. chronic lung disease), and laboratory tests (e.g. WBC count), is necessary to determine the association between RV testing in children with tracheostomy-associated ARI.

Reimbursement patterns for direct to home telehealth specialty visits

Preeya Mehta, Jill Madison, Melinda Braskett MD, Jonathan Tam MD, Juan Espinoza MD

Background: Telehealth (TH) can be defined as all models of healthcare that use a form of electronic transmission, including live video calling or photo sharing.1 TH has provided quality and accessibility in receiving medical care for remote communities.12 Studies have shown that patients have a positive attitude towards incorporating TH into their healthcare.34 While TH between healthcare sites is reasonably codified by the Centers for Medicare and Medicaid Services (CMS), TH directly to the patient's home is less established. Significant uncertainty remains over reimbursement policies that vary widely between states and by payor, with no clear evidence of costsavings. We undertook a pilot to explore the possiblity of offering Home Telehealth to our patients.

Objective: 1. Evaluate the feasibility and acceptability of introducing Home Telehealth (HTH) in our Allergy & Immunology (A&I) outpatient clinic.

2. Understand the reimbursement response from the various payors in our service area.

Design/Methods: A&I Physician defined uses cases they deemed appropriate for HTH appointments. Established patients in the A&I clinic were approached to complete an attitudes and perception survey. Patients meeting the use case definitions were asked to participate in the pilot program. If they agreed, they were given an orientation to HTH. After their HTH appointment took place, they completed a validated satisfaction survey for TH. Our institution's revenue cycle management team provided reimbursement data.

Results: Patient perceptions of TH are shown in Table 1. During the pilot period, 51 HTH appointments were offered. 46 appointments were made. 3 patients decided to cancel afterwards, 6 patients noshowed their TH appointment. 37 appointments wer completed succesfully among 32 unique patients. Patients were very satisfied with the overall HTH experience (Table 2). 36 out of 37 encounters were reimbursed by 19 different payers (Table 3). 25 encounters were privately insured, 12 were public (Medicaid or other federal programs). Payors on average reimbursed ±6% of the expected allowable for an equivalent inperson visit.

Conclusion(s): Patients showed had some reservations about HTH initially, but were very satisfied with their experience afterwards. Both private and public payors reimbursed HTH the same as in person appointments. HTH is both well accepted by patients and financially viable. Further studies are needed to understand the clinical outcomes of HTH, its effect on clinic workflows, and overall financial impact.

Tables:

Table 1. Parent perceptions of home telehealth.

Respondent Demographics	**%**
Gender	86% Female
Age	37 years old
Race/Ethnicity:	
Latino	47%
Asian	20%
White	27%
Black or African American	7%
Bilingual Households	57%
Limited English Proficiency	14%
Insurance type	53% Medicaid

Attitudes and Perceptions	**Agree or Completely Agree**
I am concerned about being able to understand what the doctor says through telemedicine video.	26%
I think that the doctor will be able to understand me and my child through telemedicine video.	26%
I would prefer to see a physician sooner through telemedicine than wait to see a physician in-person.	47%
I feel telemedicine can improve patient feedback regarding the side effects of treatment.	54%
I feel telemedicine can reduce physician response time.	73%
The idea of telemedicine sounds too complicated.	13%
If a specialist were not available in my local area, I would prefer to see a specialist via telemedicine rather than travel a long distance.	60%

Table 2. Participant satisfaction with home telehealth encounter.

How Satisfied were you with…	Satisfied or completely satisfied
The audio and video quality?	87%
Personal comfort using the TH platform?	96%
The length of time with the A/I provider?	96%
The explanation of your treatment by the A/I provider?	91%
The thoroughness, carefulness and skillfulness of the A/I provider?	96%
The courtesy, respect, sensitivity, and friendliness of the A/I provider?	96%
How well your privacy was respected?	100%
Your overall treatment experience with Telehealth?	91%

Question	% Yes
Would you use Telehealth again?	100%
Would you recomment Telehealth to another person	100%
Have you ever used Telehealth or Telemedicine before today?	21.7%
Have you ever used video call technology before, like Skype or FaceTime?	100%
How often do you use video call technology?	
Everyday	8.7%
A few times a week	4.3%
A few times a month	39.1%
A few times a year	47.8%

Table 3. Reimbursement of billed home telehealth encounters.

Category	# Encounters (n=37)	# Encounters reimbursed (n=36)	% Expected allowable
By E&M Code			
99213	21	21	98%
99214	10	9	96%
99215	6	6	98%
By Payer			
Private	25	24	94%
Public	8	8	107%
Federal	4	4	100%

Behavioral Effects of Prenatal Secondhand Smoke Exposure

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Goal: Cigarette smoking is the leading cause of preventable death in the United States, with a prevalence of 15% in the United States disproportionately affecting communities of color and those living below the federal poverty line. In addition to primary cigarette smoking, secondhand smoke has also been implicated in disease, with exposure mostly occurring in the home or workplace. We are interested in characterizing the effects of maternal secondhand smoke exposure on brain development and child behavior.
Methods: Between 1998 and 2006, African American and Dominican pregnant nonsmoking women were recruited for the study and followed through 2014. Mothers were asked about smoke exposure in the household, and cotinine levels were measured from cord blood as indicators of secondhand smoke exposure. Between the ages of 9 and 12, children completed several cognitive behavioral assessments, including the CBCL, NEPSY, WISC, amongst others.
Results: The greatest differences in behavioral outcomes with regards to cigarette smoke exposure during pregnancy were in externalizing behaviors and motor skills. 45 of the 148 tests used to measure externalizing behaviors and 12 out of 38 tests used to measure motor skills yielded significant results, when controlling for age and sex (ANCOVA, $p < 0.05$).
Conclusions: Our data corroborate existing data that suggests a correlation between secondhand smoke exposure during pregnancy and increased externalizing behaviors, but

further research is warranted in the exploring the relationship between motor skills and secondhand smoke.

Calcium levels at time of primary or secondary palate repair in patients with 22q11.2 DS and cleft palate/VPI

Eleanor Patterson (Medical student, Keck School of Medicine), Yvonne Gutierrez MD (AltaMed Pediatrics)

Goal: Studies have shown that 22q11.2 DS patients experience higher rates of postoperative hypocalcemia and complications compared to nondeletion patients following cardiac surgery. This study investigates whether or not cleft palate surgery induces postoperative hypocalcemia and associated complications in 22q11.2 DS patients in the same way that cardiac surgery does. In addition, the study assesses whether or not CHLA adheres to The Journal of Pediatrics' 2011 recommendation to check serum calcium pre- and post-operatively in patients with 22q11.2 DS.
Methods: The study population includes all 22q11.2 DS patients that received cleft palate repair at CHLA between September 2011 to present, along with their age matched controls that also received this procedure. We obtained data on pre-, peri- and postoperative serum calcium if collected, as well as rate of postoperative complications and mortality.
Results: Preliminary results suggest that 22q11.2 DS patients do not experience postoperative hypocalcemia, complications or mortality at a higher rate than nondeletion patients following cleft palate repair. Serum calcium levels were not routinely checked pre-, peri- or postoperatively. However, when calcium levels were checked, rate of postoperative hypocalcemia was not significantly higher in 22q11.2 DS patients than nondeletion patients.
Conclusions: This study suggests that 22q11.2 DS does not confer a significant risk of postoperative hypocalcemia following cleft palate repair compared to nondeletion patients. Both 22q11.2 DS patients and nondeletion patients did well following surgery, as rate of postoperative hypocalcemia, complications, and readmission or ED visits within 1 month were low for both groups. This study also suggests that cleft palate repair protocol at CHLA does not include a routine checking of serum calcium in 22q11.2 DS patients. However, we do not believe this to be detrimental to patients, as 22q11.2 DS patients did not experience higher rates of postoperative complications compared to nondeletion patients.

Effects of Maternal Depression on Brain Structure in Newborn Infants

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Background: Children born to mothers with mood disorders during pregnancy are at an increased risk for attention-deficit/hyperactivity, anxiety, and language delay. The consequences of maternal depression on the developing brain and neuropsychological functioning in infants are topics of intense research. A prior MRI study has shown that children of mothers with depression during pregnancy have significant cortical thinning in the right frontal lobes. Another study reported that newborn infants exposed to prenatal maternal depression have atypical amygdala-prefrontal cortex connectivity. We build on these prior findings by studying how maternal depression during pregnancy affects brain morphology in newborn infants.
Methods: In 135 newborn infants assembled across 3 cohorts from prior studies, we assessed the correlations of maternal depression severity during pregnancy with anatomical measures from T2-weighted anatomical MRI images obtained within 3 weeks of birth. Images for all infants

were normalized to a single template brain by first applying a similarity transformation (3 translations, 3 rotations, and a global scale) and then applying a nonlinear, high dimensional warping, thereby establishing point correspondences across each infant and template brain. These point correspondences permitted us to quantify precisely how brain morphology varied across infants. We subsequently studied whether variations in brain morphology were associated with maternal depression by applying a multiple linear regression model, which incorporated as covariates infants' sex, post-menstrual age, and cohort.
Results: Statistical analyses for this project are ongoing. We hypothesize an inverse correlation between maternal depression severity and volume of the dorsal/lateral frontal lobe in infants and a positive correlation between depression severity and volume in limbic regions implicated previously in depressive illness (hippocampus, amygdala, and the prefrontal cortex).
Conclusion: Pending statistical analyses and interpretation.

Central Venous Catheter Associated DVT in Pediatric Populations

Haarika Srinath, Kaitlyn Foreman, Dr. Margaret Trost, Dr. Julie Jaffray, Emily Crava

Background: Rates of pediatric deep vein thrombosis (DVT) are increasing as use of central venous catheters (CVC) to treat chronically or severely ill patients increases. The relationship between children with medical complexity (CMC) and CVC-related DVT has not been explored.
Objective: To evaluate prevalence of DVT following placement of CVC at our institution, CHLA. To determine CVC and patient-related factors associated with increased or decreased risk of developing DVT.
Methods: Retrospective chart review of patients who received a CVC between 2012 and 2016. Recorded variables included type of CVC, line location, removal reason, and duration in place. Patient level factors included age, sex, platelet number, and comorbidities. Patients were also classified as medically complex based on two published scales (complex chronic conditions=CCC, and CCI=chronic condition indicator). We compared characteristics between patients with and without DVT using t-test for continuous variables and Fisher's exact test for categorical variables.
Results: We reviewed 588 CVC placements in 252 children and 29 (5%) CVCs were associated with DVT in 25 (10%) patients. Patients included had an average age of 6.1 years, were 52% male, and the majority were medically complex (CCC=75%, CCI=90%). CVCs associated with DVT were more commonly double lumen PICCs (38 vs. 26%) or located in the femoral vein (28 vs. 8%; p=0.002) than non-DVT associated CVCs. A larger proportion of patients with DVT were female (60 vs. 47%), medically complex by the CCC scale (88 vs. 73%) and had congenital heart disease (36 vs. 20%) than children without DVT, although these differences were not statistically significant.
Conclusions: CVC placement in the femoral vein is associated with DVT. In this population most children met published definitions for medical complexity and CVC-associated DVT occurred in 10% of patients. Further study is needed to identify specific risk factors that may be useful for predicting CVC-associated DVT.

Early Intervention Contact by Insurance Status

Nicole Vestal Medical Student, Dr. Ashwini Lakshmanan Advisor, Dr. Christine Mirzaian Advisor, Tejal Ghadiali Medical Student, Yijie Li, PhD Student

Goal: Babies hospitalized in the NICU may benefit from Early Intervention (EI) services, which have shown a positive effect on cognitive and behavioral outcomes in children up to preschool age. NICU hospitalization is an opportunity to connect children to regional centers (RCs) for

these services; however, not all babies are connected by their first High Risk Infant Follow-up (HRIF) Visit. We undertook this chart review to determine if insurance type was associated with successful vs. unsuccessful RC contact by the time of the first post-NICU follow-up visit in HRIF.
Methods: We completed a retrospective chart review of 185 infants referred to HRIF within 6 months of NICU discharge between July 2017 and June 2019 to obtain socio-demographic information and RC contact. A Chi-square test was performed to determine the relationship between insurance status (CCS, MediCal, Private, or Other) and RC connection (defined as contact with the RC with at least an application for services in process or completed).
Results: Of the 185 patients total, 40% (n=74) were connected to the RC, 55.14% (n=102) were not connected, and 4.86% (n=9) were unknown. In the study overall, 83.24% (n=154) of patients had California Children's Services (CCS) insurance, 61.62% (n=114) had MediCal, 27.03% (n=50) had Private Insurance, and 11.35% (n=21) had Other.
Of patients connected to the RC, 54.05% (n=40) had MediCal (p=0.2246), 79.73% (n=59) had California Children's Services (CCS) (p=0.4678), 32.43% (n=24) had Private Insurance (p=0.3143), and 13.51% (n=10) had Other Insurance (p=0.7456). Many patients had 2 or more insurance types.
Conclusions: Although the results were not statistically significant, the study showed that patients with CCS and Medi-Cal made up the majority of those connected to the RC. Furthermore, the result that only 40% of patients were connected to the RC overall shows that there is an opportunity for improved referrals to early intervention following NICU hospitalization in the High Risk Infant population.

Assessment of PICU Admission Criteria for Tonsillectomy and Adenoidectomy Patients

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Background:
Patients undergoing a tonsillectomy and adenoidectomy (T&A) for obstructive sleep apnea (OSA) are often admitted to the PICU. There are no guidelines that preoperatively identify which patients need ICU care. This may result in unnecessary PICU admissions.
Methods: We conducted a retrospective chart review of patients admitted directly to the PICU after T&A for OSA between July 2015 and June 2019. We abstracted information about apneic hypoxic index (AHI), BMI, surgical complications, comorbidities, need and length of supplemental O_2. Our primary outcome was need for ICU level interventions, which included invasive or non-invasive positive pressure ventilation. We used binary logistic regression to analyze the association between covariates and outcome.
Results: We identified 60 unique admissions, 50 of which stayed 1 night or less in the PICU. Only 10 required ICU level interventions. 57% of the patients were obese, 27.5% had autism or Down Syndrome, 12% of patients had delayed development, and 46.6% had pulmonary comorbidities. The mean BMI was 25.0, with a standard deviation of 9.6. The mean AHI was 35.0, with a standard deviation of 25.3. Pulmonary comorbidity was inversely correlated with need for PICU post-op ($p = 0.054$). AHI, BMI, and other comorbidities were not associated with need for ICU care.
Conclusion: Most patients admitted to the PICU after T&A for treatment of OSA did not require ICU level interventions. None of the covariates studied were associated with need for ICU care except for pulmonary comorbidity. Further research is needed to identify factors that predict need for ICU care in OSA patients after T&A.

PHYSIOLOGY & NEUROSCIENCE

Effect of In Utero Exposure to Maternal Inflammation on Basal Forebrain Cholinergic Neuron Number in Mouse Offspring

Ani Misirian, M.S., Qiuying Zhao, Ph.D., Alexandre Bonnin, Ph.D.

Background: *In utero* exposure to maternal inflammation has been linked to a variety of neurocognitive disorders; however, the mechanisms for this linkage remain unclear. Populations of different fetal cell types have been hypothesized to be affected by prenatal inflammation. Cholinergic neurons are of interest, as altered cholinergic signaling is reported in Alzheimer's Disease, schizophrenia, and autism spectrum disorders. Here, we aimed to elucidate the effect of maternal inflammation on the number of cholinergic neurons in the basal forebrain in offspring one month after birth, hypothesizing that such exposure alters the number of cholinergic neurons in the diagonal band of the basal forebrain throughout development and into adulthood.
Methods: Pregnant CD1 mice were exposed to 10 mg/kg polyI:C or to saline at embryonic day 13. Offspring were sacrificed one month postnatally, their brains sectioned at 20 micrometer intervals, and immunohistochemically stained to identify cholinergic neurons using an antibody to ChAT. Fluorescent staining was visualized using Zeiss AxioCam ERc5s, and the ChAT+ neurons were manually counted using ImageJ software. Analogous sections of brains from the polyI:C group (n = 7) and the saline group (n = 5) were qualitatively matched. An unpaired samples T-test was used to compare the number of cholinergic neurons in histologically analogous sections of offspring brains.
Results: We found that there was no significant difference (two-tailed P value = 0.7322, Confidence Interval = -32.22 to 44.89) between the number of cholinergic neurons in the basal forebrain of mice exposed to inflammation and those exposed to saline prenatally.
Conclusions: Our results indicate that at one month of age, there is no significant difference between the number of cholinergic neurons in the basal forebrain of offspring exposed to maternal inflammation and our control group; however, these results do not exclude the possibility that a cholinergic defect could be seen later in life. Further investigation is necessary to determine whether there is a cholinergic defect later in the offsprings' life, and whether other neuronal populations known to be dysregulated in mental disorders are affected.

PLASTIC SURGERY

Immediate Free Nipple Grafting Combined with Autologous Breast Reconstruction For Large and/or Ptotic Breasts: Preserving the "Nipple-Sparing" Option

Korri S Hershenhouse, BS, Orr Shauly, BS, Ketan M Patel, MD

Background: The presence of a nipple on a reconstructed breast defines the completion of breast restoration for many patients with breast cancer. In large and ptotic breasts, nipple preservation is most times unreliable due to ischemia and mastectomy flap perfusion. Free nipple grafting (FNG) has proven valuable in the setting of reduction mammaplasty in severe macromastia. The same concept can be applied to autologous reconstruction. This study aims at evaluating using FNG immediately after autologous breast reconstruction to provide a "nipple-sparing" result.

Methods: Between March 2016 and May 2019, 14 post-mastectomy patients underwent breast reconstruction with FNG simultaneously with autologous flap reconstruction. Patients' age, weight, height, body mass index, comorbidities, smoking history, indication for the procedure, nipple survival, depigmentation and revision, and post-surgical complications were recorded in our database.

Results: A total of 25 free nipple grafts were performed on 14 patients. This procedure was performed bilaterally in 11 patients (79%) and solely on the right breast in 3 patients (21%). Mean pre-mastectomy left breast weight 1050 grams (range 600 – 1700 grams). Mean left sided ptosis grade 2.15 (range 1 – 3). Mean right sided ptosis grade 2.09 (range 1 - 3). The mean post-operative follow-up was 7.71 months (ranging from 1.75 – 14 months). There was a 100% nipple survival rate (25/25), with very few post-operative complications. There were zero cases of nipple necrosis or flap loss. 7 nipples (28%) depigmented post-operatively, with 3 patients demonstrating bilateral nipple depigmentation and 1 patient demonstrating a unilateral right sided depigmentation. 2 patients were dissatisfied with their post-operative nipple projection and underwent revision surgery with fat grafting to the nipple, resulting in a revision rate of 12%.

Conclusion: Immediate FNG following autologous reconstruction can achieve a naturally appearing nipple and areola complex with reasonable long-term nipple projection. Depigmentation does occur and touch-up tattooing may be necessary in darker pigmented nipple/areola complexes. Combined with wise-pattern excision, results can mirror aesthetic procedures for the large and/or ptotic breast.

PREVENTIVE MEDICINE

Factors associated with changes in food insecurity among people who inject drugs in Los Angeles and San Francisco, California, 2017-2018.

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Aim: Food security has been found to be low among people who inject drugs (PWID). The purpose of this study was to determine factors associated with changes in food insecurity score. ***Methods:*** PWID were recruited using targeted sampling methods in Los Angeles and San Francisco, CA in 2017 and 2018. Data from this analysis come from the 6-month and 12-month observations (n=477) in this cohort study. Food insecurity was measured using the 10-item USDA method. To determine changes in food insecurity, we subtracted the 12-month score from the 6-month score and re-classified results as follows. Those with lower scores were classified as better, those with higher scores were classified as worse, and equivalent scores were classified as no change. Demographics (sex, race, age), socioeconomic status (income, education, housing), and heroin, methamphetamine, and cocaine use were considered. ***Results:*** Marginal or lower food insecurity was reported by 80% and 79% of participants at 6-month and 12-month interview respectively. Food insecurity raw score changes were as follows: no change=48%, worse=27%, and better=25%. In multinomial regression analysis with no change as the referent group, demographic, drug use, socioeconomic or service utilization variables were not associated with better food insecurity score. A worse food insecurity score was associated with being Black (Adjusted odds ratio [AOR]=1.92; 95% confidence interval [CI]=1.19, 3.13) and not being homeless at 12-month interview (AOR=1.66; 95% CI=1.05, 2.63). ***Conclusion:*** Food insecurity is a persistent challenge for PWID. The association between race and worsening food insecurity may be due to discrimination against Black PWID. The surprising inverse relationship between housing and worsening food insecurity requires more research as does the association with race. Nonetheless, integrating food interventions into health promotion strategies for this populations is warranted.

