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Pediatric Research in the Digital Age: Innovation, Collaboration, and Translation

ABSTRACT BOOK

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PRESENTED BY

Children's Healthcare of Atlanta
EMORY UNIVERSITY
Georgia Institute of Technology
MOREHOUSE SCHOOL OF MEDICINE

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Oral Presentation Abstracts

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Non-invasive Nanovaccine for Influenza administered using fast-acting Buccal Film induces a robust immune response in a murine model

Presenting Author: Emmanuel Adediran, B.Pharm; Mercer University

Poster Number: 1

ADEDIRAN, EMMANUEL; Singh, Revanth; Vijayanand, Sharon; Arte, Tanisha; and D'Souza, Martin

Seasonal influenza is a transmissible respiratory virus that frequently mutates and is of public health concern. Most of the vaccines approved are invasive which is painful and can result in vaccine hesitancy. Additionally, the route of transmission of this virus is via the mucosal route. In our study, we investigated the immunogenicity of adjuvanted microparticulate vaccine and explored the noninvasive mucosal delivery system via the buccal(cheek) route as Oral Dissolving Films (ODFs).

Herein, we encapsulated the vaccine antigens Influenza A H1N1 virus (i-Influenza A H1N1) and Influenza A H3N2 virus (i-Influenza A H3N2) in a biodegradable Poly (Lactic-co-glycolic acid) (PLGA) polymeric matrix. PLGA MPs were prepared using a double emulsion (w/o/w) method, lyophilized, and characterized. The ODFs were prepared by combining the biodegradable polymers – Kollidon 90F, Kollidon VA64, and PEG2000 in ethanol to form a gel base. The final vaccine-loaded ODFs were prepared by combining the vaccine+adjuvant MPs with the gel base, then added to a 96-well Polydimethylsiloxane (PDMS) template. The adjuvanted vaccine ODFs were administered to mice as one prime (w0) and one boost (w3) via the buccal route to test the in vivo vaccine efficacy. The virus-specific serum antibody (IgG, IgG1, IgG2a, IgM, IgA) levels were assessed.

We found that the size and charge of microparticles were less than 2µm, -23.8mV to -26.4mV respectively. The % Encapsulation efficiency (EE) was 80% to 90%. The vaccine-loaded ODFs quickly dissolve (less than 5 mins) in artificial saliva to release the vaccine MP. More importantly, following in vivo immunization, we found that the Influenza A H1N1 specific serum IgG and IgA levels and Influenza A H3N2 specific serum IgG and IgA increased significantly ($p \leq 0.0001$) compared to the no treatment group. The IgG subtype analyses showed both significantly high levels of serum IgG1 (Th-2/antibody mediated response) and IgG2a (Th-1/cytotoxic mediated response) antibodies specific to both strains ($p \leq 0.01$). Additionally, we found significant antibody levels (IgG and IgA) in the lungs which show mucosal immunity ($p \leq 0.0001$).

Overall, fast-acting Buccal Films assisted delivery of the Influenza vaccine elicits a robust humoral and mucosal immune response.

Research and Retrofit of Powered Toy Cars to Develop Low-Cost Pediatric Mobility Solutions

Presenting Author: Karina Bhattacharya, Master of Industrial Design; Georgia Institute of Technology

Poster Number: 2

BHATTACHARYA, KARINA; Wu, Xinke; Herrin, Kinsey; and Hester, Josiah

Mobility challenges affect a significant portion of children, impairing a child's ability to participate alongside peers and impacting their social and emotional development. Facilitating movement and play supports the physical and cognitive development of these children. Specialized powered wheelchairs are often used to restore mobility but can range from several thousand to tens of thousands of dollars, which poses a considerable financial burden on families. Additionally, high-cost powered wheelchairs have limited lifespans as children grow, outpacing the static sizing of these fixed devices. This research project, in partnership with the nonprofit organization Go Baby Go, aims to enhance the accessibility of mobility solutions to families in need. Go Baby Go focuses on retrofitting powered toy cars to cater to the specific needs of children with disabilities, enabling them to move and interact more independently. To first understand the scope of challenges associated with pediatric powered mobility, interviews were conducted with experts, including an impacted family, clinicians, and research scientists with experience in pediatric mobility issues.

Subsequently, a toy car was selected for experimentation based on feedback received from the interviews. Key insights included the need for portability, ensuring correct posture and fit, and a low-cost device that parents could independently adapt for their child without expert assistance every step of the way. As significant alterations to the toy car would compromise the product warranty and could lead to potential safety issues, our changes focused on designing various add-ons and accessories that could help the children safely and comfortably use the toy cars. These prototyping experiments were compiled into a comprehensive instructional manual, enabling parents to cost-effectively follow the do-it-yourself instructions. Furthermore, this resource is now accessible to any parent through the open-source Go Baby Go online network, facilitating the affordable retrofitting of powered toy cars for children with mobility needs.

Obesity prevalence trends in a metro-Atlanta pediatric primary care practice: an analysis of well-child visit EHR data – 2016-2023

Presenting Author: Katelyn Chiang, MPH; Emory University

Poster Number: 3

CHIANG, KATELYN; Martinez, Sofia; Palmer, Wendy; McFadden, Terri; Livingston-Burns, Belise; Figueroa, Janet; and Welsh, Jean

Background: Prevalence of childhood obesity has increased in recent decades. The most recent estimate of national obesity prevalence among individuals 2-19 years, based on data collected pre-COVID (2017-2020), is 19.7%. Much of what is known about the burden of childhood obesity is derived from national and state-level surveys and programs, resulting in a dearth of timely and community-level data. Analysis of electronic health record (EHR) data is emerging as a low-cost, valid public health surveillance tool that offers the opportunity to assess chronic disease trends more locally and rapidly than does survey data.

Our objective was to assess recent trends in obesity prevalence in a single pediatric primary care practice in the metro-Atlanta area serving a primarily low-income, minority population.

Methods: De-identified data from well-child visits among patients aged 2-19 years attending a pediatric primary care clinic for each year 2016-2023 were used. BMI-for-age percentiles were calculated from patient height, weight, age, and sex information from the EHR using CDC Growth Charts. Obesity (≥95th BMI-for-age percentile) prevalence was calculated overall and by sociodemographic characteristics for each year, and statistically significant linear trends were assessed pre-pandemic (2016-2019), pandemic (2019-2021), and post-pandemic (2021-2023) using R version 4.3.2.