Racial differences in lung cancer patient experiences with care and their association with cancer mortality: A SEER-CAHPS study

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INTRODUCTION: Racial disparities in lung cancer mortality may be impacted by differences in patient experiences with care, an important quality of cancer care indicator. Our study examined whether there are racial disparities in lung cancer patient experiences and determined whether these disparities are associated with mortality.

METHODS: We used data from the National Cancer Institute's Surveillance, Epidemiology, and End Results-Consumer Assessment of Healthcare Providers and Systems (SEER-CAHPS®). Individuals ≥65 years old who were diagnosed with lung cancer and completed a CAHPS survey ≥6 months after cancer diagnosis were identified. We examined composite scores (through three domains of patient-centeredness, timeliness, and realized access) and global ratings of care. We conducted multivariable linear regression models to assess the association between race and patient composite and global ratings of care. Multivariable Cox proportional hazards models were used to determine the association between patient composite and global ratings and mortality after cancer diagnosis.
RESULTS: This study consisted of 2,603 lung cancer patients. For black patients, a 1-unit increase in their ability to get all needed care (HR: 0.99, 95% CI 0.98-0.99) and care coordination (0.97, 0.94-0.99) was associated with lower risk of mortality. Asians reported lower adjusted mean scores with their ability to get care quickly (B: -4.25, 95% CI: -8.19, -0.31), get needed care (-7.06, (-10.51, -3.61)), get needed drugs (-9.06, (-13.04, -5.08)), and rating of their overall health care (-0.39 (-0.68, -0.1)) compared to non-Hispanic white patients. Similarly, Hispanics reported lower adjusted mean score with their ability to get needed care (-5.21, (-9.03, -1.39)).
CONCLUSION: There are racial disparities in patient experiences of care among Medicare lung cancer patients, and these disparities contribute to lung cancer mortality in different ways.

Reducing adolescent obesity through the empowerment of minority youth as community health promoters

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Background: South Los Angeles faces a high obesity rate in both adults and adolescents compared to that of the county and the state. Literature reveals few programs that employ youth as community health promoters (CHPs), let alone as trainers of CHPs. Our goal was to develop a train-the-trainer program that empowers youth CHPs to sustain and grow a community-based intervention that targets adolescent obesity.
Method: Using materials from successful obesity prevention and youth community advocacy training programs, researchers developed a three-phase, train-the-trainer intervention, with each phase lasting 6 months. Phase 1 teaches participants a curriculum that focuses on individual and social determinants of obesity that culminates in the participants' implementation of a community service project. Phase 2 empowers participants to recruit their peers and teach them the Phase 1 curriculum. In Phase 3, the participants train their peers from Phase 2 to become teachers who can facilitate Phase 1. Minority students (n=35) aged 14-17 were recruited from a local high school. Tricep skinfold and waist circumference were collected at the beginning and end of each phase. Placing in the 85th percentile, accounting for sex and age, qualified as "overweight." A chi-square test for independence was used to calculate significant differences in overweight frequency between baseline and follow-up (post Phase 1) samples.
Results: For waist circumference, there was a significant decrease in the proportion of participants who were overweight at follow-up as compared to baseline ($p<0.05$). For tricep skinfold, there was no significant difference in the overweight frequency between baseline and follow-up samples.
Discussion: Although the results are modest, they indicate that youth can be a viable component in serving as health educators and reducing obesity rates.

Empowering minority youth as trainers of peer health educators for the prevention of childhood obesity: A community-based intervention in South Los Angeles

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Background: Few programs exist to meaningfully engage youth as community-based peer health educators (PHEs), let alone as trainers of PHEs. We sought to develop a train-the-trainer program that empowers youth PHEs to sustain and multiply a community-based intervention for adolescent obesity.
Methods: Researchers applied principles of Popular Education to adapt materials from successful obesity prevention and youth community advocacy training programs to develop a novel, three-phase, train-the-trainer intervention. Phase 1 consists of a six-month, evidence-based program focused on individual and social determinants of obesity that culminates in the participants' implementation of a grassroots obesity-prevention project. Phase 2 empowers participants as PHEs who recruit and train their peers to complete phase 1. Phase 3 empowers participants as trainers of PHEs who facilitate the completion of phase 2 and phase 3 with their peers. CBPR methods were utilized throughout the study. Minority students in grades 9-11 were recruited from a high school in S. LA.
Results: At 6 month follow up, participants (n=13) demonstrated an 11% improvement in dietary behaviors (p=0.02), 10% improvement in physical activity behaviors (p=0.28), 4% increase in self-efficacy (p=0.38), and 5% increase in perceived control (p=0.19). No significant differences were observed in waist circumference and triceps skinfold. Currently, 11 participants have progressed into phase 2 and are training a second cohort of 39 peers.
Discussion: Preliminary results demonstrate the capacity of minority youth to recruit peers and serve as health educators, though there is limited statistical evidence of health behavior change. Small sample size and short study duration are potential limitations.

Human Papilloma Virus Vaccination Rates and Outlooks Among Latina Women in South Los Angeles

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Background: The Latina population in the United States faces tremendous health disparities, particularly with regards to cervical cancer. Data from the American Cancer Society shows that the cervical cancer incidence and mortality rates among Latina women in the US are 40% and 26% higher than in US whites, respectively[1]. These data are surprising considering cervical cancer is highly preventable through use of the Pap Smear cytological test and Human Papilloma Virus (HPV) vaccination. In 2015, only 44% of US Hispanic girls between the ages of 13 and 17 were vaccinated with all three HPV doses, compared to a *Healthy People 2020* goal of 80% of girls[2].
Methods: To address these health disparities, we needed to understand what factors influenced the decreased vaccination rates in this population. We administered a survey (in Spanish) to 89 Latina women in East Los Angeles that asked them about their outlooks on the HPV vaccine. We hypothesized that there would be differences in knowledge about the HPV vaccine, as well as vaccination rates, based on age (>50) and country of origin (Mexico or other) in Latina women.
Results: Due to a small sample size, our chi squared analysis showed that there were no significant age or country of origin related differences. However, our data did show that there was a significant lack of knowledge about the HPV vaccine that persisted across all the women.

None of the women surveyed had received the vaccinations themselves, either because they "did not think it was necessary," or "did not know why it was important."
Conclusion: This data shows the need for culturally appropriate interventions that are both language specific and literary level appropriate, in order to increase knowledge about the importance of HPV vaccination among Latina women of East Los Angeles.

[1]Cancer Facts & Figures| Hispanics-Latinos | American Cancer Society. (2019). Retrieved from https://www.cancer.org/research/cancer-facts-statistics/hispanics-latinos-facts-figures.html

[2]Morales-Campos, D., & Vanderpool, R. (2017). Examining differences in HPV awareness and knowledge and HPV vaccine awareness and acceptability between U.S. Hispanic and island Puerto Rican women. *Journal of Health Disparities Research and Practice.*, *10*(3), 1–18.

PSYCHIATRY

Pharmacological Rescue of Src mediated NMDAR Hypofunction in Schizophrenia Mouse Models

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Background
Multiple lines of evidence suggest that there is a strong link between NMDA receptor (NMDAR) hypofunction and pathophysiologies seen in schizophrenia. Previous investigations have suggested that dysfunction at the post-receptor level, rather than NMDAR downregulation, are responsible for this phenomenon. Sarcoma tyrosine kinase (Src) serves as a hub for several kinases that mediate phosphorylation of the NMDAR complex. Mice with a reduction in Src have been shown to recapitulate multiple schizophrenia endophenotypes, including social, cognitive, and electrophysiological measures. Here we hypothesize that pump infusions of SAPIP (Src activating PSDS-95 inhibitory peptide) into the lateral ventricles will reverse these measurable deficits, implying a potential unexplored mechanism of pharmacological rescue for certain etiologies of schizophrenia.
Methods
Src +/- and Src +/+ (wild type) mice were implanted with miniature pumps that infused the treatment group with SAPIP and the control group with vehicle. The two groups were then assessed using EEG and trace fear conditioning.
Results
Analysis of the fear conditioning data showed a significant genotype/treatment interaction. WT control mice spent significantly more time frozen after a conditioned tone than pre-tone. WT mice receiving SAPIP did not exhibit this behavior, and neither did Src +/- control mice. Administration of SAPIP in Src +/-, however, restored the significant increase in freezing post-tone. Initial analysis of EEG data demonstrated notable sex differences. Final analyses are currently in progress.
Conclusion
These findings imply that SAPIP is able to restore learning and thereby reverse Src mediated cognitive/behavioral deficits. The early electrophysiological findings suggest that Src may have a sex specific effect in its regulation of NMDAR function. This could have important implications on the understanding of the complex etiologies of psychotic disorders and future treatment modalities.

TMI in patients with Treatment-Resistant Depression

Christopher Ofori, Robert Featherstone, Isabel Lagomasino

Significance/Relevance: Depression is a catastrophic mental illness that causes immense interpersonal, social and economic distress. The lifetime prevalence of depression in the United States is around 15% [1]. Approximately 1/3 of individuals with depression experience a chronic, life-long, unremitting illness, while other patients show a chronic alternating pattern of remission and relapse [2]. Only a small percentage of patients achieve lasting remission after their first episode of this disease [3]. Depression is associated with high rates of social, occupational and cognitive disability and greatly reduced quality of life [4]. There is high comorbidity between depression and several non-psychiatric illnesses, such as chronic pain, diabetes, cardiovascular disease, high blood-pressure and chronic respiratory disorders [4], leading to increased hospitalization and significantly reduced life-span [5]. Likewise, depression greatly elevates risk of suicide, being present in up to 2/3 of all suicides [6]. The indirect costs stemming from increased morbidity, decreased productivity, and direct costs associated with medical treatment for depression produces an estimated economic burden of approximately $200 billion dollars in the United States alone [7]. The World Health Organization currently lists depression as the

leading global cause of health-related disability (WHO depression fact sheet). *Treatment-Resistant Depression:* Traditional therapy for depression involves pharmacological agents, commonly known as anti-depressants (AD). Despite their widespread use, AD medications have limited efficacy in treating this disease, with approximately 30% of patients failing to show symptom remission even after several successive trials with different AD medications, and another 20 to 30% showing only partial symptom reduction [8]. This condition has been termed treatment-resistant depression and there is currently great interest in identifying the underlying factors that produce this condition. *Depression in Latinos:* Latinos represent the fastest growing demographic group in USA, and comprise the majority population in Los Angeles County. Latino Americans show a similar prevalence for depression as the general US population [9], but experience a much more disabling form of the disease. Latinos show higher odds of recurrent major depressive episodes relative to Whites, suggesting a more chronic manifestation of the disease [9]. Likewise, depressed Latinos show a greater reduction in overall quality of life compared to Whites, suggesting greater functional impairment [10]. A pressing issue in this community is a lack of access to and utilization of Psychiatric care, due to lack of health insurance, unavailability of Spanish-speaking medical providers and other factors [11, 12]. An additional concern involves the appropriateness of currently available AD treatments for this population. Latino Americans show higher rates of treatment discontinuation than the general population [13, 14], report greater incidence of adverse events and suicidal ideation following antidepressant treatment [15, 16]. Likewise, Latino patients are less likely to show positive treatment response to AD medications, and are less likely to achieve full symptom remission [17, 18]. Both increased adverse events and reduced treatment response likely contribute to increased rates of treatment discontinuation. *Repetitive Transcranial Magnetic Stimulation (rTMS)*: rTMS uses electromagnetic pulses to stimulate neural activity in disease-relevant brain regions. There are several advantages to this procedure for treatment of depression, including low risk of adverse events, few contraindications and shorter latency for emergence of positive effects relative to AD medications (which can take 4 to 6 weeks for improvement to be seen). Three large scale clinical trials (n > 200) have shown efficacy for rTMS in reducing depressive symptoms in treatment-resistant patients [19-21]. All three studies reported large effect sizes (Cohen's d >0.8), suggesting that rTMS is a highly effective treatment. rTMS hasn't been used widely amongst diverse or difficult to treat patient populations. Of the three clinical trials, O'Reardon, et al (2007) is the only one to report ethnic/racial background, with only 6% (9/155) patients being from a non-Caucasian background. No further information is provided about background. Based on demographic information reported in this study, it is likely that these patients were slightly less impaired relative to typical LA county patients. Neither George, et al (2010) nor Carpenter, et al (2012) report information on racial/ethnic background. See also the preliminary data section for further information about the racial background of the patient base used in rTMS studies. *rTMS in Latino patients:* There are many reasons why pharmacotherapies are suboptimal for treating depression in Latino patients. Latinos have high rates of comorbid health issues that contraindicate antidepressant medication, have increased rates of adverse reaction to medications, show poor treatment engagement, have poor enthusiasm for medication based therapies [22], and likely greater prevalence of treatment resistance. rTMS is free of many of these concerns and is especially useful in patients that have medical conditions, such as high blood pressure or obesity, that limit use of medication. However, efficacy in this population is unknown. Most studies assessing rTMS have not used Latino patients, have not used sufficient numbers to assess efficacy or simply did not report this information (see preliminary data section).

Approach: *Study Flow:* A high proportion of depressed LAC+USC patients are treatment-resistant (TRD). It is anticipated that there will be at least 300 such patients LAC+USC outpatient practice during years 1 and 2 that will be accessible. Of these, it is estimated roughly

10% (n=30) will fail to meet eligibility criterion for rTMS, leaving 270 eligible subjects for rTMS. These subjects will then be asked to participate in research and asked to agree to consent. At this point the offer of rTMS will be given, as well as the survey measures listed in Aim 1. Roughly 30% of patients are anticipated to accept the offer of rTMS, which is a very conservative estimate, leaving 80 patients for rTMS treatment and 190 that decline. It is expected that most of the subjects who agree to receive rTMS will agree to participate in the survey measures, while a lower participation level is expected in people who decline rTMS Dropout rates for patients undergoing rTMS are predicted based on Carpenter, et al, (2012) and O'Reardon, et al (2007). These are useful since both studies provide the necessary level of detail to derive expectations about the proposed study. The Carpenter, et al (2012) study is useful given what appears to be a high degree of impairment relative to the other studies (43% with prior hospitalization, 3.6 previous attempts at AD treatment, and high rates of ECT treatment), which is less severe, but closer to, the severity of LAC+USC patients. Both Carpenter and O'Reardon assessed patients on rTMS over a six-week period and found similar dropout rates at the four and six-week assessment periods (~ 10 - 20% patient loss). Applying a rate of 20% dropout to the predicted number of enrollees leaves 56 patients at week 6. Based on sample size/power estimate (see below) this will be adequate to assess the efficacy of rTMS with sufficient power. HAM-D will be used to assess treatment change at baseline and at 4 and 6 weeks post-treatment.

Aim 1: *Identify factors that mediate willingness to engage in rTMS in treatment-resistant Latino patients*: Patients will be given the offer of rTMS treatment, followed by a series of validated questionnaires designed to understand reasons for their response to the offer. These will include: 1) a demographic questionnaire (education, socio-economic status, education, etc) 2) the Maudsley Staging Method, which assesses depression severity, duration of illness and past history of treatment and the primary method used to assess degree of treatment-resistance 3) the Illness Perception Questionnaire [23], which assesses patient understanding of their depression, including chronicity, cyclicity, personal control, disease consequence and likely effectiveness of treatment 4) questions about barriers to treatment and 5) Bidimensional Acculturation rating scale [22], which assesses acculturation to the US. The goal of Aim 1 is to identify factors that predict and/or mediate acceptance of novel forms of treatment. This patient group is seldom on the forefront of treatment development, so very little is known about how they approach such treatments. As such, Aim 1 will generate data for i) hypotheses generation for future studies, ii) development of questionnaire items that predict treatment engagement/efficacy and iii) development of educational materials and/or other interventions to increase willingness to engage in rTMS, and, by extension, other novel treatments. Statistical Analyses: Primary interest will be in regression methods to identify factors that predict variance in outcome measures (i.e. how does patient insight into depression predict degree of treatment engagement? what factors predict degree of treatment-resistance?, etc) and multivariate methods, such as principle components analysis, to detect outcome measures that significantly correlate.

Aim 2: *Identify factors that mediate adherence to rTMS in treatment-resistant Latino patients*: Aside from the inability to access Psychiatric care, treatment discontinuation is perhaps the most significant factor that limits Latino patients from receiving adequate treatment and achieving significant symptom remission. While some studies have addressed this (for example [22]) these have mostly focused on psychotherapy or AD medications and may not translate to acceptance of novel treatments, and have typically been conducted in significantly less disabled populations. During Aim 2, patients will undergo rTMS treatment and adherence will be monitored. The main outcome measures will be number of rTMS session completed before discontinuation and the number of missed or skipped sessions. We expect that patients who drop out will do so due to adverse reactions to rTMS, inability to commit to treatment schedule and/or perceived lack of treatment success. Other significant predictors are expected to be

identified from more detailed statistical analysis using data gathered from these patients during Aim 1.
Aim 3: *assess treatment efficacy of rTMS in treatment-resistant Latino patients*.: The measure of symptom severity and change will be the Hamilton Depression Inventory (HAM-D), which has been a standard assessment tool for depression since the 1960s. Change will be assessed using a pre-post design comparing post treatment HAM-D scores to pretreatment. Assessments will occur prior to starting rTMS (baseline), and at 4 weeks and 6 weeks post treatment. It is hypothesized that patients will show substantial change in depression severity across the course of treatment. Statistical Analyses: HAM-D scores will be analyzed using repeated measures ANOVA comparing HAM-D at baseline to the same measure at 4 and 6 weeks. As in Aim 1, exploratory regression and multivariate analyses will be conducted to assess relationships between survey measures and treatment response.
Methods: *Subjects* will be between 18 and 80 years of age, of Latino heritage, with a history of unsuccessful response to an AD treatment. This will be defined as failure to respond to one or more anti-depressants administered for 6-8 weeks at FDA approved highest dose. Care will be taken to obtain roughly 50% of subjects from each gender. Exclusion criteria will be; presence of psychosis or other axis 1 related disorder, pregnancy, history of seizures, seizure risk, metal plate or electrode in head, pacemaker, or cochlear implant, or other metal in body. During an initial session subjects will be given questionnaires and other materials listed above in Aim 1. It is expected that this will take about an hour to administer and subjects will be paid to participate. *rTMS*: Treatment sessions will occur over a 6 week period. For the first two weeks treatment will be given 5 times a week, then Monday, Wednesday and Friday for the remaining weeks, for a total of 22 sessions. During the first session a doctor will determine where to place the magnet relative to the skull and will establish the proper level of stimulation. Treatment will last approximately 40 minutes. rTMS is not incapacitating and does not require anesthesia, allowing subjects to travel to and from treatment without assistance. After the first session rTMS can be administered by a technician. Patients will remain on antidepressant medication during treatment. *Sample Size Analysis*: O'Reardon, et al, 2007, is the most useful study for determining sample size. It is the study with the most conservative effect size, uses the HAM-D as primary outcome measure, and reports all the information necessary to calculate necessary sample size (means + sd). In this study, pre-treatment mean HAM-D was 30.1, with SD of 5. HAM-D after 6 weeks of treatment HAM-D was 23.2 with SD of 10.6. The number of rTMS treated patients in this study was 155. The formula to the right was used to estimate sample size, where: r = 1 (equal sample size); $Z\alpha/2 = 1.96$ for $\alpha=0.05$; $Z1-\beta=1.2816$ for power = 0.9; d = MEANtreatment - MEANbaseline, = 30.1 - 23.2 = 6.9; $\sigma = (\sigma baseline + \sigma treat) / 2 = (5 + 10.6) / 2 = 7.8$; Therefore: $N = 2(10.51)\ (60.84)/\ (1)(47.61) = 27$. Thus, at least 27 subjects will be needed to detect a similar effect size between baseline and treatment

HAM-D scores as previously reported, at 0.9 power at alpha = 0.05. As we would like to have separate Male and Female groups, 54 subjects will be needed.
Limitations and Alternative Strategies: Lack of explicit hypotheses: Although there is an explicit hypothesis in aim 3 regarding effects of rTMS treatment on symptom severity, aims 1 and 2 are primarily exploratory. This is unavoidable given the lack of information about this patient group and novelty of rTMS. The nature of this research is aimed at developing hypotheses to test in future studies and developing interventions to increase patient engagement, adherence and efficacy. *Participation rates differ from predicted*: There is no official data on depressed patients in the LAC+USC hospital system. (The I2B2 database currently does not have information about psychiatric disorders). As such, predicted participation rates are derived from estimates provided by Drs Figueroa and Lagomasino, both of who have extensive experience in the Keck and LAC+USC environment. However, the actual outcome could differ from that predicted in a number of ways. a) Not enough patients accept the rTMS offer. The number of required patients

has been doubled in order to have separate Male and Female groups. If a sufficient number of patients cannot be obtained, males and females will be collapsed into a single group for analysis b) Not enough patients decline offer of rTMS. This is unlikely given the high number of patients available and potential reticence within the population. c) Patients who decline the rTMS offer decide not to participate in the survey questionnaires. We will be offering potential participants $20/hr to complete these surveys. Based on discussions with Dr. Lagomasino, this is likely sufficient to get adequate participation. d) Not enough people drop out during aim 2. One of the advantages of rTMS treatment is the relatively low dropout rate. Latino patients report greater experience of adverse events following anti-depressant medication, so it is possible increased incidence in adverse events will also be seen in Latino patients despite the low adverse event rate with rTMS. Additionally, there may be socio-cultural issues particular to Latinos that increase dropout, such as the required time commitment, aversion to novelty, etc. In the event that we do not have sufficient numbers of patients who drop out, we will forgo formal quantitative statistical analysis and focus on qualitative approaches to understand reasons for dropping out. *Cost:* There are costs associated with the production of bilingual questionnaires, costs for bilingual research assistants to administer the questionnaires, and reimbursements to patients for participation. Aim 1 will administer questionnaires to 140 subjects, at a cost of $20 per subject. CTSI charges ~$50 per hour for research assistants, for a total of $70 per subject or $10500 to complete Aim 1. Aim 2 will make use of data from Aim 1, with the possible addition of telephone interviews with a small number of subjects who dropout of treatment. Administration of the HAM-D is a standard component of treatment and will be paid for through health care reimbursement. These costs will be well below the yearly $25,000 allotted to the award. In the event of unanticipated costs the Department Chair, Dr. Steven J Siegel, has set aside resources (see Department Head letter).

Innovation: There are several innovative aspects of the proposed research. Subjects will be derived from an *understudied population* that is at elevated risk for chronic forms of depression for which current treatments have been largely ineffective. This is significant since there are few studies that have specifically addressed depression in this population and many existing rTMS clinical trial studies were either conducted on non-Latino Caucasian populations or did not specify patient background. The need for better understanding of this population is particularly great. Latino patients have seldom been at the forefront of novel, cutting-edge medical therapies like rTMS. Additionally, there are few studies that have assessed *barriers to treatment in Latino patients*. Many of these studies were conducted over ten years ago, and most looked at earlier stage barriers, such as availability of health insurance. The research proposed here will fill this gap and extend our knowledge of treatment barriers to acceptance of treatment. Subjects will be given the opportunity to participate in a *novel therapy with proven results*. There are currently few treatment options for patients that have failed to respond to AD medications or psychotherapy. In many cases, electroconvulsive therapy (ECT) or deep brain stimulation via implanted electrode, of which are costly and have serious potential side effects, are typically the next steps. rTMS is likely to *fill an important gap between AD medication and these more invasive procedures*. Not surprisingly, rTMS has shown to be *cost effective* (lower cost and greater benefit) in treatment-resistant patients compared to continued treatment with additional AD when considered across patient lifespan [24].

PUBLIC HEALTH

Starting a New Volunteer Income Tax Assistance (VITA) Center in The Wellness Center

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Goal: Many low-income individuals and families qualify for tax credits, specifically the earned income tax credit (EITC); however, only 78% of those eligible for this credit receive it. The EITC has the power to help alleviate poverty; in 2017, it lifted 8.9 million people out of poverty and made 20.2 million others less poor, according to the IRS. It has also been shown that receiving this credit is correlated with improved healthcare. We opened a Volunteer Income Tax Assistance (VITA) Center in The Wellness Center, which serves low-income individuals and families, to offer on-site free tax preparation services. The goal was to assess the use and financial impact of the center. Additionally, we recruited medical students to volunteer in the center; we assessed the impact this experience had on their financial awareness, and how this may contribute to their future practice.
Methods: The VITA Center was open 2 days/week for 7 weeks throughout the 2019 tax season. Anonymous data was collected from TaxSlayer and analyzed. Medical student volunteers were surveyed, and their responses were analyzed.
Results: The VITA Center submitted tax returns for 74 people, with a total of $91,261 returned. Of this, 41.8% ($38,190) was due to the EITC. Of those who received the EITC, the average refund amount was $1,591.25. Data will be collected for the 2020 tax season, and further analysis will then be performed. We expect results to be similar to those of 2019. Results of the medical student volunteers' surveys will be analyzed after the 2020 season, so our sample size will be more substantial. We expect this volunteering experience will improve medical students' confidence in their ability to discuss finances with patients.
Conclusions: Data from the first year of the VITA Center shows that it benefitted members of the community. Future data will allow us to expand upon the extent of this impact, and eventually may allow us to examine the impact this has on health.

Direct Linkage of Primary Care Patients to Community-Based Resources for Social Determinants of Health and Chronic Disease Self-Management

Kaitlin Vick, Telma Menendez, Dr. Janina Lord Morrison

Background: Initial efforts to link primary care patients to community-based resources at The Wellness Center (TWC) using verbal referrals, informational flyers, and event calendars were ineffective. Therefore, we established a program utilizing on-call Wellness Navigators to increase referrals from a primary care clinic to these community-based services and therefore improve patient chronic disease outcomes and general wellbeing via evidence based programs (EBPs).
Methods: Using an internal database shared by all onsite community organizations, we tracked the number and demographics of clients successfully referred from the primary care practice to our community-based organizations.
Results: From August 2018 through June 2019, 966 primary care patients connected with on-call Wellness Navigators, with 318 of those patients ultimately visiting TWC, for a successful referral rate of 33%. This population was 84% Latino, 66% Spanish speaking, and 73% female with an average age of 50. 23% of patients screened positive for housing insecurity and 45% for food insecurity. Additionally, 41% reported they were diabetic or pre-diabetic. Of those 318 clients that were successfully referred to TWC, 65 were referred into EBPs, 13 enrolled in EBPs, and 9 graduated. There was increased health care utilization in EBP enrollees and graduates

before program initiation as compared to individuals who were referred to EBPs but never enrolled.
Conclusions: This program demonstrates that Wellness Navigator programs can serve to effectively link primary care patients to community-based resources. The main limitation of this pilot innovation was the limited uptake: 67% of patients did not visit TWC after referrals from our Wellness Navigators. Moving forward, the Wellness Navigator program will be standardized across the primary care clinic and follow-up will be incorporated by calling patients who were referred to, but do not visit TWC.

RADIATION ONCOLOGY

Detection of breast cancer recurrences in high-risk node positive patients

Ariani R, Hwang L, Ragab O, Ye JC

Purpose/Background – Patients with axillary nodal breast cancer have high rates of local, regional and distant recurrence despite advances in systemic therapies. Current NCCN guidelines offer no recommendation for routine laboratory or imaging studies for metastatic screening in absence of clinical signs or symptoms, despite recent evidence suggesting that aggressive local management of oligometastatic (≤5 metastases) disease can improve survival.
Methods – This was a retrospective chart review of women with nonmetastatic unilateral invasive clinical or pathologically node-positive breast cancer, seen at Los Angeles County Hospital between 2008-2019 at time of definitive therapy with surgery, chemotherapy, and radiation. We recorded demographic information, tumor diagnosis, treatment information, and imaging studies performed post-therapy to detect recurrence or metastases.
Results – A total of 103 node-positive unilateral invasive breast cancer patients were identified, of which 28 ultimately developed recurrence or metastases. Local recurrence (breast, chest wall) was detected in 12 patients (6 oligometastatic), in a median time of 33 months, diagnosed on CT (6), PET scan (2), bone scan (1), and other (3). Median survival after first detection was 35 months. Regional recurrence was detected in 12 patients (4 oligometastatic), in a median time of 32 months, diagnosed on CT (8), PET (2) and other (2). Median survival after first detection was 14 months. Distant metastases were detected in 24 patients (6 oligometastatic), in a median time of 33 months, diagnosed on CT (15), PET (3), bone scan (3), and other (3). Median survival after first detection was 18 months.
Conclusion – The majority of patients developed distant metastases, most commonly diagnosed on CT. A quarter to half of all recurrences were oligometastatic. All recurrences occurred between 32-33 months, suggesting that surveillance imaging prior to this period can aid in earlier detection of recurrent or metastatic disease.

Quantifying Organ-Specific Radiation Doses Using An Auto-Segmentation-Based Atlas Program

Pierre Kobierski; Sally Cohen-Cutler, MD; Arthur Olch, PhD; Department of Radiation Oncology, Children's Hospital Los Angeles (CHLA)

Background
CT-based irradiation plans are created to facilitate radiation therapy for pediatric cancer patients. Current guidelines[1] for follow-up for late effects of radiation are based on radiation field areas (RAs) rather than specific organs. In Varian Medical Systems' Eclipse software, each organ in a CT plan can be drawn slice-by-slice (segmented) to determine the radiation dose to a percentage of each organ volume (Dv). If the Dv exceeds a certain value, late effects surveillance is required. This process is time consuming, but use of an auto-segmentation-based atlas program via VelocityAI software can expedite it.
Methods
The patient population studied included pediatric cancer survivors who underwent radiation therapy. RAs studied were based on COG guidelines. In Eclipse, organs of interest were segmented within CT plans. Using segmentation sets created using 6 patients, an auto-segmentation-based atlas was created that was then used to auto-segment the rest of the CT plans. Once segmentation was done, volumetric dose calculations were applied. Organs exceeding the tolerance Dv metric were recorded and compared to the non patient-specific screening guidelines.

Results
Dvs were collected for 132 patients. Of 3,399 structures total, 2,276 were flagged by the COG guidelines vs 645 by our patient-specific metrics. For select organs, the numbers of structures flagged, respectively, were: for the brain, 68 vs 16 of 77 total; for the hypothalamus, 75 vs 45 of 92 total; for the liver, 50 vs 0 of 60 total; for the pituitary, 75 vs 42 of 93 total; and for the thyroid, 51 vs 32 of 96 total.
Conclusion
Use of an auto-segmentation-based atlas significantly reduced time and work needed to segment organs. Using patient-specific metrics on the dose volumetric data collected from segmentation yielded a total of 72% fewer flags for surveillance vs the COG guidelines.
References
Children's Oncology Group Long-Term Follow-Up (COG) Guidelines for Survivors of Childhood, Adolescent, and Young Adult Cancer

Dosimetric comparison and clinical implications of dose calculation algorithms for stereotactic body radiation therapy in spine metastases

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BACKGROUND: Dose calculation algorithms for radiotherapy differ in their ability to handle patient-specific anatomy, tissue heterogeneity, and artificial implants, which is especially crucial in spine stereotactic body radiation therapy (SBRT). Slight differences in dose calculation can result in overdosing the cord or under-dosing the tumor. This study evaluated the dosimetric differences in three commonly used algorithms—collapsed cone convolution (CCC), anisotropic analytic algorithm (AAA), and Acuros XB (AXB)—for SBRT in spine tumors with and without metal implants.
METHODS: We retrospectively analyzed 27 spinal SBRT patients, 8 with metal hardware. Fourteen plans calculated using CCC were recalculated with AAA and AXB and 13 plans calculated with AXB were recalculated using AAA. Target coverage and maximum dose for cord were compared with AXB as the standard.
RESULTS: The maximum dose to the spinal cord was overestimated with AAA by +3.4% and CCC by +0.34% compared to AXB. Patients with metal hardware in the target volume showed larger degree of overestimation with both algorithms.
The maximum dose to the target was overestimated with AAA by +1.2%, whereas CCC underestimated by -4.9%. However, for patients with metal in the target, AAA overestimated minimally, but CCC underestimated by a larger degree.
Both algorithms overestimated the dose covering 95% of the target volume: AAA by +2.9% and CCC by +3.9%, with larger degree of overestimation in patients with metal.
CONCLUSIONS: As more accurate dose calculation algorithms (AXB) are implemented clinically, the dosimetric review of target and normal organs need to be re-examined. Historical algorithms overestimate the minimum target coverage, indicating potential under-dosing. Additionally, spinal cord tolerances established using historically less accurate algorithms need to be validated in plans calculated with AXB. The differences are exaggerated in patients with metal implants, warranting additional attention.

Association between wait-time for definitive radiotherapy and oncologic outcome of women with locally-advanced cervical cancer

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Keywords: cervical cancer; wait time; biopsy; radiotherapy; recurrence.
Funding support: Ensign Endowment for Gynecologic Cancer Research (K.M.).

Objective: A prior study found that wait-time of ≥35 days for definitive radiotherapy for locally-advanced cervical cancer treatment is associated with decreased survival. This study examines the association between wait-time for definitive combined chemo-radiotherapy and recurrence risk for women with locally-advanced cervical cancer.
Methods: This is a single institution retrospective observational study at a tertiary referral medical center examining women who received definitive chemo-radiotherapy for the 2009 FIGO stage IB2-IVA cervical cancer from 2013-2018 (*N*=93). Patients were divided into two groups based on wait-time from the diagnosis of cervical cancer via biopsy to definitive radiotherapy initiation: short (<35 days; *n*=21) *versus* long (≥35 days; *n*=72) wait-time. Propensity score inverse probability of treatment weighting was used to match the demographics between the two groups, and survival outcome was assessed. In a sensitivity analysis, wait-time was grouped per the median value (51 days).
Results: In the entire cohort, the median age was 51 years, and the most common histology type was squamous (*n*=67, 72.0%). The most common T stage was T2b (*n*=44.1%), followed by T1b2 (*n*=31, 33.3%) and T3b (*n*=13, 14.0%). Pelvic and para-aortic nodal metastases were seen in 45 (48.4%) and 20 (21.5%) cases, respectively. No patient or tumor characteristics were associated with prolonged waiting time (all, *P*>0.05), but longer wait-time was associated with longer time to complete radiotherapy (r=0.217, *P*=0.037). In a weighted model for 35 days cutoff (*n*=105), women in the long wait-time group had progression-free survival (2-year rates, 61.5% *versus* 56.8%, hazard ratio [HR] 1.00, 95% confidence interval [CI] 0.48-2.09) comparable to those in the short wait-time group. Similarly, in a weight model for 51 days cutoff (*n*=109), wait time was not associated with progression-free survival (67.3% *versus* 59.3%, HR 0.85, 95%CI 0.44-1.66).
Conclusion: Our study suggests that long wait-time of ≥35 days between diagnosis and radiotherapy initiation may not be associated with increased recurrence risk in women with locally-advanced cervical

RADIOLOGY

Diagnostic Yield of Neck Computed Tomography Angiography in the Absence of Cervical Spine Fracture in Trauma Patients

Stephanie Jones, Ali Gholamrezanezhad MD, Department of Radiology, Keck School of Medicine

Background: Computed tomography angiography (CTA) of the neck has been shown to be a valuable tool in the evaluation of trauma patients for cervical vascular injury (CVI). However, CTA is an expensive procedure that carries risks to the patient, and thus there is value in utilizing it only when strongly indicated. The objective of this study is to determine the rate of CVI among patients with no cervical spine fracture in order to inform a set of guidelines that can be used to indicate situations in which neck CTA is necessary.
Methods: We are reviewing the records of all patients who were evaluated at LAC-USC Medical Center for head and neck trauma from 2012 to 2019. Inclusion criteria are negative non-contrast CT findings regarding cervical spine fracture and evaluation for CVI using neck CTA. Patients are categorized according to the mechanism of trauma, the imaging findings, and patient outcomes. At the conclusion of data collection, machine learning models will be used to determine diagnostic yield and build a prediction model to estimate the percentage of unnecessary neck CTA procedures that may be prevented with a set of CVI indication guidelines.
Results: We expect that out of approximately 1000 cases screened, about 800 will meet inclusion criteria, and of those cases, 99% will be negative for CVI on neck CTA. Thus we predict that the rate of CVI in the absence of cervical fracture will only be around 1%.
Summary: If the expected results are found, this will suggest that performing neck CTA in trauma patients who have already been shown to lack cervical spine fracture on non-contrast CT is unnecessary 99% of the time. These findings could help develop a set of guidelines to triage head and neck trauma patients for the necessity of neck CTA by identifying potential indicators of CVI. If absence of cervical spine fracture is a low indicator of CVI, this could be used as a screening tool to prevent overutilization of CTA and the associated costs and risks to patients.

Olfactory processing in children with autism spectrum disorder and sensory processing dysfunction

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Goal: Olfactory changes have been identified in various neuropsychiatric disorders, yet studies of olfaction in autism spectrum disorder (ASD) remain inconclusive. The present study assesses olfactory processing, specifically odor detection and identification, in children with ASD, compared to children with sensory processing dysfunction (SPD) and typically developing children (TYP), and tests whether olfactory performance is associated with autism-related behaviors.
Methods: 43 ASD children, 44 SPD children, and 46 TYP children participated in this study. Group inclusion was based on the Autism Diagnostic Observation Schedule (ADOS2), Autism Diagnostic Interview, and Child Sensory Profile-2. Odor detection threshold was measured for two odorants (phenylethyl alcohol/PEA, vanillin) using Sniffin' Sticks Threshold Test. Smell identification was measured by the University of Pennsylvania Smell Identification Test (UPSIT). Autism-related behaviors were measured by ADOS2 calibrated scores.
Results: ASD did not differ significantly from TYP in Sniffin' Sticks scores for PEA or vanillin, while SPD had lower Sniffin' Sticks scores than TYP for both odorants (p_{PEA}=.039; p_{vanil}=.035). Compared to TYP, UPSIT scores were reduced in ASD (p<.001) and SPD (p=.001). UPSIT scores did not differ significantly between ASD and SPD. UPSIT scores were negatively

correlated with ADOS Total Score (p=.005) and Social Affect Score (p=.006) only in ASD. No correlation was seen between UPSIT scores and ADOS Restricted Repetitive Behaviors. **Conclusions**: Children with ASD show odor identification deficits, reflecting dysfunction in secondary olfactory cortices, while children with SPD show deficits in odor detection and identification, suggesting a broader olfactory pathway dysfunction. The relationship between odor identification and autism-related behaviors points to a shared neural substrate underlying central deficits in both olfactory and social processing in ASD.