Results: On average, 6,102 patients were seen for well-child visits each year; 88.4% were Black or African American, and 94.2% were insured by Medicaid. In 2016, 17.9% of children had obesity; obesity prevalence remained stable pre-pandemic through 2019. During the pandemic period, obesity prevalence increased from 17.4% in 2019 to a high of 24.0% in 2021, but this trend was non-significant (APC=16.1%, p=0.084). Post-pandemic, obesity prevalence has significantly decreased, falling to 21.1% in 2023 (APC=-6.4%, p<0.001). Disparities were seen by age group and race/ethnicity, with higher prevalence among older children and children living in Spanish-speaking households. No differences in obesity prevalence trends during the pandemic or post-pandemic periods were seen between sociodemographic groups.

Conclusion: Estimates from EHR data at a pediatric primary care clinic serving a primarily low-income, Black or African American population demonstrate that obesity rates rose during the COVID-19 pandemic. Although rates have decreased significantly since, prevalence is still elevated compared to pre-pandemic.

The Beneficial Microbe, Lactococcus lactis subspecies cremoris, drives Prevention of Metabolic Disease of Metabolic Disease and Hepatoprotection via Rewiring of Metabolic Pathways in the Gut and Liver

Presenting Author: Camilo Anthony Gacasan, Bachelors of Science; Emory University School of Medicine

Poster Number: 4

Gacasan, C. Anthony; Weinberg, Jaclyn; Naudin, Crystal; Askew, Lauren; Barbia, Stefi; Jones, Dean; and Jones, Rheinallt

Introduction: With over one-fifth of US children aged 2-19 years overweight or obese, the prevalence and comorbidity associated with metabolic syndrome are of significant consequence to the US populace. Dietary supplementation with beneficial microbes may be an integral approach in our therapeutic toolbox to mitigate comorbidities associated with metabolic syndrome.

Methods: C57BL/6 mice were fed a western style high fat and high carbohydrate diet. Groups were then supplemented with either 1x109 CFU of Lactococcus lactis subsp. cremoris (LLC) (ATCC 19257), Lactobacillus rhamnosus GG (LGG) (ATCC 53103) as a bacterial control, or HBSS vehicle control five times per week for four weeks. Metabolite measurement and identification was conducted on the serum and liver of mice in the experimental groups via ultra-high performance liquid chromatography coupled to

high resolution mass spectrometry (UHPLC-HRMS) and data analyzed with publicly available computational tools. Differential expression of genes in colonic and hepatic tissue was measured by RNA sequencing and RT-qPCR respectively.

Results: Our group previously showed that LLC is a highly efficacious probiotic in the attenuation of western style diet induced obesity and hepatic steatosis. Here, through unbiased metabolomic analysis via UHPLC-HRMS, we identify salient differences in metabolites present in both the serum and liver of LLC treated mice as compared to both LGG and vehicle controls. Metabolomic pathway enrichment and network analysis revealed that LLC induced enrichment of pathways that function in biosynthesis of unsaturated fatty acids (Enrichment Factor [EF]=5.909), hepatic pathways that function in tryptophan (EF=1.88) and riboflavin (EF=4.308) metabolism, as well as hepatic pathways related to the Cyp450 family of enzymes (EF=1.74). In addition, we detected significant decreases in total serum cholesterol in LLC treated groups compared to controls ($P=0.003$). Multiple genes relating to cholesterol metabolism were differentially expressed ($P<0.05$) in both the colon and liver of LLC treated mice compared to controls.

Conclusion: LLC is a highly efficacious probiotic that when supplemented to mice fed a western style diet, results in distinct changes to the serum and liver metabolome. These changes may account for the beneficial influences of LLC in mitigating weight gain, lowering cholesterol, and decreasing liver adiposity and inflammation.

Rapid, point-of-care assessment of bone marrow aspirate adequacy via deep ultraviolet microscopy

Presenting Author: Viswanath Gorti, B.S. in Bioengineering / Current Ph.D. Candidate in Biomedical Engineering; Georgia Institute of Technology / Emory University (Joint Biomedical Engineering Program)

Poster Number: 5

GORTI, VISWANATH; Subramanian, Ajay Rajaraman; Aumann, Waitman; Aljudi, Ahmed; and Robles, Francisco E.

Background: Bone marrow aspiration procedures are pivotal for diagnosing and monitoring many hematological conditions, including cancers. Evaluating the adequacy of bone marrow aspirates, indicated by the presence of bony spicules in the sample, is critical to ensure that the procedure was performed properly and that appropriate diagnostic material was collected. Currently, samples are evaluated using Giemsa staining protocols, which require a trained laboratory technician and lengthy processing that can take several hours. If a sample is deemed inadequate, which occurs in 10-50% of cases, the patient must undergo another aspiration procedure, typically requiring another episode of general anesthesia. The lack of point-of-care assessment strategies can lead to delays in diagnosis and treatment, among other complications.

Methods: To address this unmet clinical need, we applied deep ultraviolet (UV) microscopy, a real-time, low-cost, and label-free molecular imaging technology that leverages biomolecular contrast to recapitulate the appearance of Giemsa stains. Using a portable, LED-based UV microscope, we

conducted a clinical study with 51 pediatric oncology patients where UV images of unstained bone marrow aspirate smears were evaluated and compared to the clinical standard-of-care (a hematopathologist inspection of the same slides after Giemsa-staining). We then developed an automated classification algorithm to identify spicules from unstained UV images and performed whole slide imaging of bone marrow aspirate smears using a previously developed, compact deep-UV microscope.

Results: The clinical study revealed accurate adequacy assessment using both real-time visual inspection and automated classification of unstained UV images, with accuracies of 94.1% and 95.7%, respectively. Pseudo-colorized whole slide scans also demonstrated excellent congruence with corresponding stained slides, enable facile visualization of spicule density and even clinically relevant nucleated marrow cells, such as megakaryocytes, erythroid precursor cells, and myeloid precursor cells.