SOCIAL WORK

Proud and Empowered: A Theoretically Informed, LGBTQ-affirming Intervention

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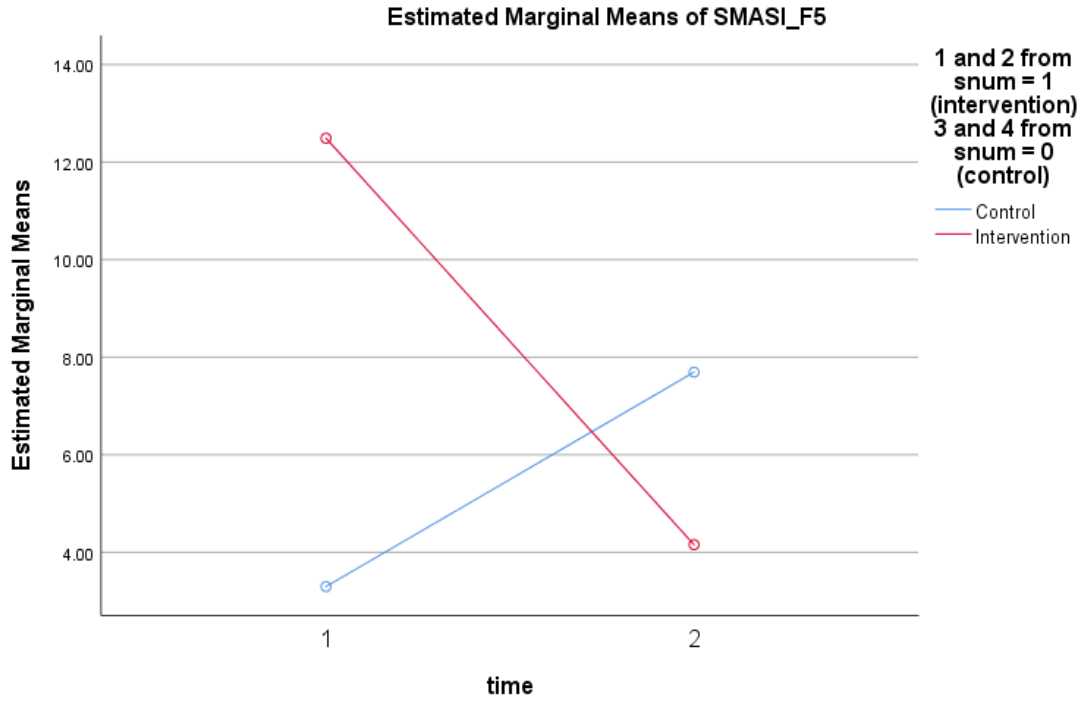
[1]Keck School of Medicine of USC, Los Angeles, CA;[2]USC Suzanne Dworak-Peck School of Social Work, Los Angeles, CA

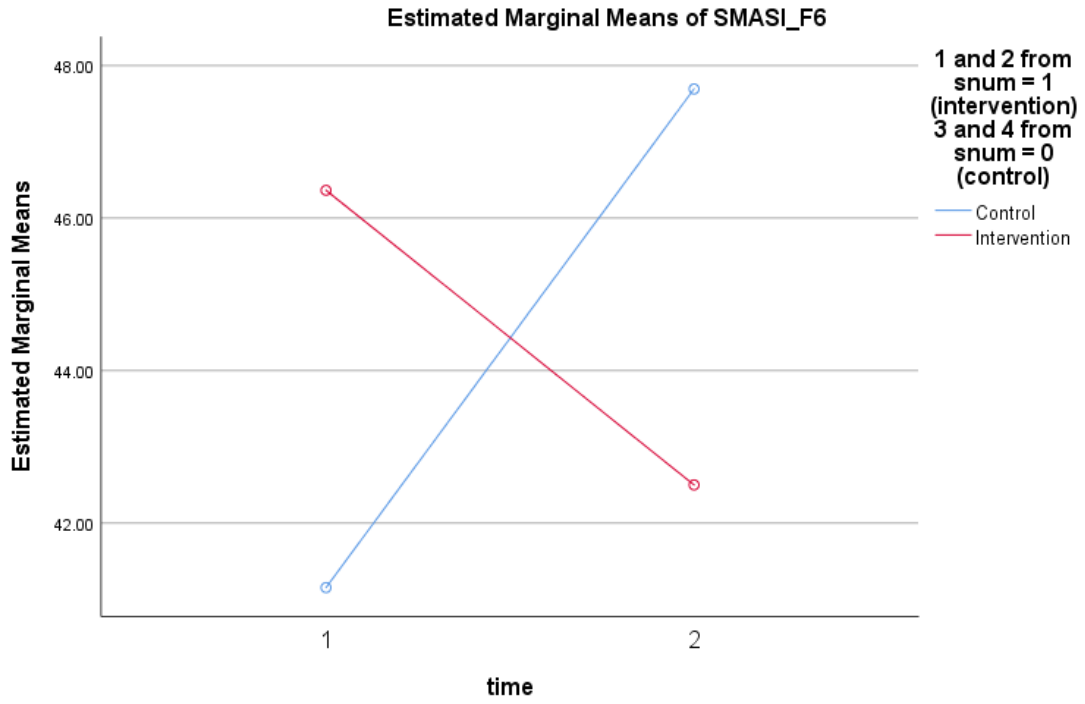
Goal: Prior research has shown that LGBTQ adolescents experience more negative behavioral health outcomes when compared to their heterosexual peers. Yet, there remains a lack of interventions to address these concerns. This study sought to demonstrate the feasibility and preliminary efficacy of a novel LGBTQ-affirming intervention on numerous behavioral health outcomes, including depression, anxiety and suicidality for LGBTQ adolescents.
Methods: Schools were randomly assigned to intervention and control conditions. Intervention schools (n=2) recruited students (n=10 & n=19) who received the 10-week P&E intervention, while control school participants received no intervention. Participants at both schools completed measures of behavioral health before and after the intervention. Preliminary analysis of intervention vs. control on a 10-domain measures of minority stress were obtained with further data analysis on other behavioral health measures pending.
Results: On the Identity Management subscale, the intervention group decreased by 4.5 points compared to the control group which increased by 2.5 points. On the Negative Disclosure Experiences subscale, the intervention group decreased by 3.5 points while the control group remained the same. On Internalized Homonegativity, the intervention group decreased by 8.3 points while the control group increased by 4.4 points (Figure 1). On the Homonegative Communication subscale, the intervention group decreased by 3.9 points while the control group increased by 6.5 points (Figure 2).
Conclusions: This data provides preliminary evidence for the efficacy of an LGBTQ-affirming intervention to address the behavioral health of LGBTQ adolescents and should be tested in future research with a larger study sample.

Figure 1



Data from Internalized Homonegativity subscale of SMASI.

Figure 2



Data from Homonegative Communication subscale of SMASI.

STEM CELL BIOLOGY & REGENERATIVE MEDICINE

Ectopic Bone Formation: The Regenerative Ability of the Periosteum

Jason Hsieh and Francesca Mariani, PhD
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Background:
Although autologous skeletal transplant surgeries can repair bone injuries with some success, transplant material can be limited in supply and the donor site can be associated with chronic pain other co-morbidities. One idea is to use the periosteum, a connective sheath surrounding the bone and containing skeletal progenitors, to induce osteogenesis in skeletal injury sites. The goal of this study is to identify the key cellular mechanisms and surgical techniques that will stimulate the cells in this tissue to respond to injury and differentiate into new skeletal tissues. By specifically implanting periosteum into intercostal muscles, the tissue is isolated from a multitude of proteins released in the skeletal injury site.

Methods:
Transgenic tissues, such as those carrying bone and cartilage specific reporters (Col 2.3 GFP; Col X mCherry) and those expressing SmoM2 (an activated form of the Smo co-receptor for Hedgehog (Hh) signaling), were implanted into murine intercostal muscles. The tissues were implanted either as collated disorganized strips or in a more native orientation as a tubular structure and analyzed 7-30 days post-implantation.

Results:
We found that the shape of the implant influenced the initial injury response but not the ability to make ectopic bone. This bone appeared to form through direct ossification in small disconnected nodules. When the cells expressed SmoM2, however, we found that extensive bone formed via endochondral ossification. Hypertrophic chondrocytes were present in Cre-SmoM2 periosteal allografts 7 days after implantation and trabecular bone-like formation appeared after 14 days.

Summary/Conclusion:
This study suggests that the Hh pathway plays a key role in inducing endochondral ossification. Understanding the regenerative ability of the periosteum and the pathways involved will be crucial toward eliminating invasive bone reconstructive surgeries. In addition, the potential to use the periosteum as an organic bone regenerative platform may provide an alternative autologous treatment for patients with extensive or challenging bone injuries.

SURGERY

Adjuvant Chemotherapy Improves Long-Term Survival in cIIIA Non-Small Cell Lung Cancer in the Presence of Residual Nodal Disease following Neoadjuvant Therapy and Definitive Resection

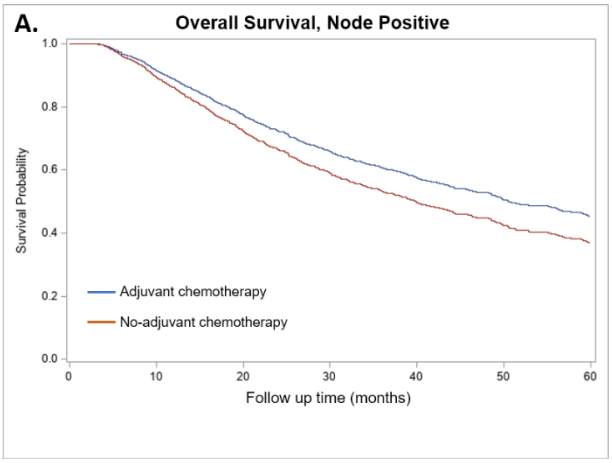
Maziar Amini, Li Ding, P. M. McFadden, Elizabeth David, Anthony W. Kim, Scott Atay

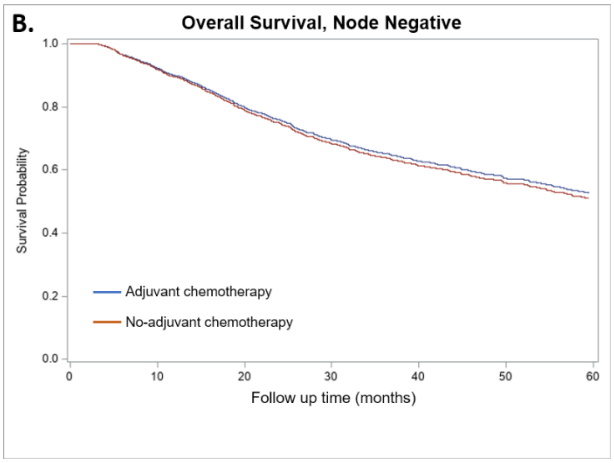
Purpose:
The utility of adjuvant chemotherapy following neoadjuvant therapy and curative intent surgical resection for clinical IIIA non-small cell lung cancer (NSCLC) is not defined. We sought to evaluate the contribution of adjuvant chemotherapy to overall survival in patients with cIIIA disease who underwent neoadjuvant therapy followed by curative intent surgical resection.

Methods:
The National Cancer Database (NCDB) was queried from 2010 to 2016 for clinical stage IIIA NSCLC patients who underwent curative intent surgical resection following neoadjuvant therapy (chemotherapy or chemoradiation). Patients were grouped by receipt of adjuvant chemotherapy and overall 5-year survival was calculated using the Kaplan-Meier method. Logistic regression was performed to identify predictors of residual node involvement. The association between survival and adjuvant chemotherapy in patients with residual pathologic nodal disease was evaluated using Cox regression. An additional 90-day landmark analysis was performed to address bias associated with early peri-operative morbidity.

Results:
A total of 3847 patients met inclusion criteria, of which, 780 received adjuvant chemotherapy (20.3%). In the unadjusted cohort there was no difference in overall 5-year overall survival between the adjuvant and no adjuvant chemotherapy (45.1% vs. 45.6%, p=0.132). In the subgroup analysis, risk of death was decreased in the pathological node positive patients receiving adjuvant chemotherapy (HR 0.79 CI 0.68-0.92, p<0.005) while no difference was seen in node negative patients (HR 0.952 CI 0.78-1.17 p=0.64).

Conclusions:
For patients with completely resected cIIIA NSCLC following neoadjuvant therapy, adjuvant chemotherapy is associated with an increase in overall survival for patients with residual lymph node disease. In node negative patients, adjuvant chemotherapy did not appear to improve survival, and may be associated with a decrease in long-term survival.





Regional Variation in Treatment for Non-Small Cell Lung Cancer Patients with High-Risk Socioeconomic Factors

Katherine J. Bick, MS[1] Li Ding, MD MPH[2] Peggy J. Ebner, BA[1] Anthony W. Kim, MD[1] Scott M. Atay, MD[1] Sean C. Wightman, MD[1] P. Michael McFadden, MD[1] Albert J. Farias, PhD MD[2] Elizabeth A. David, MD MAS[1]

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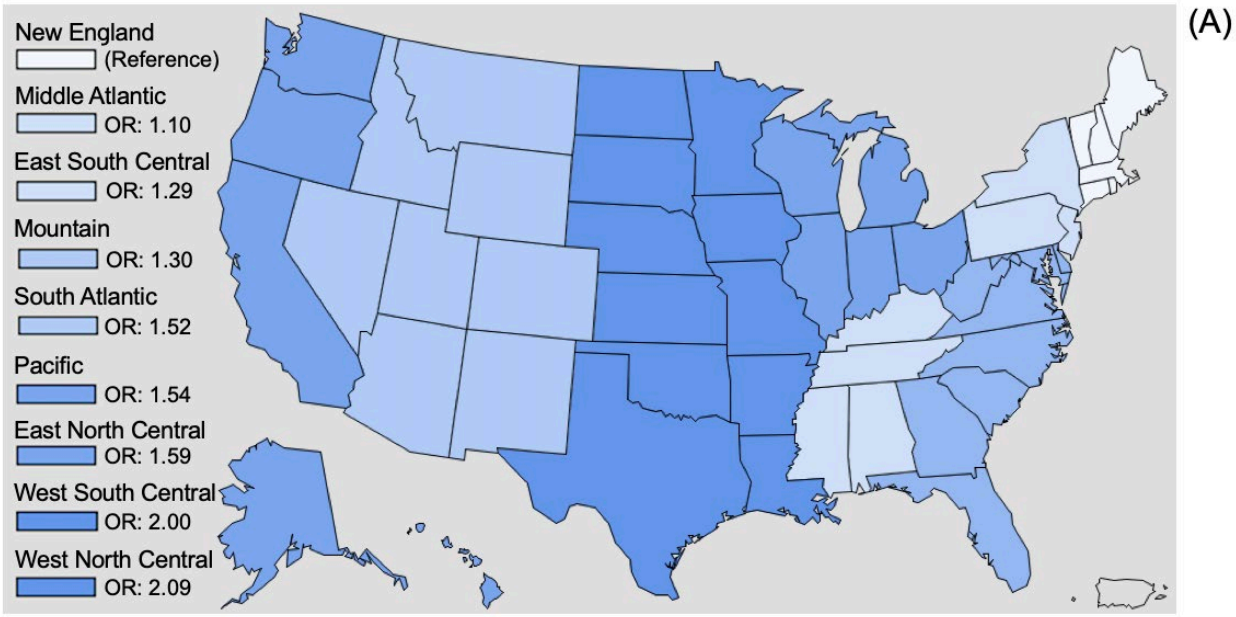
Background: Non-small cell lung cancer (NSCLC) patients with multiple high-risk socioeconomic factors experience greater treatment and survival disparities. We hypothesized the association between number of high-risk SES factors per patient (NumSES) and treatment varies by region.

Methods: The National Cancer Database was queried for patients with clinical stage I-IIA NSCLC diagnosed between 2004-2015. Patients were categorized by treatment: standard treatment (ST), nonstandard treatment (NST), and no treatment (NoT). The primary outcome was odds of NST and NoT in each region compared to New England, evaluated with multivariable logistic regression. The secondary outcome was survival, evaluated with Cox proportional hazard regression and the Kaplan-Meier method.

Results: 93,211 patients met inclusion criteria. The odds of NST were significantly greater in six regions compared to New England for ≥3 NumSES, greatest in West North Central (OR, 2.09; 95% CI, 1.58-2.77; *P* <0.001) (Fig 1). The odds of NoT were significantly greater in seven regions compared to New England for ≥3 NumSES, greatest in West South Central (OR, 3.56; 95% CI, 2.33-5.43; *P* <0.001) (Fig 1). Compared to New England, West North Central had the highest risk of all-cause mortality (HR, 1.10; 95% CI, 1.04-1.16; *P*<0.001), and Middle Atlantic had the lowest (HR, 0.86; CI, 0.82-0.91; *P*<0.001). 5-year overall survival for ≥3 NumSES was longest in Middle Atlantic (60.8%) and shortest in Mountain (36.8%) (Fig 2).

Conclusions: Patients with three or more high-risk socioeconomic factors experience treatment and survival disparities across the U.S., though disparities are more pronounced in certain regions. Regional interventions may be an effective strategy to mitigate disparities among highest risk non-small cell lung cancer patients.

Fig 1. Heat Map For Odds Ratio of (A) NST and (B) NoT For ≥3 NumSES Across Regions Compared to New England



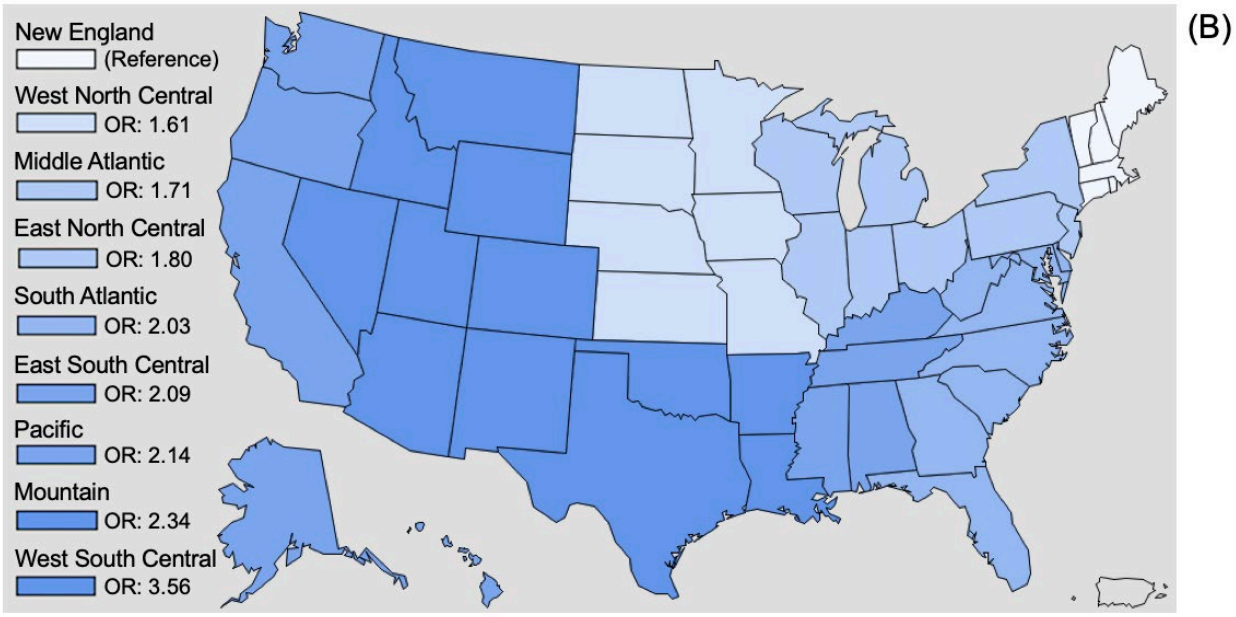
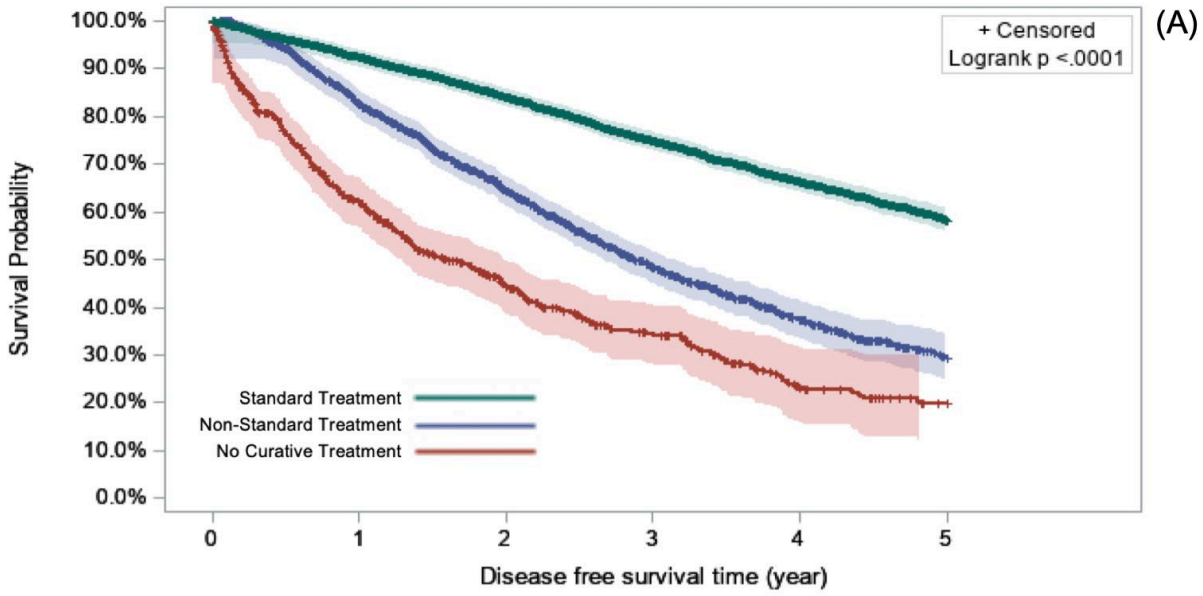
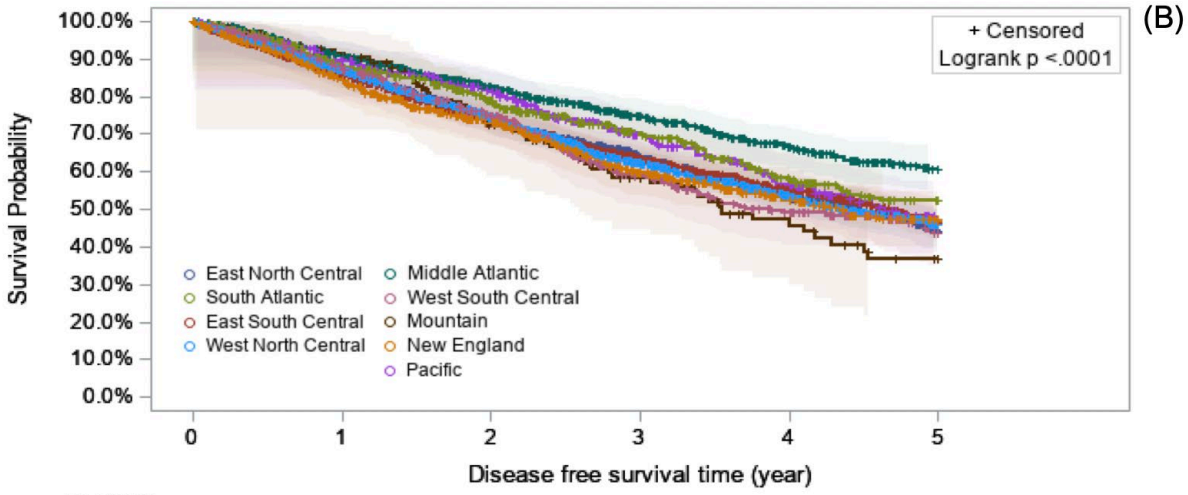


Fig 2. Kaplan-Meier 5-Year Overall Survival Curves Associated With ≥3 NumSES For (A) Treatment and (B) Region



No. at Risk						
Standard Treatment	5305	4366	3462	2407	1602	955
Non-Standard Treatment	2163	1642	1090	619	352	178
No Curative Treatment	728	395	223	137	62	32



No. at Risk						
East North Central	1249	977	721	499	303	160
East South Central	1810	1410	1065	722	468	282
Middle Atlantic	822	670	502	347	233	142
Mountain	150	119	81	47	29	17
Pacific	378	301	241	155	104	56
South Atlantic	521	402	309	208	133	85
West North Central	2158	1677	1245	798	501	283
West South Central	410	325	247	155	105	59
New England	703	522	364	232	140	81

Organogenesis and Distribution of the Ocular Lymphatic Vessels in the Anterior Eye: Implication to Glaucoma Surgery Site Selection

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Glaucoma surgeries, such as trabeculectomy, are performed to lower the intraocular pressure to reduce the risk of vision loss. The surgeries create a new passage in the eye that reroutes the aqueous humor outflow to the subconjunctival space, where the fluid is presumably absorbed by the conjunctival lymphatics. However, the current knowledge of these ocular surface lymphatics remains limited. Here, we characterized the biology and function of the ocular lymphatics using transgenic lymphatic reporter mice and rats. We found that the limbal and conjunctival lymphatic networks are progressively formed by a primary lymphatic vessel that grows out from the nasal-side medial canthus region at the time of birth. This primary lymphatic vessel immediately branches out and invades the limbus and conjunctiva, and then simultaneously encircles the cornea in a bidirectional manner. As a result, the distribution of the ocular lymphatic is significantly polarized toward the nasal side, and the limbal lymphatics are directly connected to the conjunctival lymphatics. New lymphatic spouts are mainly produced from the nasal-side limbal lymphatics, posing the nasal side of the eye more responsive to fluid drainage and inflammatory stimuli. Consistently, when a fluorescent tracer was injected, fluid clearance was much more efficient in the nasal side than the temporal side of the eyes. In comparison, blood vessels are evenly distributed on the front surface of the eyes. We found that these distinct vascular distribution patterns were also conserved in human eyes. Together, our study demonstrated that the ocular surface lymphatics are more densely present in the nasal side and uncovered the potential clinical benefits in selecting the nasal side as a surgical site for glaucoma surgeries to improve the fluid drainage.

Long-term Outcomes with the Pulmonary Autograft Inclusion Technique in Adults with Bicuspid Aortic Valves Undergoing the Ross Procedure

Vaughn A. Starnes, Ramsey S. Elsayed, J. Alexander Weston, Wendy J. Mack, **Rafaello M. Cutri**, Hans C. Baertsch, Craig J. Baker, S. Ram Kumar, Michael E. Bowdish

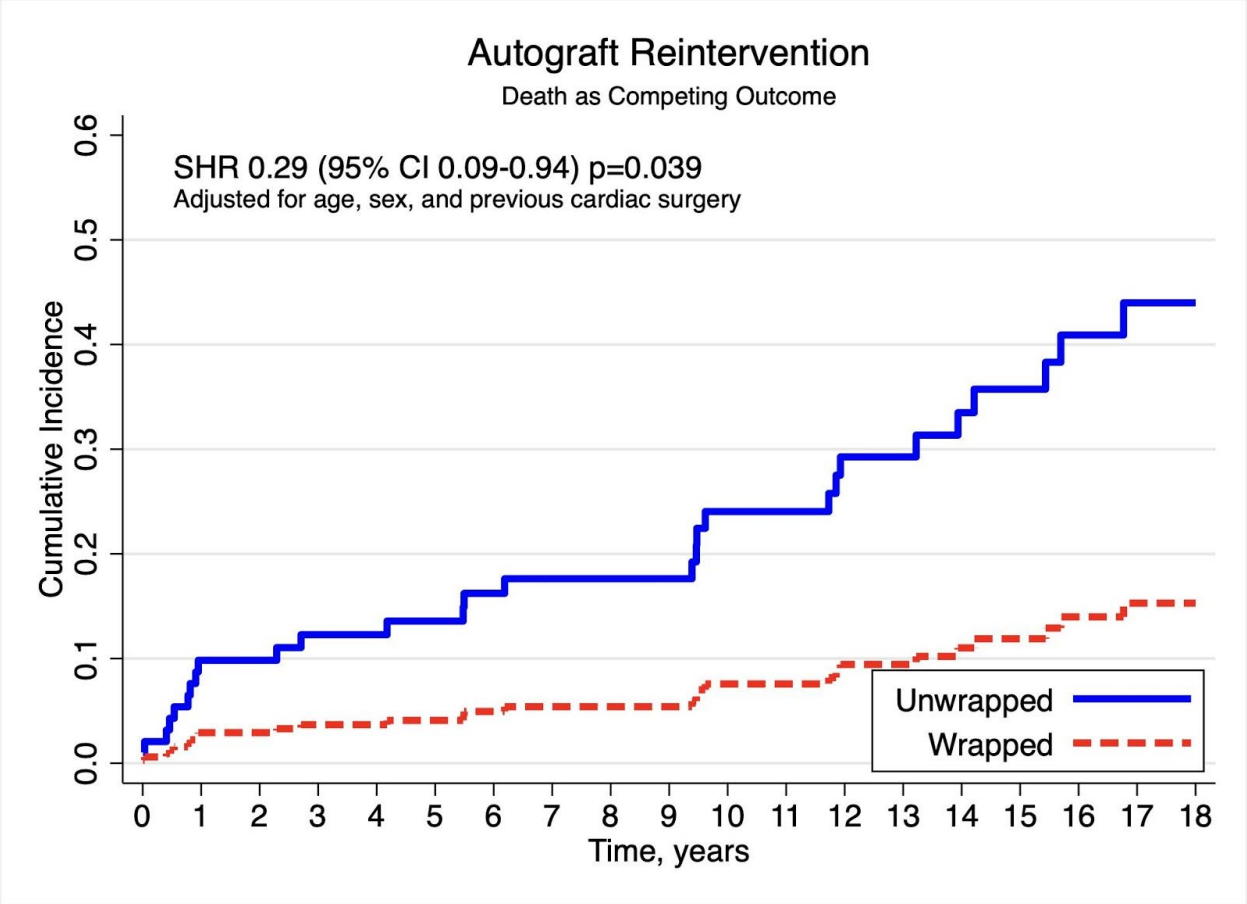
Objective: To evaluate whether the pulmonary autograft inclusion technique reduces the need for autograft reintervention in adult patients with bicuspid aortic valves undergoing the Ross procedure.

Methods: From 1992 to 2019, 129 adults with bicuspid aortic valves (age ≥18 years) underwent the Ross procedure by a single surgeon at a single institution. In 2001, the technique was modified by placement of the pulmonary autograft inside a woven polyethylene terephthalate (Dacron™) graft. The 129 patients divided into two cohorts, those without autograft inclusion (unwrapped cohort, n=71) and those with autograft inclusion (wrapped cohort, n=58). Follow-up ended 7/1/19 and was truncated at 18 yrs. Standard descriptive statistics were utilized to compare cohorts; survival was compared using Kaplan Meier (KM) methods and Cox-Proportional hazards; need for autograft reintervention was analyzed using cumulative incidence functions and competing risks modeling considering death as a competing outcome (sub-hazard ratios, SHR).

Results: Median age was 35 [IQR 26, 44] years. Pre- and intraoperative characteristics including age, sex, comorbidities, ejection fraction, valvular pathology, incidence of previous heart surgery, aortic cross clamp time, and need for concomitant procedures did not differ.

There were more obese patients (7(12%) vs 0, p=0.003) in the wrapped cohort. 30-day morbidity or mortality did not differ between cohorts (p=0.96, p=0.20, respectively). Median follow-up was 9.8 years [IQR 3.0, 16.8]. There were 3 deaths, all in the unwrapped cohort (4.2 vs 0%, p=0.11). KM survival at 1, 5, and 10 years was 97.2, 97.2, and 95.6% in the unwrapped cohort and 100%, 100%, and 100% in the wrapped cohort and was not different (log-rank p=0.15). Autograft valve failure requiring repair or replacement, occurred in 11 (15.5%) of the unwrapped and 3 (5.2%) of the wrapped patients. Autograft conduit failure due to dilatation, with or without valve failure, occurred exclusive in the unwrapped cohort, requiring aortic root replacement in 14 (17.9%) and valve sparing root replacement in 2 (2.8%). Competing risks analysis, adjusted for age, gender, and previous cardiac surgery and considering death as a competing outcome, demonstrated the wrapped cohort to have a lower need for autograft reintervention (SHR 0.29, 95% CI 0.09 – 0.94, p=0.039). Estimates of the cumulative incidence of autograft reintervention (with death as a competing outcome) at 1, 5, and 10 years was 9.8, 13.6, and 24.0% in the unwrapped cohort and 2.9, 4.1, and 7.8% in the wrapped cohort.
Conclusion: Bicsuspid aortic valves were often stated as a contraindication to the Ross procedure. Using the autograft inclusion technique the Ross procedure can be performed in these patients with excellent long-term outcomes.

FIGURE



Comparing Outcomes of Fasciocutaneous and Muscle Flaps in Lower Extremity Trauma Patients with Post Flap Bone Grafts

Matthew Gillum, Anna Howell MD, Joseph Carey MD, Division of Plastic and Reconstructive Surgery, KSOM

Background: After lower extremity fractures requiring free flap coverage, bone grafts are often required in order to achieve bony healing. Either fasciocutaneous or muscle flaps are most often used. While these two types of flap have similar complication rates, there is no consensus about which type of free flap has superior outcomes following post flap bone graft. This study compares outcomes of patients with lower extremity fractures who receive fasciocutaneous or muscle free flap coverage followed by bone graft.
Methods: A retrospective chart review was performed and included surgical history, demographic data, and outcomes of patients at a level 1 trauma center between 2007 and 2019 who received free flap coverage of lower extremity fractures followed by bone graft. Chi^2 tests and a t-test were done to examine the relationship between flap type and outcomes: infection, bone union, ambulation, and days between flap placement and bone graft.
Results: Fifteen patients were identified who met criteria. This included 1 female and 14 males with an average age of 39. The flaps used were ALT (n=6), Latissimus (n=5), Gracilis (n=2), and Vastus lateralis (n=2). The variables examined were infection rates (Mean .27 SD .46), bony union (Mean .54 SD .52), ambulation (Mean 2.1/3 SD 1.1/3) and days between free flap placement and bone graft (Mean 181 SD 143). No differences were found between patients receiving muscle (n=9) or fasciocutaneous (n=6) flaps in infection rates (33% vs 17%, p=.47), bony union (62.5% vs 40%, p=.28), ambulation (2.1/3 vs 2.2/3, p=.82), or days between flap placement and bone graft (221 vs 128, p=.24).
Conclusion: Type of flap did not have an effect on outcomes and no results were significant. The trends found in this patient population—the similarity between ambulation rates and the muscle flap's higher rate of bony union and longer delay between flap and bone graft—can be investigated further in a study with a larger sample size.

Small Pediatric Burns can be Safely Managed on an Outpatient Basis

Andrea C. Grote BSc, Alexandra M. Lacey MD, Warren L. Garner MD, T. Justin Gillenwater MD MS, Ellen Maniago RN, Haig A. Yenikomshian MD, Department of Plastic and Reconstructive Surgery, Keck School of Medicine of USC

Goal: American Burn Association guidelines recommend that all pediatric burns be transferred to a burn center if their presenting hospital lacks the necessary personnel or equipment for their care. Our institution often treats small (<10% TBSA) burns in pediatric patients as outpatients with a non-daily dressing. The aim of this study was to determine if small pediatric burns could be managed in an outpatient manner.
Methods: A retrospective chart review was conducted from July 2016 to July 2019 at a single ABA-verified burn center. All patients under the age of 18 who presented for evaluation were included. Post burn day, age, sex, TBSA, burn etiology, body area burned, burn dressing type, outpatient versus inpatient management, reason(s) for admission, and any operative intervention were collected.
Results: In total, 742 patients were included in our cohort. The most common burn etiologies were scald (68%), contact (20%), and flame (5%). From initial presentation, 101 patients (14%), mean TBSA 9%, were admitted to the burn unit and 641 patients (86%), mean TBSA 3%, were treated outpatient. Of those, 613 (96%) were treated entirely outpatient and 28 (4%) were admitted at a later date. There were no significant differences in age nor gender distribution between those who were successfully treated outpatient and those who failed. There was a

significant difference ($p < 0.001$) in TBSA between the patients who were treated successfully as outpatients (mean=3%) versus those who failed outpatient care (mean=4%). The primary reason for subsequent admission of these patients was nutrition optimization (61%).
Conclusions: The vast majority of small pediatric burns can be treated as an outpatient with a non-daily dressing with good results. Over 80% of pediatric patients seen in our clinic were successfully managed in this manner. As suspected, when the burns are larger in size (>4% TBSA) there is a potential increased risk for admission especially with regards to poor PO intake, so this requires close monitoring and family education.

Evaluating the efficacy of a modified approach to phallourethroplasty in transgender men

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Phallourethroplasty is often the final step of physical transition in transgender men. This is preceded by a minimum one year of social transition and hormone therapy. To form a neophallus, a free flap is taken from a suitable donor site, commonly the patient's forearm and a “tube within a tube” is constructed to include a functional urethra (Morrison, 2005). The use of free-tissue transfer requires careful planning that involves connecting veins and arteries of the donor site to appropriate recipient vessels. The standard approach is to connect the radial artery and venae comitantes of the newly constructed neophallus to the femoral artery and saphenous vein, respectively. This technique has its limitations, however. Often the donor vessels have a drastically different diameter than their recipient vessels, leading to a non-anatomic pressure gradient within the vessels and flap. This problem, coupled with a large groin scar and potential for recipient site complications (lymphatic leak, seroma, pain, vessel dilation) make it an imperfect option. Instead of using the femoral artery and saphenous vein as recipient vessels, Drs. Ray and Garcia use the deep inferior epigastric artery (within the abdomen) and venae comitantes, providing more anatomically similar vessel diameters with respect to the flap artery and veins. Our results are very promising: there were no partial or full flap losses in any of our patients. This study suggests that this modified approach is a safer and more efficacious phalloplasty technique.

Salvage Esophagectomy For Adenocarcinoma Is Associated With A Negative Impact On Long-term Survival And Increased Risk Of Perioperative Morbidity

Valerie P. Huang, Li Ding, Anthony W. Kim, Elizabeth A. David, Sean C. Wightman, P. Michael McFadden, Scott M. Atay

Purpose: Salvage esophagectomy (SE) after failure of definitive chemoradiation (CRT) for local-regionally advanced adenocarcinoma provides durable disease-free survival in select patients. Characteristics of patients undergoing “successful” salvage are less well defined. Outcomes following salvage esophagectomy were evaluated to identify prognostic factors for long-term outcome.
Methods: The National Cancer Database (2010-2016) was queried for patients diagnosed with stage II-III esophageal adenocarcinoma who underwent trimodality therapy, consisting of CRT followed by definitive surgical resection. Patients were divided into two groups based on the timing of surgery following completion of radiation therapy; (1) SE, >60 days, (2) non-salvage esophagectomy (NSE), <60 days. Length of stay, (LOS) 30- and 90-day mortality, and overall survival (OS) were compared. Cox regression was performed to identify prognostic factors for SE failure.

Results: 8157 patients met inclusion criteria. Age >69, non-white race, Medicare/Medicaid insurance status patients were more likely to undergo SE. Unadjusted 5-year OS favored the NSE over SE, (36% vs 31%, p=0.008, Figure 1). Cox regression identified salvage resection, clinical stage >T2 or >N0 as independent prognostic factors for death. Within the SE group, OS favored early cT-status whereas cN-status (N0 vs. N1-3) did not contribute to survival outcomes. SE was worse than NSE in terms of both 30- and 90-day mortality (11.1%/4.5% vs 6.5%/2.9%, p<0.001/p<0.01) and margin positive (R1/R2) resection rates (7.1% vs. 4.2%, p<0.001), respectively.
Conclusions: For locoregionally advanced esophageal adenocarcinoma SE is associated with a decreased OS compared to NSE. For SE only, cT-status is prognostic for OS while cN-status was not. The increased 30-/90-day mortality and margin positive resection rates for SE support the cautious selection of patients. These results question whether SE should be offered to patients with locally (T3/T4) advanced primary esophageal adenocarcinoma.

Adjuvant chemotherapy does not impact survival in thymoma and thymic carcinoma patients with R2 resections

Taylor A. Kline, BS, Li Ding, MD MPH, Anthony W. Kim, MD, Scott M. Atay, MD, Sean C. Wightman, MD, P. Michael McFadden, MD, Albert J. Farias, PhD MD, Elizabeth A. David, MD MAS

Objectives: Postoperative radiation therapy (PORT) and chemotherapy is the standard treatment for thymoma and thymic carcinoma patients with R2 resections. The efficacy of PORT has been studied while the efficacy of chemotherapy has been examined less. Our objective was to examine the influence of adjuvant chemotherapy on the overall survival (OS) of thymoma and thymic carcinoma patients with R2 resection.
Methods: The National Cancer Database was used to find patients diagnosed with thymoma and thymic carcinoma between 2004 and 2016. Only patients with gross positive margins (R2) after resection were selected and were staged using the Masaoka-Koga system. Patients were categorized into four treatment groups: surgery only (SO), surgery and radiation (SR), surgery and chemotherapy (SC), and surgery, radiation and chemotherapy (SRC). A Kaplan-Meier analysis was used to compare OS between treatment groups. Chi-squared analyses were used to compare descriptive statistics between treatment groups.
Results: 207 patients met the inclusion criteria of the study. 44 patients received SO, 50 received SR, 37 received SC and 76 received SRC. A chi-squared analysis of categorical and continuous variables found a significant difference of age at diagnosis, sex, histology (carcinoma vs. thymoma), and Charlson-Deyo score between treatment groups (p<0.05). A Kaplan-Meier analysis found a significant difference in survival probability between treatment groups (p<0.05).
Conclusions: While there was a significant difference in survival probability, the SC group had the lowest OS while the SRC group had the highest, suggesting this may be due to the addition of PORT rather than chemotherapy. This data could allow for physicians and their patients to consider a more comprehensive risk-benefit analysis of adjuvant chemotherapy when treating advanced cases of thymoma and thymic carcinoma.