Conclusion: Deep-UV microscopy allows for real-time evaluation of bone marrow aspirate samples, demonstrating the potential to reduce the time, cost, and number of aspirations performed in the clinic, with concurrent reduction in episodes of general anesthesia. The developed system is well suited for use at the point-of-care and allows for adequacy assessment to be performed by non-experts. Ultimately, this technology can improve clinical management of pediatric hematology patients.

Preferential Attention to the Eyes of Others During Early Infancy Predicts Language Acquisition in Typically Developing Toddlers but Not in Autistic Toddlers

Presenting Author: Jaime Kortanek, B.A.; Marcus Autism Center; Emory University School of Medicine; Children's Healthcare of Atlanta

Poster Number: 6

KORTANEK, EVE; Ford, Aiden; Shultz, Sarah; Jones, Warren; Klin, Ami; and Edwards, Laura

Background: Attention to the eyes of others in the first year of life is associated with language skills in toddlerhood and differs between typically developing (TD) and autistic (AUT) infants. Developmental dynamics of the relationship between early social attention and language development, and how they differ across neurodevelopmental phenotypes, remain poorly understood. This longitudinal study explores the adaptive significance of preferential attention to the eyes across 2–6 months for expressive language outcomes at 24 months in both TD and AUT toddlers.

Methods: Eye-tracking data were collected from TD (N = 93) and AUT (N = 52) infants at up to 5 time points between 2 and 6 months. Infants viewed pre-recorded videos of naturalistic caregiver interaction, and preferential eye-looking (P-EL) was quantified as the percentage of time fixating on the eye region relative to the mouth region during each video. Expressive language age equivalent scores were calculated from the Mullen Scales of Early Learning, which was administered by a trained clinician at 24-month visits. Functional data analysis with Principal Analysis by Conditional Expectation modeled P-EL trajectories across 2–6 months, and functional scalar regressions assessed the extent to which P-EL

trajectories predict 24-month expressive language and whether the predictive relationship varies across developmental time.

Results: P-EL trajectories from 2–6 months predict 24-month expressive language scores in our TD sample (R2 = .087, p = .015) but not in our AUT sample (R2 = .014, p = .683). The direction of the association in our TD group shifts between 4 and 5 months, such that infants who display P-EL in early infancy, and then transition to increased mouth-looking around 5 months of age, have higher expressive language scores at 24 months.

Conclusions: Our findings demonstrate a time-varying adaptive value of P-EL for language learning in TD infants and indicate developmental differences between TD and AUT infants in the relationship between social attention and language outcomes. Altogether, these findings may reflect differential engagement with social stimuli between TD and AUT infants and shed light on when, and for whom, certain social attention supports may facilitate language development.

Postnatal Zika Virus Infection Alters Temperament and Social Attention in Infant Rhesus Macaques

Presenting Author: Kaitlyn Love, Bachelor of Science in Agriculture; Emory University

Poster Number: 7

Love, Kaitlyn; Matsuoka, Joy; Van Schoor, Alex; Richardson, Rebecca; Suthar, Mehul; Chahroudi, Ann; and Raper, Jessica

Zika virus (ZIKV) is now endemic in mosquito populations in many countries, presenting a continued risk for human health. Fetal ZIKV exposure can cause congenital defects, including microcephaly, brain structural abnormalities, visual impairments, cognitive deficits, and changes in socioemotional behavior. However, the potential consequence of ZIKV infection during infancy remains largely unexplored. Considering the rapid postnatal brain development that occurs during the first years of life, it is crucial to understand the potential impact of ZIKV neurotropism during infancy.

This study investigates the effects of postnatal ZIKV infection using a rhesus macaque (RM) model with twelve infant RMs infected with the Puerto Rican ZIKV strain (105 pfu PRVABC59) at one month of age (ZIKV-1), six uninfected controls (UIC), and six immune stimulation controls (Poly-IC, PIC). During the first two months of life, infants undergo weekly standardized neurodevelopmental assessments, similar to the Brazelton Test for human infants. Subsequently, at four and six months of age, their attention is tracked while viewing videos focusing on social interactions, non-social stimuli, and visual acuity.

ZIKV-1 infants displayed a decline in orientation scores post-infection, corresponding with elevated temperament scores during neurodevelopmental testing compared to UIC and PIC controls. Groups did not differ in their performance on visual acuity test at four or six months of age. Interestingly, compared to UIC and PIC, ZIKV-1 infants directed more visual attention to the mouth and less visual attention to the eyes of social stimuli at 4 months of life, whereas visual attention did not differ for nonsocial videos.

Despite a decline in orientation scores after ZIKV infection, there is no evidence of visual impairment as indicated by the scores for visual acuity. Therefore, differences in orientation during early infancy are more plausibly linked to heightened emotional reactivity (elevated temperament scores) resulting in a lack of attention span during the neurodevelopmental assessment. Considering the rapid neural plasticity happening during the first years of life, altered attention to social cues could improve or worsen with age. Further characterization of these animals will help shed light on the potential impacts of ZIKV infection on the developing brain.

NOVEL COMPUTATIONAL MODEL FOR PLANNING PATENT DUCTUS ARTERIOSUS STENTING PROCEDURE

Presenting Author: Luis Rene Mata Quinonez, MS, ME; Georgia Institute of Technology

Poster Number: 8

Luis René Mata, Srujana Joshi, Shweta Karnik, Leon Cheng, Andrew Marini, Shobana Santhanam, Rahav Kothuri, Charles Federico, Suhaas Bonkur, Agustin Munyau, Lakshmi P. Dasi, Holly D. Bauser-Heaton

Background. Ductal-dependent cyanotic congenital heart disease relies on a patent ductus arteriosus (PDA) for circulatory equilibrium, often requiring interventions like PDA stenting to keep patency and maintain pulmonary blood flow until definitive surgical repair1-3. However, the complex anatomy of the PDA presents challenges in ensuring successful stent deployment1. To address this, we propose a comprehensive finite element analysis (FEA)-based computational framework for patient-specific PDA stenting planning.

Methodology. Our methodology involves segmentation of PDA and adjacent vascular structures (aortic arch, descending aorta, and pulmonary arteries) from pre-procedural CT scans using software tools like Materialise Mimics and 3-Matic. We then create CAD models for the stent, guidewire, and angioplasty balloon, incorporating measurements from MicroCT scans. Hexahedral meshing in Hypermesh facilitates subsequent FEA simulations in Abaqus, allowing us to simulate default configurations of the angioplasty balloon and stent through radial compression, guidewire tracking and stent deployment including inflation and deflation of the balloon and the dynamical interaction of the stent and patient-specific anatomy.

Results. Results from our study provide detailed insights into stent behavior, including deformation patterns of the stent and PDA, stress distribution, and potential complications associated with partial stenting coverage, particularly in moderately straight PDA anatomies (Qureshi's type I). Our simulations reveal minimal stent recoil and significant straightening of the PDA morphology, accompanied by formation of tissue bulges, but no stenosis formation. von Mises stress distribution analysis highlights stress concentration at the stent fixation points on the aortic side, stent bending and straightening of stent rings.

Conclusions. These findings offer valuable guidance for future interventions, informing clinicians about optimal stent selection, deployment strategies, and potential risks associated with PDA stenting. Our approach aims to enhance the precision and efficacy of PDA stenting procedures, ultimately improving

patient outcomes in the management of ductal-dependent CHD. Future work will involve applying this simulation pipeline to a broader range of patient-specific geometries accompanied by rigorous validation to enhance the accuracy and reliability of our simulations.

References.

Bauser-Heaton, H. et al., J Cardiov Angio & Interven, 1(6), 2022.

May, L. et al., Pediatr Radiology, 2022.

Qasim, A. et al., ProgressPediatr Cardiol, 61, 2021.

Dear Diary, Today Feels Different: Exploring Intra-individual Dynamics in Pain and Relevant Correlates for Youth with Chronic Sickle Cell Disease Pain

Presenting Author: Jan Mooney, PhD; Emory University

Poster Number: 9

MOONEY, JAN; Adkins, Taylor; and Sil, Soumitri

Background: Chronic pain is prevalent and life-interfering for youth with sickle cell disease (SCD), often co-occurring with other challenges, such as sleep disturbance and fatigue. Evidence-based chronic pain management guidelines emphasize individualized treatment. Self-monitoring through daily diaries can increase awareness of symptom patterns to inform care. Prior research has observed group-level patterns between pain, sleep, and self-management techniques. This approach may obscure important person-level nuances. The goal of the present work was to represent intra-individual dynamics of pain and relevant correlates in youth with chronic SCD pain.

Method: Participants (N = 11) were enrolled in a single-arm pilot of a virtual group-based (n = 3-4) non-pharmacological interdisciplinary chronic SCD pain management treatment. Group sessions integrated neuromuscular exercise with cognitive-behavioral skills across 16 twice-weekly sessions with periodic caregiver involvement. Daily texts or e-mails prompted participants to respond on visual analog scales regarding their levels of physical activity, sleep quality, fatigue, pain, pain intensity, and soreness. Unified structural equation models (uSEM) tested relationships between all experiences individually for each participant.

Results: Teens were between age 13 and 18 (M = 16.6) and 54% identified as male. On average, participants completed 37 of 56 diary prompts (range = 14-56). For the present analyses, we included participants (n = 8) who completed at least 50% of diary prompts. Standardized root mean residual (SRMR) ranged from 0.04 to 0.12 (M = 0.07). Concurrent and prospective relationships varied in both strength and direction. For example, approximately a third of models (33%) estimated an inverse concurrent association between activity and fatigue, yet the strength varied ($-0.27 < \beta < -0.62$). In addition, 22% estimated a relationship between soreness and future pain, though in opposing directions ($\beta = -0.54$ vs. 0.52).

Conclusions: This innovative use of uSEM identified complex, variable interrelationships among activity, fatigue, soreness, sleep and pain for youth participating in an SCD chronic pain management group treatment. Results suggest that insights from person-specific network analysis can inform individualized treatment. Replication of this work with larger within-person sample sizes and more consistent diary completion may help identify more stable patterns and optimize model fit.

Making a Model: Examining Distinct Transcriptional Programs between Perianal Crohn's Disease Patient-Derived Organoids and Corresponding Mucosal Epithelium using Single-Cell Transcriptomics

Presenting Author: Shanta Murthy, Master of Science, Systems Medicine; Emory University

Poster Number: 10

MURTHY, SHANTA; Maddipatla, Sushma; Anbazhagan, Murugadas; Hwang, Yeonjoo; Dodd, Anne; Kolachala, Vasantha; Koti, Tarun; Cutler, David; Matthews, Jason; and Kugathasan, Subra

Background: Perianal Crohn's disease (CD) induces extensive mucosal damage involving changes in the epithelium. Here, we profiled mucosal epithelial signatures during active perianal CD by first examining sample-specific variance from pseudobulked single-cell data, and further assessing single-cell gene expression of patient-derived intestinal organoids to maintain detected disease-specific transcriptional and cell subtype characteristics.

Methods: Rectal mucosal biopsies were obtained from patients (n=31, 12 inflamed, 19 non-inflamed) at Children's Healthcare of Atlanta and immediately processed for single-cell RNA sequencing, and for a subset of those patients (n=13), organoids were established and sequenced after 3 passages. Organoids and mucosal epithelial cells were bioinformatically evaluated at patient and cell subtype levels using count aggregation per sample (pseudobulking) and single-cell normalized and differential gene expression.

Results: Mucosal epithelial cells (n=96,392) and cells from paired patient-derived organoids (n=77,044) demonstrated significant differences at the cell subtype and transcriptomic levels. While mucosal epithelial cells displayed 18 subtypes, organoids comprised 10. Organoid subtypes were transcriptionally distinct from mucosal subtypes, with only partial indication of early subtype lineages. Unlike mucosal epithelial cells where the first principal component (PC1) correlated with patients' phenotypic inflammation (37% variance, $r=0.65$, $p=0$), organoids' primary component (39% variance) correlated with gender ($r=0.59$, $p<0.03$) and ancestry ($r=0.69$, $p<0.01$). The mucosal epithelial cell type distribution was not retained by organoids. Organoid cells lacked expression of transcription factors critical for maturation of secretory and select absorptive cell types but constitutively express HES1 that promotes the absorptive lineage in mucosal epithelial cells. Hierarchical clustering conveyed that transcription profiles of patient-derived organoids shared similar composition, regardless of patient phenotype, than to their mucosal counterparts. Microfold-like cells detected in organoids appeared to be the sole epithelial subtype closely resembling a mucosal counterpart, but lacked SPIB expression, a transcription factor required for full microfold differentiation. Enriched pathways attributed to culturing differences included

Notch, WNT, and chromatin modifying enzymes. Phenotype-based gene set enrichment identified remnants of disease in vitro, including altered metabolism and epithelial barrier function.