The Additive Effect of Size and Visceral Pleural Invasion on Survival

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[1]Keck School of Medicine, [2]Division of Thoracic Surgery, Department of Surgery, [3]Division of Preventive Medicine, Los Angeles, CA, USA

Objective: The objectives of this study were to compare patients with NSCLC in clinical stage I and II of disease to determine the impact of visceral pleural invasion and tumor size on overall survival.
Methods: The National Cancer Database (NCDB) was queried from 2010 to 2016 for cases of NSCLC and reviewed as a retrospective cohort study. Patients with NSCLC clinical T1-2aN0M0 disease with no missing pertinent clinical data.
Results: A total of 61,454 patients with NSCLC clinical stage T1-2aN0M0 were evaluated from the NCDB that met the criteria of this study. 17% (10,382) had VPI and 83% (51,072) did not have VPI. Patients with VPI who received adjuvant chemotherapy had an overall higher 5-year OS (65.5%) compared to those who did not receive adjuvant chemotherapy (58.8%) ($p<0.0001$). Patients with tumor size >3 cm and $\leq$ 4 cm demonstrated an increased 5-year OS when given chemotherapy compared to individuals not given chemotherapy ($p<0.0001$). Patients with tumor size >0-$\leq$1 cm, >1-$\leq$2 cm, and >2-$\leq$3 cm did not demonstrate a difference in 5-year OS when given chemotherapy.
Conclusions: These findings suggest that the survival benefit associated with tumors >3cm and $\leq$ 4 may drive the difference in survival among all patients with VPI. VPI remains a poor prognostic factor in NSCLC patients. Chemotherapy should be considered in patients with VPI and tumor size greater than 3 cm.

Effects of Socioeconomic Status on Treatment and Survival in Thymoma Patients

Ruibei Li (Medical Student), Li Ding, MD MPH, Elizabeth A. David, MD MAS

Goal: Treatment decisions for patients with thymoma are based upon patient and tumor characteristics, including socioeconomic status (SES) factors. The objective was to assess the contribution of SES factors to treatment and outcomes among patients with thymoma.
Method: The National Cancer Database (NCDB) was queried for patients with all four stages of thymoma and divided into three treatment groups: No treatment (NT), guideline concordant treatment (GCT), and non-guideline concordant treatment (NGCT). The SES of patients who made up the treatment groups was assessed, and the overall survival rate of all groups was analyzed.
Results: The cohort included 4599 patients with stage I-IV thymoma where each of the of the patients had between 0-6 SES factors. We expect that factors associated with NT are: nonwhite race, low income, low high school graduation rate, Medicaid or no insurance, rural residence, and distance >12.5 miles from treatment facility. Furthermore, we expect that GCT will be associated with significantly longer overall survival rate compared to NT and NGCT.
Conclusion: We expect that SES factors increase the probability of receiving NT or NGCT which is associated with adverse health outcomes as measured by overall survival rate. This research highlights the disparities that exist in the treatment and outcome of thymoma patients. Awareness is necessary in order to mitigate potential negative disparity-driven health outcomes.

The Utility of Computed Tomography in Patients with Abdominal Gunshot Wounds

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Background: Over the last few decades, care for patients with abdominal gunshot wounds (GSW) has shifted drastically from the standard approach of a mandatory laparotomy to selective non-operative management (SNOM) for stable patients. Currently, hemodynamically stable patients undergo a computed tomography (CT), upon which they are taken for immediate laparotomy if hollow viscus injuries are suspected. We conducted a retrospective study at LAC+USC Medical Center to evaluate the diagnostic value of several CT findings that may be significantly associated with hollow viscus injuries in patients with abdominal GSW.
Methods: This is a single center, retrospective study. We collected data from patients who underwent a CT following an abdominal GSW from January 2015 to December 2018 at LAC+USC Medical Center. The CT scans were read by a board-certified radiologist looking for CT signs suggestive of hollow viscus injuries.
Results: We hypothesize that there will be findings seen on an abdominal CT of patients with abdominal GSWs that will be suggestive of a hollow viscus injury. A total of 217 patients were identified for our study. We are currently analyzing the data to test our hypothesis.
Conclusion: The presence of hollow viscus injuries is an absolute indication for immediate laparotomy following abdominal GSW. However, due to the nature of hollow viscus organs, it is often difficult to determine on CT whether or not such an injury is present. Our findings would be able to be used to determine when there is a need for immediate laparotomy as opposed to opting for SNOM of the patient.

Effect of Selective Lymphadenectomy in a Pre-Clinical Animal Model of Secondary Head and Neck Lymphedema

Andrea Y Lo, BS, Giulia Daneshgaran, BS, Roy Yu BS, Sarah X Wang,., Haig Manoukian, ., Wan Jiao, MD, PhD, and Alex K Wong, MD

Background: Head and neck lymphedema (HNL) is a disfiguring disease that affects over 75% of patients treated for head and neck cancer (HNC). Animal models of lymphedema are used to test pharmacologic and microsurgical therapies, which can offer improved outcomes compared to standard conservative therapies. However, no animal model for HNL has been described in peer-reviewed literature. We have recently described a robust rat HNL model based on complete bilateral deep and superficial lymphadenectomy using our Prox-1 eGFP transgenic rats which facilitate real time *in situ* lymph node localization. A limitation of this model is that most patients with HNC have tumors which only require unilateral lymph node dissection. Our aim was to determine if unilateral lymphadenectomy is sufficient to produce clinically relevant HNL and to compare this phenotype to that of animals that receive bilateral lymphadenectomy.
Methods: Rats were subjected to two surgical protocols: (1) unilateral lymphadenectomy with post-operative irradiation (n=8) and (2) sham surgery with no irradiation (n=9). In the lymphadenectomy group, the superficial and deep cervical lymph nodes were dissected unilaterally. For both groups, neck hemi-circumference and cheek-to-midline distance was quantified on the operated side and reported as “percent change from unoperated side” in order to assess head and neck expansion on post-operative days 15, 30, 45, and 60. Finally, lymphatic clearance was measured on post-operative day 60 by injected indocyanine green (ICG) lymphography.
Results: Neck hemi-circumference on the operated side was significantly greater in the lymphadenectomy group than in the sham surgery group at all post-operative time points

(p<0.01). Cheek-to-midline distance on the operated side was also significantly greater in lymphadenectomy animals on post-operative days 30, 45, and 60 (p<0.001, p<0.05, p<0.01). Lymphographic analysis revealed that lymphatic clearance was considerably slower 12 hours after ICG injection in the lymphadenectomy group, indicating reduced drainage secondary to lymphatic injury (p<0.01) .

Conclusions: Unilateral cervical lymph node resection in rats leads to significant head and neck expansion and reduced lymphatic clearance, both of which are consistent with the development of HNL. The phenotype is sustained for at least 60 days with minimal reversion to normal lymphatic function. Our unilateral cervical lymphatic injury animal model is clinically relevant and can be used to better understand HNL and test microsurgical procedures that can ameliorate HNL.

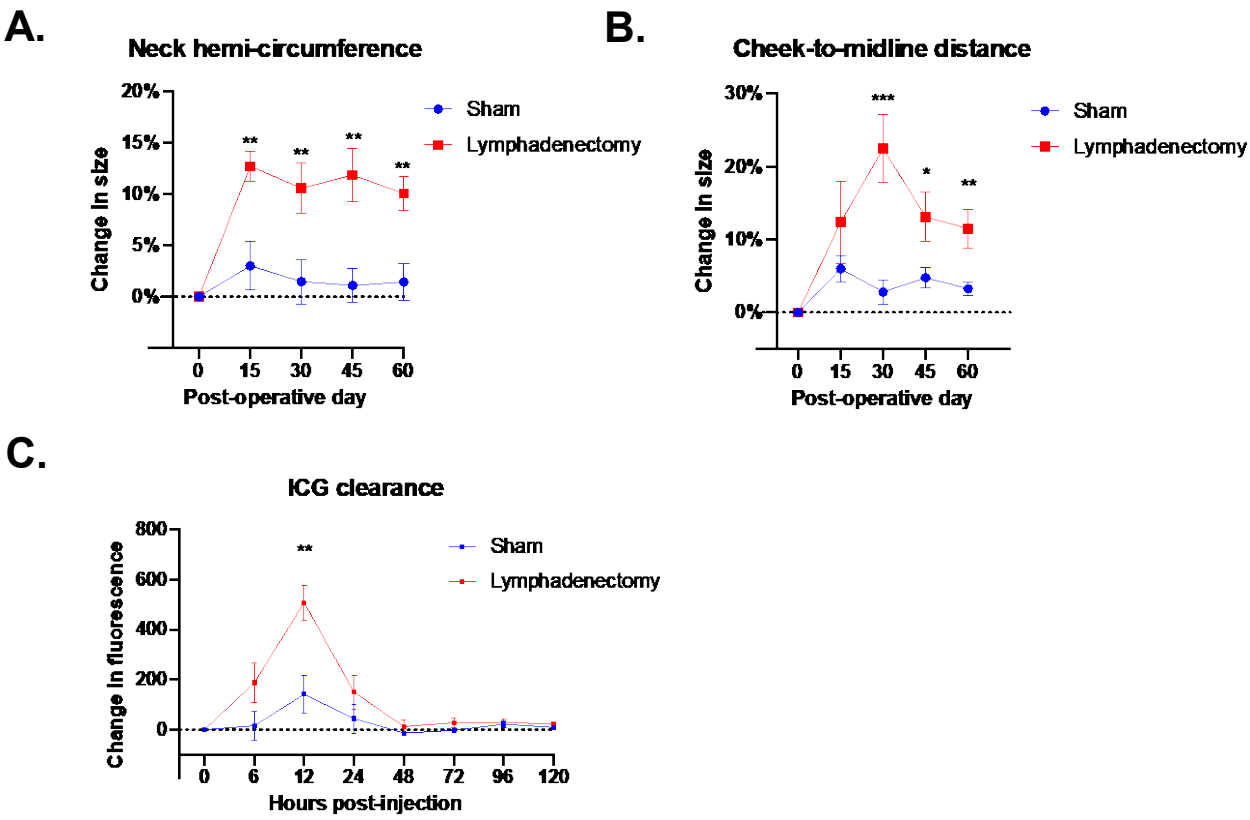

Figure 1. A. Difference in neck hemi-circumference between operated and un-operated side over time **B.** Difference in check to midline distance between operated and un-operated side over time **C.** Change in adjusted fluorescence over time post-ICG injection. Adjusted fluorescence is the difference between operated and un-operated side. (Sham n=8, Lymphadenectomy n=9, ***p<0.001, **p<0.01, *p<0.05)

Assessment of Lower Extremity Perfusion with Spatial Frequency Domain Imaging in Patients with Diabetes Mellitus

Grant A. Murphy[1], Amaan Mazhar[2], Karen D'Huyetter[1], David J. Cuccia[2], David G. Armstrong[1]

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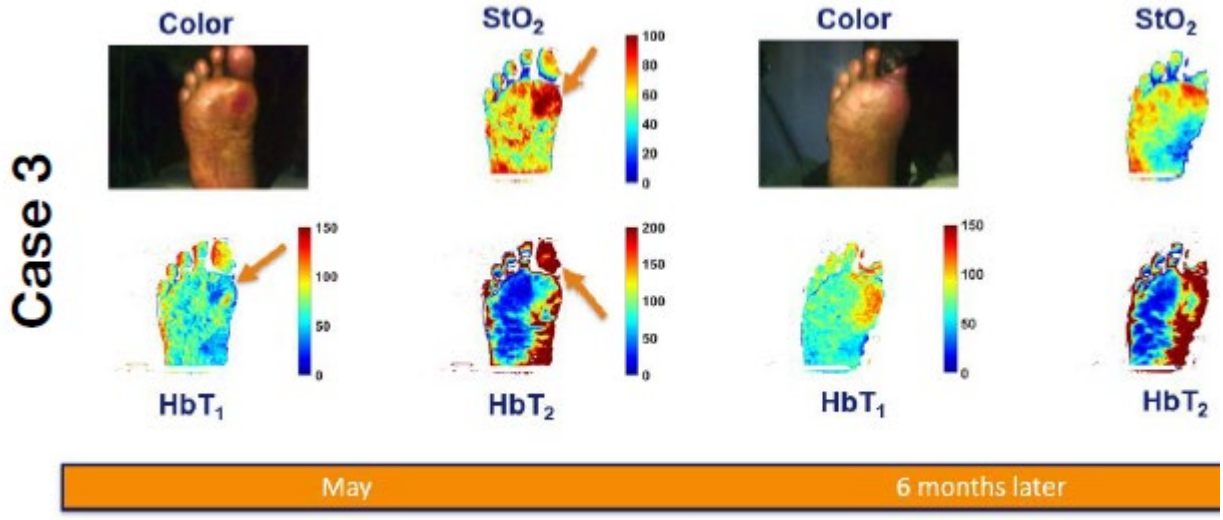
Background: Spatial frequency domain imaging (SFDI) is a non-invasive method for quantitatively measuring microcirculation. It is particularly well suited for patients with diabetes and other pathologies that can cause inaccurate ankle-brachial indexes (ABI) from non-compressible arteries. SFDI can rapidly measure skeletal muscle oxygenation (StO2), dermal papillary hemoglobin (HbT1), and dermal reticular hemoglobin (HbT2). This prospective longitudinal study aims to quantitatively monitor diabetic wound remission and ulceration of the lower extremity.

Methods: 35 patients in diabetic foot remission were imaged with SFDI (Reflect RS®, Modulim) every 4-6 weeks. This was an observational study with no change to standard of care. SFDI is a non-contact optical imaging method that uses visible and near-infrared structured illumination to quantitatively assess superficial and subsurface (0-4 mm) tissue optical properties to quantify hemoglobin oxygen saturation and distribution over large fields of view (15 cm x 20 cm).

Results: 4 patients – receiving 5 vascular interventions in 4 limbs – were identified and global lower extremity tissue oxygenation was increased compared to pre-intervention levels. In a patient (see illustration), a localized increase in tissue oxygen saturation in the periphery (indicating poor extraction) and increase in deep hemoglobin of a necrotic area indicated inadequate circulation to an at-risk area.

Conclusion: The results suggest that SFDI signatures of hemoglobin oxygen saturation and distribution may provide clinicians with quantitative signs of diabetic foot complications and responses to vascular interventions before clinical signs are grossly present.



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Surgical shunts for pediatric extrahepatic portal vein obstruction: case series and systematic review.

Lalita Narayanan, Shannon Zielsdorf, Sophia Kantymyr, Carly Weaver, Rohit Kohli, Kambiz Etesami, Yuri Genyk, and Juliet Emamaullee

Introduction: Extrahepatic portal vein obstruction (EHPVO) is a leading cause of portal hypertension (PHT) in children. A variety of surgical portosystemic shunt (PSS) techniques as well as the Meso-Rex shunt (MRS) have been described. To understand long-term outcomes following surgical intervention for EHPVO, we reviewed our institutional experience and performed a systematic review.
Methods: Case series: Billing records for our center were reviewed from 1/2000-5/2019 for CPT codes associated with portal decompression surgery. In all, 25 patients were identified and reviewed. Systematic review: After multiple rounds of filtering, PubMed and Google scholar citations for 19 articles published between 1992-2019 were identified, consisting of 283 pediatric patients. Patient characteristics and perioperative data comparing PSS and MRS were analyzed.
Results: Case series: Among 25 patients, the overall post-shunt thrombosis rate was 4% (N=1/25). There were no post-operative stenoses, gastrointestinal bleeds, or other serious complications. Long-term follow up revealed normal growth and development. In the systematic review of 283 pediatric patients, there were no differences in patient demographics when MRS (N=196) were compared to PSS (N=87). While the overall post-shunt thrombosis rate was 13.1% (N=37/283), post-operative thrombosis following MRS was significantly higher than PSS (10.9% vs 2.1%, p=0.04).
Conclusion: These data suggest that both MRS and PSS can achieve good results; however, the more technically demanding MRS procedure is associated with higher post-operative shunt thrombosis, often requiring further procedural intervention. Our case series demonstrates that PSS, which may be less physiologic than MRS, rarely develops post-operative stenosis or thrombosis and does not impact growth and development in these pediatric patients. This study suggests that the risk of the MRS may outweigh the benefit when compared to other surgical shunts for pediatric patients with EHPVO.

Cruroplasty Alone Versus Cruroplasty Plus Fundoplication Revision for Recurrent Hiatal Hernia: A Role for a More Selective Approach

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Background: Radiographic recurrence of a hiatal hernia after antireflux surgery is common. Past studies report recurrence rates between 30-50% at five years. Most patients experience relief from GERD-related symptoms; however, some patients have symptoms or hernias severe enough to warrant reoperation. We hypothesize that revising the fundoplication is unnecessary and a repeat cruroplasty is all that is needed to alleviate patients' symptoms.
Methods: We performed a retrospective review of patients with recurrent hiatal hernia after previous antireflux surgery. Patients who received cruroplasty alone were compared with cruroplasty plus additional revision (fundoplication revision or takedown and magnetic sphincter augmentation). Demographics, operative details, and postoperative outcomes were measured.
Results: This study included 93 patients who underwent a second or third revision for recurrent hiatal hernia. Mean time to recurrence after the first procedure was 5.28 years. Mean time to second recurrence was 3.58 years. The cohort was 40.2% male, with a mean age of 61 and a mean BMI of 27.74. Patients presented with dysphagia (44.7%) and regurgitation (63.9%)

before radiographic evaluation. Mean GERD health-related quality of life score was 24.8 preoperatively. Barrett's Esophagus was present in 36.7% of patients. Twenty-six (28.0%) patients underwent hiatal hernia repair only. Sixty-seven (72.0%) patients underwent hiatal hernia repair and revision of their original fundoplication or MSA. Patients had a mean follow-up time of 1.21 years (1.62 SD). Of the 92 patients, 6 (6.5%) had subsequent hiatal hernia recurrence. The recurrence rate for patients with cruroplasty alone versus cruroplasty plus redo fundoplication/LINX were 7%, and 6%, respectively.
Conclusions: We did not identify any significant difference in outcomes between patients that received cruroplasty only and those that received cruroplasty plus revision fundoplication or LINX procedures. This data suggests a role for hernia-only repair for recurrent hiatal hernias.

The Impact of No Next of Kin Decision Makers on End-of-Life Care

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Introduction: For critically ill burn patients without a next of kin (NOK), the medical team must act as the surrogate decision maker. This poses ethical and legal challenges for burn providers. Despite this problem, there has been no investigation of how the presence of a NOK affects treatment in burn patients. This study is the first to evaluate this relationship.
Methods: A retrospective chart review was performed on a cohort of patients who died during the acute phase of their burn care from a single burn center from 2015 to 2019. Inclusion criteria were age ≥18 years and mortality within 4-weeks of admission. Exclusion criteria were death from dermatologic disease or trauma. Variables collected included age, gender, mechanism of injury, length of stay, total body surface area, revised Baux score, and the presence of a NOK. Fisher's Exact Test and Student's t-test were used for analysis.
Results: In total, 67 patients met inclusion criteria. Of these patients, 14 (21%) did not have a NOK involved in medical decisions. Table 1 shows the means and odds ratio between the two groups. Patients without a NOK were younger ($p < 0.05$), more likely to be homeless ($p < 0.01$), had higher TBSA ($p < 0.01$), had shorter LOS ($p < 0.01$), and were 5 times less likely to receive comfort care ($p < 0.05$). Gender and ethnicity were not statistically significant.
Conclusions: Patients without a NOK present to participate in medical decisions are transitioned to comfort care less often despite a higher burden of injury. This disparity in standard of care between the two groups demonstrates a need for a cultural shift in burn care to prevent suffering of these marginalized patients. Burn providers should be empowered to reduce suffering when no decision maker is present.