Conclusion: Unsupervised hierarchical clustering on aggregated single-cell data revealed robust sample-specific signatures within the epithelial compartment, which were deconvoluted to clarify culturing and cell subtype transcriptional activity.

Detection of Minimally Invasive Biomarkers for Pediatric Eosinophilic Esophagitis

Presenting Author: Teresa Oh, MD; Emory University School of Medicine

Poster Number: 11

OH, TERESA YOUNG; Johnson, Laura; Westbrook, Adrianna; Vos, Miriam; Rudra, Sharmistha; Sinclair, Elizabeth; Lam, Wilbur

Background: The gold standard for diagnosis and surveillance of eosinophilic esophagitis (EoE) requires multiple endoscopies with biopsies to identify the maximum tissue eosinophil count. Repeated procedures are invasive, expensive, time consuming, and involve procedural and anesthesia-associated risks. Moreover, uneven tissue distribution of eosinophils can lead to sampling error with false negatives. Thus, there is a significant need for the development of less invasive tests to diagnose and monitor EoE. There are candidate biomarkers based on the pathogenesis of EoE however, none have yet been validated in the pediatric population. The aim of this study was to determine the utility of minimally invasive blood biomarkers to diagnose pediatric EoE.

Methods: This is a prospective cohort study at a single pediatric tertiary center comparing plasma charcot-leyden crystal protein/galectin-10 (CLC/GAL-10), eosinophil cationic protein (ECP), eosinophil-derived neurotoxin (EDN), eotaxin-3 (CCL26), and major basic protein-1 (MBP-1) in pediatric patients with active EoE compared to controls. Active EoE was defined by histologic evidence of 15 or more peak eosinophils per hpf. Disease controls were patients with atopic diseases of asthma, eczema, allergic rhinitis, and/or IgE-mediated food allergies but without a diagnosis of EoE. Patients aged 0-21 years underwent routine endoscopy for symptoms of dysphagia. Plasma was isolated from peripheral blood obtained during the procedure. Enzyme-linked immunosorbent assay testing was performed comparing the concentrations of each biomarker in patients with active EoE vs healthy vs disease controls.

Results: Of the 71 samples collected, there were 14 with EoE, 20 who were healthy, and 37 with atopic disorders but without EoE. Median plasma EDN, MBP, and ECP were increased in EoE compared to all controls at 6.56 vs 3.12 ng/ml ($p < 0.001$), 35 vs 27 ng/ml ($p < 0.05$), and 21 vs 13 ng/ml (p 0.56), respectively. There was no difference in plasma CLC/GAL-10 and CCL26 in EoE vs atopic/healthy controls.

Conclusion: This study validated novel eosinophil-associated plasma biomarkers distinguishing EoE from healthy and atopic controls. Potentially, these may be used as minimally invasive tests in diagnosing EoE. Future analysis will include random forest analyses to identify optimal thresholds and building a risk assessment tool via logistic regression modeling.

The mitochondrial citrate carrier, SLC25A1, is a dosage-dependent regulator of metabolic reprogramming and morphogenesis in the developing heart.

Presenting Author: Chiemela Ohanele, BA; Emory University

Poster Number: 12

OHANELE, CHIEMELA; Peoples, Jessica N.; Karlstaedt, Anja; Geiger, Joshua T.; Gayle, Ashley; Ghazal, Nasab; Sohani, Fateemaa; Brown, Milton E.; Davis, Michael E.; Porter Jr., George A.; Faundez, Victor ; and Kwong, Jennifer Q.

Background: While congenital heart defects (CHDs) are the most common type of birth defect and account for >20% of all deaths in the first year of life, the etiology of most CHDs remains unknown. One common genetic cause of CHD is 22q11.2 deletion syndrome (22q11.2DS), where ~75% of 22q11.2DS patients present with CHD. Identification of additional genes within 22q11.2DS required for cardiac development is needed to enhance screening and therapeutic approaches to reduce deaths due to CHDs. SLC25A1, a gene found within the 22q11.2DS deletion region, encodes for the mitochondrial citrate exporter which is regulates citrate distribution required for metabolic processes including oxidative phosphorylation and cytosolic Acetyl-CoA production. As the developing heart is a dynamic metabolic environment that undergoes several physiological and morphological transitions before birth, we hypothesize that SLC25A1 plays a key role in metabolic processes that are required for cardiac development.

Methods: In developing a knockout mouse model to study the in vivo functions of SLC25A1, we uncovered unexpected congenital heart defects as well as perinatal lethality. We assessed the role of SLC25A1 in cardiac morphogenesis by performing histologically analyses across cardiac development. To further understand the mechanism underlying these cardiac derangements, we performed mitochondrial TEM and oxygen consumption studies, transcriptomics, and ChIP-qPCR. These studies allowed us to assess the role of SLC25A1 in mitochondrial function, gene expression, and epigenetic regulation.

Results: Hearts from Slc25a1 knockout embryos displayed a striking array of cardiac malformations. Analysis of mitochondrial structure and function reveal that loss of Slc25a1 causes mitochondrial ultrastructural defects and decreased oxygen consumption. Transcriptomics analyses of metabolism-related genes revealed that Slc25a1 deletion causes widespread alterations in metabolic gene expression in a dosage-dependent manner. Moreso, metabolic modelling predicted that loss of SLC25A1 downregulated the metabolic flux of oxidative phosphorylation, while upregulating flux of glycolysis. As SLC25A1 function promotes cytosolic Acetyl-CoA production, we found that loss of SLC25A1 decreases H3K9 acetylation levels globally and at promoter regions of dysregulated metabolic genes from our transcriptomics analysis.