Table 1. Means and odds ratio (OR) comparison for patients with and without NOK decision makers

	Mean (SE)		P
	NOK	No NOK	
Age	**61.6** (2.6)	**50.1** (3.4)	0.02
TBSA	**42.3** (4.1)	**67.2** (7.5)	<0.01
LOS	**7.1** (0.9)	**2.0** (0.4)	<0.01
	OR – NOK vs No NOK (95% CI)		
Homeless	**0.14** (0.03, 0.62)		<0.01
Comfort Care Initiated	**5.44** (0.13, 2.20)		0.01

Palliative Care Protocol in the Trauma ICU

Hugo Padilla, Geoffrey A Anderson MD, Kazuhide Matsushima MD, Dept. of Surgery, LAC+USC

Goal: The American College of Surgeons Trauma Quality Improvement Project (TQIP) works on improving the quality of care for trauma patients. The TQIP publishes Best Practice Guidelines (BPG) that recommend a palliative care assessment of trauma patients. The trauma ICU at LAC has not yet implemented a protocol for accomplishing the BPG goals for high-risk populations. We plan to identify this population and implement a protocol for accomplishing the BPG goals.
Methods: We have selected our high-risk population to be those aged 70 or older who are admitted to the ICU with trauma at LAC. We will administer a well-validated survey that is commonly used to gauge family satisfaction to family members of enrolled patients for 6 months before and after the intervention. Family satisfaction has been proposed as a surrogate for patient satisfaction in the critical care setting given the problems with altered sensorium and consciousness with many ICU patients. The intervention will introduce a protocol that mandates an initial palliative care discussion with the family using a templated note in the first 24 hours followed by a formal family meeting within 72 hours. Surveys will be completed through REDcap by family members 5-7 days after patient is admitted to the trauma ICU.
Results: We hypothesize that a protocol will improve compliance with the TQIP BPG and will improve family satisfaction, especially with respect to family-physician communication.
Conclusions: The aim of this project is to determine if a protocol for early initiation and structured framing of family discussions will improve compliance with TQIP BPG and family satisfaction (proxy for patient satisfaction).

Health-Related Quality of Life After Anonymous Nondirected Living Liver Donation: A Multi-Center, North American Collaboration.

Muhammad H. Raza[1], Whitney E. Jackson[2], Angela Dell[3], Li Ding[4], James Shapiro[3], Elizabeth A. Pomfret[5], Yuri Genyk[6], Linda Sher[6], Juliet Emamaullee[6], [1]Keck School of Medicine of USC, Los Angeles, CA, [2]Gastroenterology, University of Colorado, Aurora, CO, [3]Surgery, University of Alberta, Edmonton, AB, Canada, [4]Preventive Medicine, University of Southern California, Los Angeles, CA, [5]Surgery, University of Colorado, Aurora, CO, [6]Surgery, University of Southern California, Los Angeles, CA

Background: Literature on anonymous or 'altruistic' nondirected living liver donors (ND-LLD) remains sparse as living donor liver transplant (LDLT) programs continue to explore the utilization of this unique donor group. This international, multi-center study assesses health-related quality of life (HRQOL) in a distinct living donor population up to 15 years post-donation.
Methods: ND-LLDs at University of Alberta (n=12), University of Colorado (n=12), and University of Southern California (n=10) were approached to respond to the validated Short-Form 36 (SF-36) and Donor Quality of Life (USC DQLS) surveys. Results were compared to a previously reported cohort (n=68) of directed living liver donors (DLLDs) followed for a mean of 11.5±5.1 years.
Results: 28 ND-LLDs (82%) responded with a median follow-up of 1.1 [IQR 0.4-3.2] years. Most (64%) were female. Mean age at donation was 38.8±11.5 years. Half (50%) donated a left lobe, 29% right lobe, and 21% left lateral segment. Ten ND-LLDs experienced a post-operative complication, with only one Clavien-Dindo IIIb. SF-36 physical (*P*=.03) and mental (*P*=.04) component summary scores for ND-LLDs were significantly higher compared to DLLDs (**Figure 1**). USC DQLS outcomes were similar between both groups. All ND-LLDs felt positive or neutral about their overall health. Surgery had no or minimal impact on job performance in all donors. No ND-LLD indicated that donation impacted their health insurability. Two attempted to

purchase life insurance post-donation without difficulty. Remarkably, no ND-LLD reported post-donation regrets.
Conclusions: We report the first comprehensive assessment of HRQOL in ND-LLDs from three high-volume North American LDLT centers, finding no reason to deny this highly motivated group of individuals an opportunity to donate.

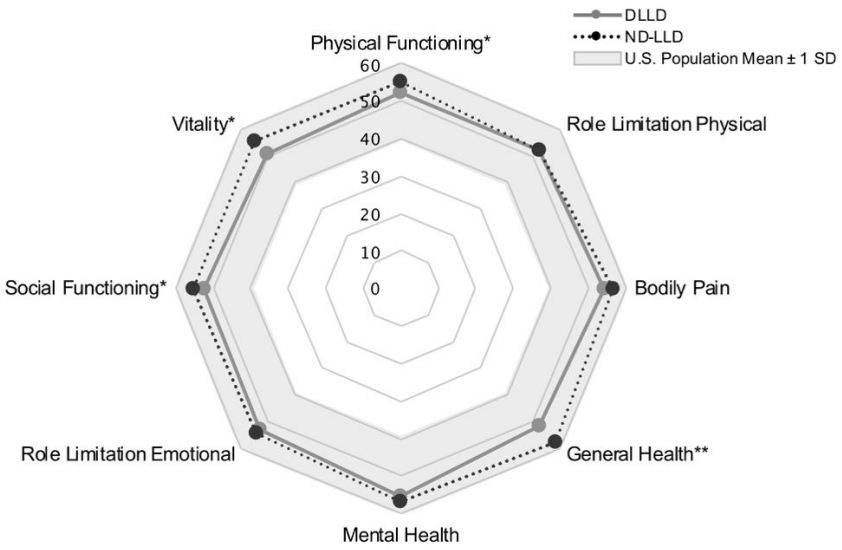

Figure 1. HRQOL estimated by population adjusted SF-36 subscale scores in ND-LLDs (n=28) vs. DLLDs (n=68). *P* values for two-sample t-test. *$P < .05$; **$P < .001$

Analysis of clinical outcomes of lung cancers within the homeless population
Matt Sumethasorn, Dr. Elizabeth David, Dept of Surgery, KSOM

Goal: There are numerous studies in the literature that have examined the disparities in risk factors and outcomes for cancers in different racial and socioeconomic groups, but little is known about the homeless population in this same regard. We are looking to characterize demographics, risk factors, clinical features, and outcomes associated with lung cancers in the homeless population. Due to limited access to care and poor follow-up within this population, we wish to study mortality rates and disparities in disease management.
Methods: This will be a retrospective review of all lung cancer patients with appointments made between 1/1/10 to 1/1/19 at the LAC+USC Medical Center in Los Angeles, California. Outcome measures extracted from medical records will include, diagnosis, time from radiographic finding to biopsy, time from biopsy to intervention, missed appointments in year following diagnosis, and mean time from diagnosis to last known contact. Demographic and disease data will be extracted from the Sage i2b2 application pending initial approval from the DHS Informatics and Analytics core.
Results: We are currently awaiting datasets and have not finished collecting and analyzing data. We will be paying close attention to the mortality rate and outcomes of patients diagnosed with lung cancer compared to the general population. We hypothesize that homeless patients with lung cancer have a higher mortality and shorter mean survival time due to discrepancies in care. Therefore, there should be a difference in metrics such as time from diagnosis to last known contact, delays in biopsy after imaging, time to treatment after biopsy, and number follow-ups after diagnosis between the two populations.
Summary: Lung cancer has been found in previous studies to disproportionally affect homeless individuals more than their housed counterparts and is one of the primary causes of death in

this population. There are numerous studies in the literature that have examined the disparities in risk factors and outcomes for cancers in different racial and socioeconomic groups, but little is known about the homeless population in this same regard. Homelessness is estimated to affect 553,000 people in the United States on any given night, or around 0.17% of the population. This study is an attempt to better understand the epidemiology of lung cancer in homeless individuals. We hope that a better understanding of the disparities surrounding diagnosis and treatment can help us bridge the gap in care, so that we can offer better outcomes to our highly vulnerable homeless patients.

9-cisRA reduces postsurgical lymphedema through RXRα signaling pathway

Cynthia Sung, BS; Wan Jiao, MD, PhD; Sun Young Park, MS; Michael Cooper, BS; Eunson Jung, MS; Young Kwon Hong, PhD; Alex K. Wong, MD

Background: Secondary lymphedema is a debilitating disease characterized by lymphatic system dysfunction and chronic soft tissue swelling. Despite a high prevalence of secondary lymphedema after cancer treatments, current managements are limited to slowing disease progression, and cannot prevent pathological tissue changes. We have previously demonstrated that 9-cis retinoic acid (9-cisRA) improves post-surgical lymphedema by promoting lymphangiogenesis and reduces postsurgical lymphedema *in vivo*. Despite the resulting efficacy, little is known about the signaling pathway of 9-cisRA in this context. 9-cisRA is thought to induce its target gene responses by binding to and activating one of its receptors, nuclear retinoid X receptors (RXRs). The aim of this study was to determine whether RXRα signaling is necessary for 9-cis-RA efficacy using lymphatic endothelial cell specific conditional deletion mutant mice.
Methods: Tail model of lymphedema was performed on transgenic *Prox1*-GFP; *Prox1-CreER*^{T2} *RXR*α$^{fl/fl}$ mice and an age-matched control group. Superficial lymphatic vessels were severed by a 5-mm circumferential excision 2-cm distal from the tail base. The animals were treated with 9-cisRA once daily for 40 days. The distal part of the tail was imaged on days 1, 8, 15, 22, 29, 36, and 40 postoperatively and tail volumes were calculated using the truncated cone formula. On post-op day 40, lymphatic function was analyzed using indocyanine green (ICG) lymphography. Tail samples 1-cm distal to the wound edge were collected and analyzed histologically and immunohistochemically.
Results: Disruption of the superficial lymphatics resulted in initial surgical edema in both the control and *RXR*α$^{fl/fl}$ (KO) groups. The *RXR*α$^{fl/fl}$ group showed a significantly less decrease in post-surgical tail lymphedema. KO mice showed delayed lymphatic clearance and less lymphangiogenesis in response to 9-cisRA treatment. In addition, KO mice showed more severe inflammatory response and fibrotic scarring of the tail tissue compared to the control group.
Conclusion: When we compared RXRα-knockout mice and their wildtype counterparts, 9-cisRA did not prevent post-surgical lymphedema and pathological changes of the tissue in the knockout mice. These findings demonstrate that RXRα plays an important role in the therapeutic efficacy of 9-cisRA in post-surgical lymphedema. These detailed mechanistic studies support further translation of 9-cis RA for safe clinical use in the prevention of lymphedema in humans.

Putting a Spring in Your Step: Sole Salvation for At Risk Diabetic Feet

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Background

Nearly 500 million people suffer from diabetes worldwide, including over 30 million Americans; these numbers are increasing. Common complications like peripheral neuropathy and diabetic vascular disease help explain why up to one-third of these people will develop a diabetic foot ulcer (DFU) over the course of their lifetime, and why DFUs have a 5-year mortality on par with cancer. Even a simple blister from standing with too much pressure on one part of the foot can progress to a fatal ulcer; increased plantar pressure not only causes new DFU formation but also impedes active ulcers from healing. Reducing this plantar pressure may decrease ulcer incidence and speed ulcer healing.

Methods

The novel flyBand device has the potential to aid these patients by reducing plantar foot force. A control group (no diabetic neuropathy) of 5 people and an experimental group (at-risk for developing DFU) of 15 participants walked in a line (10m) at various speeds in multiple types of shoes - their normal shoes, a half-boot, and the flyBand (at three tension settings). During each walking trial, gait metrics were collected using a LEGSys system consisting of two inertial measurement sensors (one for each shank; BioSensics, LLC, USA). Plantar foot pressure was measured using a pressure mapping sensor placed under the insole in the right foot of each participant (Tekscan, Inc., USA). Data were collected at 100Hz.

Results

Participant stride length and stride velocity increased as flyBand tension increased, with a maximum occurring at the high-tension setting. At all tensioned settings average and peak plantar foot forces were decreased compared with no tension; the greatest reduction in mean force occurred at the medium tension setting. (Table 1)

Table 1: Measured Stride and Metatarsal Force Variables at Each Walking Condition

Variable (Mean ±1SD)	**FlyBand with no spring**	**flyBand Low Spring**	**flyBand Medium Spring**	**flyBand High Spring**
Stride Length	2.1 ± 0.3 m	2.5 ± 0.2 m	2.9 ± 0.3 m	3.2 ± 0.2 m
Stride Velocity	0.64 ± 0.12 Hz	0.69 ± 0.11 Hz	0.72 ± 0.13 Hz	0.78 ± 0.12 Hz
Mean Force	54 lbs	46 lbs	46 lbs	49 lbs
Peak Force	145 lbs	129 lbs	130 lbs	129 lbs

Conclusion

Diabetic lower extremity complications remain enormously burdensome. The incorporation of the flyBand device in the healing or daily regimens of patients with active DFUs or in DFU remission may be beneficial due to the additional offloading and improved gait metrics. Based on study results the device both increases the walking speed and reduces the peak and average plantar foot forces. The U.S. national cost for diabetic ulcer care exceeds $10 billion annually; although more work is needed to determine how the flyBand will affect re-ulceration rates, it holds promise in helping to mitigate these costs.

Main Location of Bleeds in Penetrating Traumas as Divided by Procedure Type

Carissa Villanueva, Medical Student, Dr. Dominik Jakob, Dept. of Acute Care Surgery, Dr. Kenji Inaba, Professor and Vice Chair of Surgery of University of Southern California LAC+USC Medical Center

Background: Penetrating traumas such as gunshot wounds and stab wounds have been found to have a high rate of mortality. The cause of mortality is most often due to exsanguination in victims. Many studies looked particularly at gunshot wounds in the civilian population, as they often require massive transfusions and still result in death. Risk factors for mortality include variables such as a high number of injured organs or shock. Another study identified that a delay to the operating room for greater than 10 minutes resulted in adverse effects for gunshot wound patients with signs of hemorrhage.
Goal: While many studies have outlined that victims of penetrating trauma often die due to hemorrhage, none have looked directly at the significance of where the injury and bleeding source has occurred. Because of this gap in research, we have decided to examine the impact of bleeding source in penetrating trauma and its relation to mortality and secondary outcomes.
Methods: We will be using a retrospective method to search for data. Variables such as mortality and hospital length of stay can be found in the chart registry. Other variables such as specific location of penetrating wounds, bleeding source, the estimated intraoperative blood loss and FAST results will be chart checked. We approximate the bleeding source by separating the data by procedure type since each is very region specific. The data will therefore be separated into categories depending on the procedure performed: thoracotomy, laparotomy, vessel procedure, other procedures, or multiple.
Results: We expect that the results should find a significant difference in mortality and secondary outcomes based on location and bleeding source of the penetrating trauma.
Conclusions: Our proposal is worthwhile because it allows to have deeper knowledge on the potentially most dangerous areas for penetrating injuries. It gives us insight to where the bleeding--a leading cause of death in penetrating trauma--is most likely to occur based on location of wounds. Furthermore, this data can be applied practically to things like optimizing body armor. Knowing the most vulnerable spots of the body is vital for maximizing protection.

Straying from recommended therapy to include surgery into the therapeutic plan for T3N2 Non-Small Cell Lung Cancer is beneficial

Jennifer C. Wang[1], Li Ding[2], Elizabeth A. David[1], Scott M. Atay[1], Sean C. Wightman[1], Paul M. McFadden[1], Anthony Kim[1]

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Background: Treatment of non-small cell lung cancer (NSCLC) with positive mediastinal (N2) involvement remains controversial. Similarly, owing to its heterogeneous presentation, the treatment of NSCLC with a T3 descriptor designation also is controversial. Recommended guideline concordant primary therapy for T3N2 NSCLC is chemoradiation therapy (CR). This study was conducted to evaluate whether the addition of a surgical modality in the context of T3N2 disease is associated with a superior survival relative to CR.
Methods: Patients with T3N2 NSCLC were identified in the National Cancer Database (NCDB) from 2010-2018. The T descriptor of the 7th edition of the American Joint Committee on Cancer TNM staging system and therapies rendered (Sequential or concurrent chemoradiation – CR, Chemotherapy with or without radiation prior to surgery – CR+S, Surgery followed by

chemotherapy with or without radiation – S+CR, and Surgery – S) were used to group patients. Sequence of therapies and T3 disease descriptors were compared for differences in 5-year survival outcomes. Kaplan-Meier analysis was used to generate the 5-year overall survivals and were compared using log-rank tests. Multivariable Cox regression was used to determine prognostic factors for survival.

Results: A total of 4330 patients met the inclusion criteria for this study. Of these patients, 71.3% (3160) underwent CR, 15.2% (671) underwent CR+S, 8.8% (390) underwent S+CR, and 4.7% (209) underwent S alone. The overall 5-year survival for patients who underwent only CR compared to those who underwent S either before or after CR was 16.9% and 38.1%, respectively ($p < 0.0001$). When evaluating the specific sequence of treatment with respect to surgery, the 5-year overall survival was 43.1% for the CR+S group, 34.5% for the S+CR group, and 19.4% for the S group ($p < 0.0001$). ***Figure 1*** Multivariate analysis demonstrated a lower risk of death for patients who had surgery included into their therapy compared to those patients who underwent only CR. ***Table 1***

Conclusions: The inclusion of surgery in a multimodal approach to treating T3N2 NSCLC, compared to CR alone, is associated with superior overall survival and lower risk of death. For this subset of patients evaluating the role of including surgery with systemic therapies prospectively should be considered.

Figure 1. Overall 5-year survival in cases with and without surgical intervention

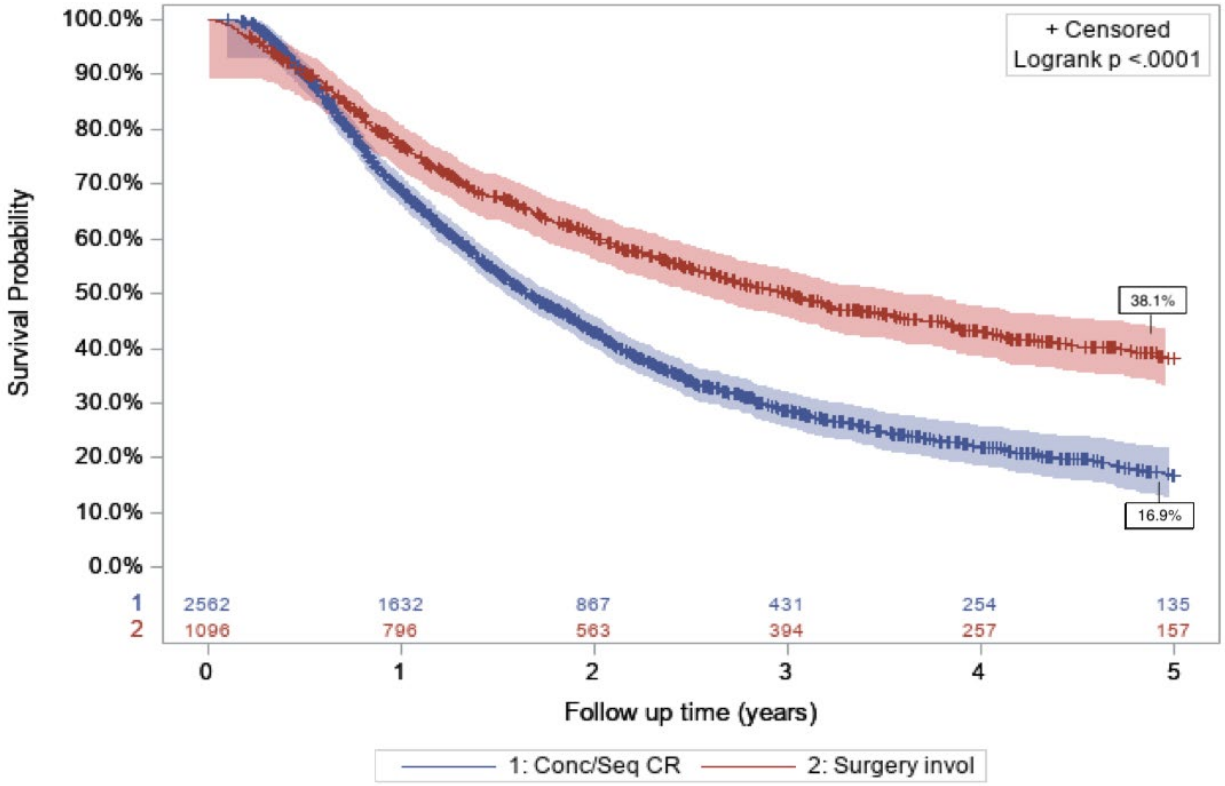

Table 1. Association between hazard of death and specific treatment sequence

Treatment	Hazard Ratio (95% CI)	p-value
CR	Reference	
CR+S	0.697 (0.547-0.888)	0.0035
SR+C	0.696 (0.548-0.884)	0.0029
S	1.231 (0.946-1.601)	0.1215

Abdominal Wall Reconstruction After Orthotopic Liver Transplantation

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Introduction: Abdominal wall reconstruction (AWR) in liver transplant patients presents unique anatomical and physiologic challenges. The subcostal incision divides muscle fibers and potentially motor nerves. The patients are immunosuppressed, frequently with malnutrition and other metabolic derangements. Between 5-40% of liver transplant recipients will develop an incisional hernia. We reviewed our experience to define factors that may contribute to success.
Methods: We reviewed the records of liver transplant recipients undergoing AWR by a single surgeon from 2014 to 2019. Patients with incomplete records or follow-up less than 6 months were excluded. Baseline characteristics, comorbidities, index operation characteristics, and AWR characteristics and complications were recorded. Fisher's exact test and Mann Whitney U test were used for categorical and continuous variables, respectively.
Results: Sixteen patients were identified meeting criteria. Median follow-up was 27 months (range 7-80). Five defects also included umbilical hernias, while three comprised a large umbilical hernia without subcostal defect. There were no early postoperative complications of AWR. There were four recurrences, at median 17 (12-46) months. Recurrence was not correlated with comorbidities, index operation characteristics, or hernia or AWR characteristics. There was a non-significant increase in recurrence with anterior component separation (50% vs 0%, p=0.118), and with underlay (intraperitoneal) mesh position (40% vs 0%, p=0.115).
Conclusions: Liver transplant recipients pose challenging and diverse problems in the setting of abdominal wall reconstruction. Anterior components separation may be less effective in repairing subcostal defects; however, further study is necessary to delineate this.