Conclusions: Mechanistically, SLC25A1 may link mitochondria to transcriptional regulation of metabolism through epigenetic control of gene expression to promote metabolic remodeling in the developing heart.

Proteomics profiling of inflammatory responses to elexacaftor/tezacaftor/ivacaftor in cystic fibrosis

Presenting Author: Hazel Ozuna, BS, MS, PhD; Emory University

Poster Number: 13

OZUNA, HAZEL; Bojja, Dinesh; Partida-Sanchez, Santiago ; Hall-Stoodley, Luanne ; Amer, Amal; Britt Jr, Rodney D; Sheikh, Shahid ; Kang, Bum-Yong; and Kopp, Benjamin T.

CFTR modulator therapies have resulted in positive clinical outcomes, yet people with CF (pwCF) continue to suffer from chronic inflammation and bacterial infections. How ETI fails to improve innate immune signaling responsible for bacterial clearance and inflammation resolution remains unknown. We used an unbiased proteomics approach to detect changes in inflammatory proteins pre- and post-ETI. Blood samples from 20 pwCF and 20 non-CF (NCF) were collected before and 3 months after ETI and sent for protein screening using an inflammation panel from Olink®. Bioinformatics analysis identified changes in expression patterns in CF pre- and post-ETI and compared to NCF. There were significantly fewer pulmonary exacerbations after ETI initiation, along with sustained improvement in lung function and reduced bacterial colonization. Normalized values between CF pre-ETI and NCF were significantly different for all target proteins. There was a modest shift in overall CF protein profiles post-ETI towards the NCF cluster. Unpaired analysis of protein differential expression among identified a total of 35 proteins significantly impacted by ETI therapy ($p - value \leq 0.05$), of these CCL20, MMP-10, EN-RAGE, AXIN1 had a fold-change of 1.2 or more. Paired analysis resulted in significant expression change of MMP-10, EN-RAGE and IL-17A. No significant change was observed in other critical inflammatory proteins such as IL-8, CASP-8, ADA, IL-5, and IL-13. Pathway analysis identified significantly altered proteins involved in defense responses to bacteria, cytokine production, NF-κB signaling regulation, ion homeostasis, and chemokine activity. ETI had a modest effect on several inflammatory proteins that could serve as biomarkers of therapeutic response. In contrast, proteins unaffected by ETI highlight pathways to target for future therapies to combat persistent inflammation and dysregulated immunity in pwCF.

Strategic Targeting of Bcl2-family Protein Interactions in High-risk Neuroblastoma

Presenting Author: Douglas Saforo, MDPhD; Emory University

Poster Number: 14

SAFORO, DOUGLAS; Jonus, Hunter; Shim, Jenny; McGraw, Morgan; Hogarty, Michael; and Goldsmith, Kelly

Background: High-risk Neuroblastoma (HR-NB) poses a significant challenge when initial therapies fail, with no curative options available following relapse. The effectiveness of current NB therapies largely depends on their ability to induce mitochondrial apoptosis, a process regulated by Bcl2-family protein-protein interactions (PPIs). For example, chemotherapy activates pro-death protein Bim that converges

on the mitochondria to activate apoptosis. Pro-survival proteins (Mcl-1, Bcl-2, Bcl-xL) sequester Bim (Bim-PPI) to prevent it from binding pro-death Bak/Bax to induce apoptosis. We previously demonstrated that Bim-PPI can predict responses to BCL-2 selective inhibitors using a novel patient derived xenograft (PDX) slice culture system. Interestingly, PDXs derived from post-chemotherapy NBs were associated with multiple Bim-BCL-2 family interactions. Now, we utilize this system to determine responses to therapeutic targeting of additional pro-survival members in multiple-Bim PPI PDX.

Aim: Define how diverse Bim-PPI's correlate with Bcl-2 family inhibitor response to leverage biomarkers for clinical use.

Methods: We defined human primary NB and PDX Bim-PPI's using co-immunoprecipitation of BCL-2 proteins. NB PDXs of diverse Bim-PPI profiles were grown in NSG mice, excised, and sectioned into 400 µm thick slices prior to ex-vivo transfer into cell culture media. NB PDX cell lines and tumor slices were exposed to BCL-2 family inhibitors (ABT-199, ABT-737, S63845) for 24hrs. Cell viability was analyzed with CellTiter-glo, apoptosis was measured by PARP cleavage and cleaved caspase 3 via immunoblot and immunofluorescence. Multi-dose combination inhibitor response data was analyzed with SynergyFinder.

Results: Human NB Bim-PPI are preserved from primary NB tumor to matched PDX. Combinations of Bcl-2 family inhibitors against NBs harboring Multiple-Bim PPI's resulted in increased cell death in post-chemotherapy NB PDXs. Single target inhibition resulted in compensatory sequestration by non-targeted pro-survival proteins, leading to tumor survival. MCL-1 inhibition synergized with BCL-2 and BCL-xL targeting to overcome compensatory binding in multi-Bim PPI PDXs.

Conclusions: Selective Bim-PPI targeting induces apoptosis in chemotherapy-naïve tumors. Yet, in post-chemotherapy scenarios, Bim sequestration shifts to untargeted Bcl-2 proteins under single targeting pressure. Combining inhibitors targeting different Bcl-2 pro-survival members effectively overcomes apoptosis resistance, suggesting a future strategy focusing on multi-targeted Bcl-2 family inhibition in post-chemotherapy tumors to enhance tumor cell death.

Innate Immunity in Placental Hofbauer Cells to HCMV and HIV Across Gestation and a Potential Role in Protection

Presenting Author: Viviane Schuch, Doctorate; Morehouse School of Medicine

Poster Number: 15

SCHUCH, VIVIANE; Chakraborty, Rana; Johnson, Erica L.

Background. Placental immunity is vital in host defense against invasive pathogens. However, maternal infection with Human Cytomegalovirus (HCMV) and HIV can cause inflammation at the maternal-fetal interface resulting in vertical transmission. Placental immune responses to these viruses across gestational stages shape outcomes and require further characterization.

Methods. Here we examined innate immune responses in isolated placental macrophages or Hofbauer cells [HCs] following exposure to HIV-1BaL or HCMV TB40/E strain. Placentae were obtained from HIV/CMV-negative women at different gestational ages (early gestation (~ 24 weeks) and term (> 37

weeks). Post-infection, mRNA was isolated, and transcriptome profiling conducted. We used DESeq2 for differential gene expression analysis and FGSEA for gene set enrichment.

Results. Term HCs exposed to HCMV exhibited increased levels of pro-inflammatory markers (TNF and the IL-1 antagonist IL1RN) and chemokines (CCL3, CCL4, CCL5), with upregulation of antiviral and inflammatory genes (IFNA1, IFNB1, DDX58, IF1H1, DHX58, STAT1, STAT2, STAT3), and a concomitant decrease in STAT5B expression, compared to non-infected term controls. These robust antiviral responses were further underscored by enhanced expression of ISG15, OAS1, IFIT1, IFIT2, IFIT3, and RSAD2 (Viperin). In contrast, early gestation HCs exposed to HIV exhibited increased CCL3, CCL5, STAT1, and STAT5A levels, but decreased STAT5B. Term HCs exposed to HIV exhibited reduced levels of antiviral genes, including DDX58, IF1H1, DHX58, STAT1, STAT2, IFIT2, IFIT3. Enrichment analysis revealed that HCMV-exposed term cells significantly downregulated gene sets related to both Hallmark interferon alpha and gamma responses compared to non-treated term cells.

Conclusion. These findings highlight the role of innate immunity in early- and late gestation during maternal HCMV and HIV infection. Such studies not only enhance understanding of placental immunity, but may promote future therapeutic interventions in the mother-infant dyad during maternal infection.

Hyperglycemia Severity and Patient-Reported Outcomes during Induction for Acute Lymphoblastic Lymphoma

Presenting Author: Liberty Strange, MD, MPH; Emory University

Poster Number: 16

Strange, Liberty; DeGroote, Nicholas P; Stevenson, Jason; Bernardo, Stephanie; Chukoian, Lois; Clegg, Ellen; King, Dejoix-Leigh; Harris, Ebonee; Lahey, Amy; Schlesinger, Jacqueline; Castellino, Sharon M; Cossen, Kristina; and Miller, Tamara P

Background: Children with acute lymphoblastic leukemia/lymphoma (ALL/LLy) may experience significant treatment-related adverse events (AEs). Hyperglycemia commonly develops during induction and can cause significant morbidity, including additional blood testing and medications. The impact of developing hyperglycemia on patient experience using patient-reported outcomes (PROs) has not been well described in this population.

Methods: A prospective study of patients with ALL/LLy aged 1-21 years began on 2/11/2022 and is ongoing at Children's Healthcare of Atlanta (CHOA). After consent, patients aged 5-17 years or their caregivers complete the nine-question (45-point scale) Patient-Reported Outcomes Measurement Information System (PROMIS) Global survey at diagnosis and weekly through the end of induction. Demographic and clinical data (family history of diabetes, targeted AEs presence and grade) are obtained via manual chart abstraction. Descriptive statistics were calculated for all study variables.

Results: Of the 70 patients who completed induction as of March 2024, 59% were male, 50% identified as White, 27% as Black, and 77% were Non-Hispanic/Latino. Median age at diagnosis was 5.2 years. Hyperglycemia was present in all participants: with 20% having grade 2+. All grade 3 hyperglycemia

required insulin administration. Patients with grade 2+ hyperglycemia were older (median 10.9 years vs. median 6.7 years, p=0.01) and more likely to have a family history of diabetes (57% vs. 20%, p=0.03). Among the 12 patients with grade 2+ hyperglycemia, 71% developed ≥1 targeted grade 3+ AEs: 29% had elevated aspartate and/or alanine aminotransferase, 7.1% with hyperbilirubinemia, 25% developed infection and/or sepsis, 21% with hyponatremia, and 50% with hypertension. 21 eligible patients/caregivers completed both baseline and day 22 PROMIS surveys. Patients with grade 2+ hyperglycemia had a decline in median PROMIS scores between baseline and day 22 indicating worse health-related quality of life compared to those with grade 1 who had improvement (-2 (IQR: -8,3) vs. 3 (IQR: -1,5)), though this difference was not statistically significant.

Conclusion: Development of clinically significant hyperglycemia during induction is common and associated with older age and family history of diabetes. PROs indicate poorer quality of life associated with hyperglycemia. This will be further explored upon completion of analysis.

Harnessing Bilayer Biomaterial Delivery of FTY720-Nanofibers to Enhance Oral Wound Healing

Presenting Author: Afra Toma, Master of Science in Biomedical Engineering; Emory University and Georgia Institute of Technology

Poster Number: 17

Toma, Afra I; Shah, Daniel; Roth, Daniela; Piña, Jeremie Oliver; Liu, Ken; Bartsch III, Perry; Jacobs, Leon; D'Souza, Rena; Liotta, Dennis; Botchwey, Edward; Willett, Nick; and Goudy, Steven

Background: Orofacial clefts are the most prevalent congenital defect and require palate surgery to allow proper feeding and maxillary growth. Repair of ONF is challenging as current gold standard method using human donor tissues also carries the risk of infection or allograft rejection. Due to adverse healing, 60% of these surgeries fail, leading to oronasal fistula (ONF). The ONF affects the ability to eat, talk, and thus, the overall quality of life. We repurposed an FDA-approved immunomodulatory drug, FTY720, to reduce the egress of lymphocytes and induce recruitment of pro-regenerative immune cells. Here, we engineered a bilayer biomaterial system using Tegaderm, a liquid-impermeable wound dressing, to secure and control the delivery of FTY720- nanofiber scaffolds (FTY720-NF).

Method: ONF injury of 1.5mm was modeled as a critically-sized defect in the hard palate mucosa of C57BL/6 mice. Blank and FTY720-NF were implanted at site of ONF injury, and mucosa was harvested at D1, 3, 5, and 7 post-ONF formation. Flow cytometry was used to investigate the contribution of FTY720 on pro-regenerative cell infiltration and biodistribution studies helped determine safety and efficacy levels. Multiplex assays were used to measure cytokine production in Raw 264 Macrophages and human tonsil-derived macrophages treated with bioactive FTY720.