Immunotherapy sequence associated with surgery affects survival in non-small cell lung cancer whereas additional chemotherapy does not

Edison Xu[1], BA, Elizabeth A. David[2], MD, Li Ding[3], MD, Scott M. Atay[2], MD, P. Michael McFadden[2], MD, Sean C. Wightman[2], MD, Anthony W. Kim[2], MD
[1]Keck School of Medicine of USC, [2]Division of Thoracic Surgery, Department of Surgery, [3]Division of Preventative Medicine, Los Angeles, CA, USA

Background: Immunotherapy is changing the treatment of lung cancer, as studies are showing that it, in combination with other modalities including surgery, improves survival. The objectives of this study were to compare overall survival (OS) between patients with non-small cell lung cancer (NSCLC) undergoing neoadjuvant and adjuvant immunotherapy in combination with surgery and to evaluate the impact of chemotherapy on survival after combination immunotherapy and surgery.
Methods: The National Cancer Database (NCDB) was queried for cases of NSCLC from 2004 to 2016. Patient treatment was categorized into neoadjuvant and adjuvant immunotherapy in combination with surgery. Kaplan-Meier curves were generated to compare OS between

treatment groups, among clinical stages, and between those who did and did not also undergo chemotherapy. Cox regression was used to identify factors predictive of OS.
Results: 673 patients from the NCDB underwent both immunotherapy and surgery within 4 months. The unadjusted overall 5-year OS was significantly longer for patients undergoing neoadjuvant immunotherapy than for those undergoing adjuvant immunotherapy (p=0.006), with OS being 56.2% and 33.0%, respectively. When comparing OS between those who did and did not undergo chemotherapy in addition to immunotherapy and surgery, no difference was observed.
Conclusions: OS is longer in patients undergoing neoadjuvant immunotherapy compared to those undergoing adjuvant immunotherapy. Chemotherapy does not have an effect on OS when combined with immunotherapy and surgery.

Trends in Pneumonectomy for Treatment of Small Cell Lung Cancer

Jasmine Zhao, Alexandra Nguyen, Li Ding, Elizabeth David, Scott Atay, Sean Wightman, P. Michael McFadden, Anthony Kim, Div. of Thoracic Surgery, KSOM

Background: According to practice guidelines, patients with clinically staged T1-2 node-negative small cell lung cancer (SCLC) are candidates for surgical resection. However, the role of pneumonectomy for SCLC patients is not well understood. The objective was to assess the extent to which pneumonectomy is used and evaluate the survival implications for SCLC patients who underwent pneumonectomy.
Methods: SCLC patients who underwent pneumonectomy were identified in the National Cancer Database (NCDB) between 2006 and 2016. Demographics and treatment regimens were described; overall survival (OS) was assessed using Kaplan-Meier and log-rank tests.
Results: A total of 106 patients met inclusion criteria for this study. The most common treatment was surgery with adjuvant chemotherapy, followed by surgery only and surgery with neoadjuvant therapy. The 5-year OS for the entire cohort after pneumonectomy was 23%. In subgroup analysis, the 5-year OS was 30% for guideline-concordant clinical stage I patients and 28% for clinical stage II/III patients who underwent pneumonectomy. Patients with right-sided pneumonectomy had greater mortality than patients with left-sided pneumonectomy.
Conclusions: This study suggests a role for pneumonectomy for clinical stage I and potentially some clinical stage II and III SCLC patients. It is not apparent if the similar 5-year OS is attributed to cT1-2 N0 pneumonectomy patients having favorable outcomes for any treatment or to advanced staged patients having less favorable outcomes with more aggressive disease.

UROLOGY

CORRELATING SIMULATOR AND LIVE ROBOTIC SURGICAL PERFORMANCE USING BIOMETRICS, SIMULATOR METRICS AND AUTOMATED PERFORMANCE METRICS

Andrew Cowan*, Runzhuo Ma, Jessica Nguyen, Swetha Rajkumar, Samuel Mingo, Ryan Hakim, Los Angeles, CA, Sandra Marshall, Solana Beach, CA, Andrew Hung, Los Angeles, CA

INTRODUCTION AND OBJECTIVES: Multiple training modalities exist for robotic surgery, each with their own performance metrics. This study compares performance in analogous vesicourethral anastomosis (VUA) training tasks in simulation (SIM) and dry lab (DL). We investigated recorded biometrics, SIM metrics, and DL Automated Performance Metrics (APMs) to determine which were capable of distinguishing experts (E) from novices (N).
METHODS: Experts (≥ 300 cases) and novices (<300 cases) performed VUAs during SIM and DL sessions (Figure 1). 22 SIM metrics (kinematics, safety) were captured by the simulator. 20 DL APMs (kinematics, events) were recorded by a systems data recorder (Intuitive Surgical). In both settings, task-evoked pupillary response (reported as Index of Cognitive Activity [ICA]) and heart rate variability (HRV) were collected as cognitive workload and stress biometrics respectively, analyzed by EyeWorks Cognitive Workload Software and Kubios HRV. Pearson Correlation, Mann-Whitney and Independent t-tests were used for the comparative analyses.
RESULTS: Our study included 6 experts (median 1300 [400-3000]) and 11 novices (25 [0-250]). 7/8 metrics directly comparable between SIM and DL showed significant positive correlation ($p \leq 0.032$). Of these, kinematic metrics including path lengths of all three instruments (dominant/non-dominant hand, camera) ($\rho \geq 0.677$, $p \leq 0.008$), and both biometrics ($\rho \geq 0.806$, $p \leq 0.001$) showed strong correlations. ICA distinguished E v. N across SIM ($p=0.036$) and DL ($p=0.024$) while HRV was able in DL ($p=0.024$). 4/22 SIM metrics distinguished E v. N: task time ($p=0.031$), clutch usage ($p=0.040$), unnecessary needle piercings ($p=0.026$) and suspected injury to endopelvic fascia ($p=0.040$). This contrasts with 13/20 DL APMs ($p \leq 0.038$) including: linear velocities of all three instruments ($p \leq 0.038$) and dominant-hand instrument wrist articulation ($p=0.013$). Novices experienced higher cognitive workload in DL ($p=0.024$) and SIM ($p=0.036$), while all participants experienced higher cognitive workload in SIM than DL ($p<0.001$).
CONCLUSIONS: A majority of performance metrics between SIM and DL provided a moderate to strong correlation. APMs on the live robot, focused on kinematics, are better able to distinguish E v. N surgical ability than error-focused SIM metrics.

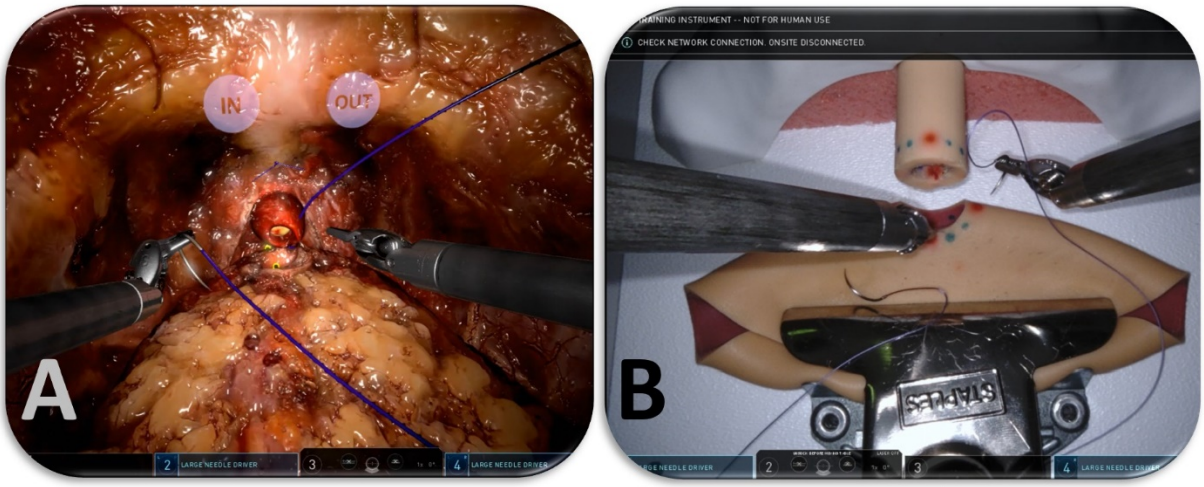

Figure 1. A) Guided Urethrovesical Anastomosis by 3D Systems (on SimNow [Intuitive Surgical]).
B) Vesico-Urethral Anastomosis model by 3-D Med (on live da Vinci Xi Surgical System [Intuitive Surgical]).

Association between Severity of Prenatally Diagnosed Hydronephrosis and Receipt of Surgical Intervention Postnatally among Patients Seen at a Maternal-Fetal Health Clinic

Danielle Estell, Zoe Baker, PhD., Evalynn Vasquez, MD

Goal: Hydronephrosis appears on routine prenatal ultrasound in 1-4.5% of pregnancies[1]**.** Here, we aim to determine the proportion of children diagnosed with hydronephrosis prenatally that go on to require urologic surgery based on severity of prenatal diagnosis and track follow up.
Methods: We conducted a retrospective analysis of individuals prenatally diagnosed with hydronephrosis (HN) at a maternal-fetal health clinic from 2004-2019. Patients were included if severity of HN was recorded at the prenatal visit and were excluded if they did not survive to term. Odds of undergoing surgical intervention for HN were stratified by prenatally diagnosed HN severity, and differences in proportions were assessed using a logistic regression model. HN severity was classified as mild (SFU grades 1-2), moderate (SFU grade 3), or severe (SFU grade 4).
Results: 103 infants prenatally diagnosed with HN were included. Of those, 29 were prenatally diagnosed with mild HN (28.2%), 35 with moderate HN (34.0%), and 39 with severe HN (37.9%). After birth, 86.2% patients with mild HN (n=25), 94.3% of those moderate HN (n=33), and 97.4% of those with severe HN (n=38) returned to the Urology clinic for follow-up care. Among patients who received urologic care after birth, increased severity of prenatally diagnosed HN was significantly associated with odds of undergoing surgical intervention. 16% of patients with mild prenatal HN (n=4), 27.3% for those with moderate prenatal HN (n=9), and 44.7% for those with severe prenatal HN (n=17) underwent surgery for HN (p=0.01).
Conclusion: Our results demonstrate that increased severity of prenatally diagnosed HN predicts increased likelihood of surgical intervention after birth and also appears to play a role in likelihood of follow-up with our Urology clinic.

1. Liu DB, Armstrong WR, Maizels M. Hydronephrosis: prenatal and postnatal evaluation and management. *Clin Perinatol*. 2014;41(3):661-678. doi:10.1016/j.clp.2014.05.013

Association of manual and automated performance metrics with urinary continence recovery after robot-assisted radical prostatectomy

Samuel Mingo*, Runzhuo Ma, Jessica Nguyen, Erik Vanstrum, Andrew Hung, Los Angeles, CA

INTRODUCTION AND OBJECTIVE: Previous studies link surgeon performance during the vesicourethral anastomosis (VUA) to urinary continence recovery (CR) time after robot-assisted radical prostatectomy (RARP). Automated performance metrics (APMs) assess surgeon efficiency while manually-observed metrics (e.g. Robotic Anastomosis Competency Evaluation (RACE)) evaluate surgeon technical skills. In conjunction, these metrics create a comprehensive measure of surgeon performance. Our study determines the association between APMs and RACE as assessment tools during the VUA with CR.
METHODS: Clinicopathological data was collected prospectively at USC. Surgical video and APMs (kinematic and system data) were recorded (Intuitive Surgical) and collected from a da Vinci robot. RACE was assessed by 3 individuals. **Analysis 1:** Spearman's coefficient determined between RACE and APMs. **Analysis 2:** Univariate analysis determined how patient factors, RACE, and APMs predict CR time. **Analysis 3:** Multivariate analysis determined if significant parameters found in Analysis 2 independently predict CR time. CR time established as 0 to 1 safety pad after RARP.
RESULTS: 103 RARPs performed by 21 surgeons were analyzed. Median CR time of 166 days (16-553 range). Median RACE of 29 (25-30). Median surgeon RARP experience of 135 cases

(30–2000). **Analysis 1:** Spearman's correlation coefficient of total RACE and APMs yield a weak association (-0.210<ρ<0.339 p<0.038) **Analysis 2:** Cox regression yielded patient age as predictive of CR (HR=0.960 p=0.011). For RACE, *needle positioning* (HR=2.392, p<0.001), *suture placement* (HR=2.505 p=0.001), and *tissue approximation* (HR=2.505 p<0.001) domains were predictive of CR. For APMs, moving time of dominant instrument (HR=0.999 p=0.011), dominant instrument articulation (HR=0.999 p=0.025), and linear velocity of dominant instrument (HR=1.019 p<0.001) were predictive of CR. **Analysis 3:** Cox regression returned patient age as predictive (HR=0.943 p=0.002). For RACE, *needle positioning* (HR=1.880 p=0.008), *suture placement* (HR=2.317 p=0.005), and *tissue approximation* (HR=2.163 p=0.005) domains were predictive. For APMs, wrist translation of dominant instrument (HR=0.998 p=0.018), and linear velocity of dominant instrument (HR=1.015 p=0.018) were independently predictive of CR time.
CONCLUSIONS: Surgical skills, as measured by automated and manual assessments, can predict clinical outcomes. In our study, RACE evaluation of technical skills were stronger predictors of CR time than APM assessments of surgical efficiency.
Source of Funding: This study was funded in part by an Intuitive Surgical Clinical Grant; Intuitive Surgical provided the systems data recorder. 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 Number K23EB026493.

The Effect of Testicular Rupture on Male Infertility

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Presenting Author: Richard Mora

Introduction and Objective:
Testicular involvement in trauma cases is a relatively rare phenomenon, due to the mobile nature of the testicles and their protected location between the legs. There is scant data available on the later reproductive effects of such traumas on male fertility and sexual function. We sought to evaluate the effect of testicular trauma on male reproductive outcomes.
Methods:
The electronic medical record at Los Angeles County Hospital was retrospectively queried for ICD-10 S31.30XA, testicular rupture. Results were limited to men aged 18-55 years. Charts were reviewed for trauma related details, reproductive hormones and semen analyses. Men were then contacted by phone for a fertility survey.
Results:
46 patients were identified as having testicular trauma. 12 (26.1%) were reached by telephone, of which 5 (41.7%) were blunt and 7 (58.3%) were penetrating. Of these, none had associated injuries that may have affected their fertility, and none had subsequent trauma or orchitis. The mean duration since trauma was 41 months (from 212 months to 12 months). 25% (3/12) reported new erectile dysfunction post-trauma. 16.7% (2/12) endorsed new dysuria. One patient (8.3%) with a scrotal degloving endorsed long term pain of the left testicle post-trauma.

Two patients attempted paternity post-trauma (16.7%), both with primary infertility. The first was the scrotal degloving patient who underwent a male fertility evaluation, with a normal semen analysis and testosterone level. This evaluation was done at Cedar-Sinai in Los Angeles, Ca.

The second, had a gun-shot wound resulting in shrapnel lodged in scrotum. This patient attempted pregnancy for 42 months post-trauma, with his partner having one miscarriage. Two (16.7%) patients had offspring prior to the testicular trauma. None of the 12 patients we reached were under the care of a urologist.

Conclusions:

This is the largest reported series looking at testicular trauma and male fertility/paternity outcomes. Most men did not have long-term follow-up to assess their fertility potential, although most were not trying for a pregnancy. The patient who was attempting paternity was not successful after approximately 12 months duration of trying. 25% of men did have de-novo erectile dysfunction, 16.7% de-novo dysuria, and 8.3% had de-novo orchialgia, although none were followed by a urologist. Men with a history of testicular trauma should have long-term urologic follow-up to assess for issues that may arise after their acute traumatic events have been managed.

Spinal Cord Neuromodulation on Neurogenic Bladder of Patients with Neurological Conditions and Spinal Cord Injuries

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Keck School of Medicine, Ranch Los Amigos National Rehabilitation Center & the University of California, Los Angeles

Patients with neurological disorders such as stroke or spinal cord injury experience many disruptions to their usuals functions, including voluntary control over their lower urinary tract. The interruption or lack communication among the neural tract in patients with these conditions often lead to loss of bladder sensation, loss of urinary retention, and inability to coordinate the bladder and the external sphincter. In our study, we use a noninvasive neuromodulation method, the Transcutaneous Electrical Spinal Cord Neuromodulation (TESCoN) to deliver an electrical stimulation in order to activate the patient's neural structures. Urodynamics and Neurogenic Bladder Symptom Scores (NBSS) were evaluated at baseline and at the completion of the study, and t tests were conducted to determine significant change. The data indicates that TESCoN could lead to increased bladder capacity, improved sensation, and decreased incontinence.

Socioeconomic Differences in Opioid Use and Morbidity Following Ambulatory Urologic Procedures

Terry Zhu, BS, Melissa Trabold, BSN, RN, MSN, CPNP, Zoë G. Baker, MPH, PhD, Michael F. Basin, BS, Ragini Vazirani, MPH, Jiayao Chen, BA, and Paul J. Kokorowski, MD, MPH

Objectives: To examine associations between sociodemographic factors and postoperative opioid use and morbidity in pediatric outpatient urologic procedures.

Methods: We retrospectively reviewed electronic medical records of patients undergoing ambulatory urologic procedures performed by a single surgeon from 2013 - 2017 at an urban pediatric hospital. Patients were evaluated for two primary outcomes at post-operative visits: (1) days of opioid use and (2) days until return to baseline behavior. Differences in these outcomes by race/ethnicity, primary language, median neighborhood income, and insurance status were analyzed using negative binomial regression models.

Results: 831 patients undergoing 856 procedures were included in the study. After controlling for covariates, Hispanic patients took opioids for 55.7% longer than did white patients (95% CI: 14.5-211.7%; p=0.005). Additionally, patients with public insurance used opioids for 43.4% longer than privately covered patients (95% CI: 11.8-83.9%; p=0.005). Patients whose parents

were not primary English speakers had a 23.1% increase in length of disability (95% CI: 4.4-45.2%; p=0.01) as compared to patients with primarily English-speaking parents. There were no significant associations between median neighborhood household income and primary outcomes in the adjusted models.
Conclusions: Hispanic patients and publicly insured patients had a longer duration of postoperative opioid use than white patients and privately insured patients respectively, while patients whose parents were not primary English speakers report a longer period of morbidity than patients with primarily English-speaking households. These disparities should be considered when designing postoperative care pathways for pediatric ambulatory urologic procedures.