Results: We optimized release kinetics of the bilayer FTY720-NF to sustain drug release for up to 7d with safe, efficacious transdermal absorption and tissue biodistribution. Through comprehensive immunophenotyping, our results illustrate a pseudotime pro-regenerative state transition in recruited hybrid immune cells to the wound site. Histological assessments established a significant difference in

full thickness ONF closure in mice on Day 7 following treatment with bilayer FTY720-NF. Multiplex assays showed robust activation of pro-regenerative cytokines following FTY720-treated murine and human cells.

Conclusion: Local delivery of FTY720 promotes complete oral wound closure through recruitment of anti-inflammatory immune cells. By identifying the recruitment of key immune regenerative cells, we can deliver FTY720 to modulate the oral healing cascade to accelerate tissue remodeling. These findings demonstrate the utility of immunomodulatory strategies for oral wound healing, better positing the field to develop more efficacious treatment options for pediatric patients.

Prediction Modeling in Clinical Medicine: A Real-World Application to Identify Neonates At Risk for Post-Discharge Mortality

Presenting Author: Adrianna Westbrook, MPH; Emory University

Poster Number: 18

WESTBROOK, ADRIANNA; Ideh, Readon; Kisenge, Rodrick; Kamara, Julia; Coleman, Ye-Jung; Samma, Abraham; Godfrey, Evance; Manji, Hussein; Sudfeld, Christopher; Niescierenko, Michelle; Morris, Claudia; Whitney, Cynthia; Breiman, Robert; Duggan, Christopher; M

Background: Predictive binary regression modeling harnesses the power of real-world data to make informed decisions for the future and can lead to the development of risk assessment tools (RAT) that assist clinicians in decision making. Our objective was to explore the various facets of prediction modeling such as variable selection and validation techniques. We then applied these techniques to derive and internally validate a RAT to identify neonates at risk for all-cause mortality within 60 days of discharge from the neonatal wards of two national referral hospitals in sub-Saharan Africa.

Methods: Using data from a prospective observational cohort study, bivariate analysis, stepwise regression, best subset, and regularization for variable selection were considered. Possible validation techniques included split-validation, cross-validation, and bootstrapping. We calculated adjusted log coefficients for each candidate variable and assigned weighted points to derive a RAT to identify neonates at risk for post-discharge mortality within 60 days of hospital discharge from referral hospitals in Dar es Salaam, Tanzania and Monrovia, Liberia.

Results: We considered 115 candidate variables in 2,310 neonates. Stepwise regression suffered from overfitting and although regularization techniques had acceptable performance (area under the ROC curve [AUC] 0.89), this method only reduced the RAT to 105 variables which is unfeasible in a clinical setting. Therefore, we limited candidate variables to those with a P-value <0.20 in bivariate analysis and applied the best subset method. We used bootstrap validation with 500 repetitions to internally validate our RAT which performs best with rare event samples and is considered a stronger internal validation technique than split-validation. Ten variables, including leaving against medical advice and meconium aspiration, contributed to the RAT for a total possible score of 63. The tool had good discriminatory value (optimism corrected AUC 0.77, 95% CI: 0.75-0.80) and excellent calibration.

Conclusions: Although best subset and bootstrap validation provided the best strategy for our data, other methods have proficiencies that may be optimal in other scenarios. Our RAT accurately predicted all-cause, 60-day post-discharge mortality among neonates discharged from neonatal wards of referral hospitals in Tanzania and Liberia.

Evaluation of the Impact of a Naturally Occurring Beta Hemoglobin Variant, Hb G-Makassar, on Mature Red Blood Cell Function and Pathology in a Sickle Cell Disease Mouse Model

Presenting Author: Jordan Zgodny, Bachelor of Arts; Emory University

Poster Number: 19

Kostamo, Zachary; Darazim, Jawa; Hernandez, Britney; Pendergast, Alex, M.; Zgodny, Jordan; Evans, Erica; Zhang, Yankai; Patel, Ashwin; Kanne, K. Celeste; Budak, Elizabeth; Jenkins, Rebecca; Haupt, Daniel; Winton, Valerie; Yan, Bo; Hartigan, Adam; Chu, Hai

Background: Gene therapy is a potential cure for children with sickle cell disease (SCD). The sickle hemoglobin (HbS) mutation cannot be converted to wild-type hemoglobin (HbA) by an adenine base editor; however, it can be converted to a naturally occurring hemoglobin variant, HbG-Makassar (HbG). HbG is a non-sickling hemoglobin variant and no HbGS individuals have been previously described. We propose to use mouse models of HbGG and HbGS to evaluate the function of their mature RBCs.

Methods: A humanized beta globin mouse with the HbG-Makassar allele was created by knock-in. HbGS genotypes were subsequently generated by crossing with HbSS Townes mice. We analyzed the red cell function of HbAA, HbAS, HbSS, HbGG, and HbGS mice.

Whole blood collected through terminal enucleation was used for complete blood counts, red cell deformability, and viscosity measurements. Flow cytometry was performed on bone marrow and whole blood to determine erythroid maturation and mitochondrial retention of RBCs. Analyses were performed with Dunn's Pairwise test with statistical significance at $p < 0.05$.

Results: HbGG RBC was comparable to HbAA for most rheological assays apart from significantly lower hemoglobin levels (Hb) and higher dense red blood cells (% DRBC). HbGS mice had significantly lower Hb and absolute reticulocyte count (ARC). HbSS and HbGS mice had comparable values for Hb and ARC. HbGS also had significantly higher values for WBC and % DRBC compared to HbAS mice. Hematocrit to viscosity ratio (HVR) shows comparable oxygen transport effectiveness of HbGG, HbGS, HbAS and HbSS RBC.

Conclusions: HbGG appears functionally similar to HbAA, with minimal sickling under hypoxia, no anemia, normal spleen size, and no organ damage in 24-week-old mice. HbGG RBCs are dehydrated. RBC function, Hb, WBC, ARC, and mitochondrial retention measures place HbGS as an intermediate in severity between HbAS and HbSS. However, organ pathology, spleen, and liver weights for HbGS were more comparable to HbAS than HbSS. Base editing strategies to install the HbG-Makassar variant can potentially lead to >90% of RBCs that have therapeutic benefit due to rheological properties comparable to HbAA and can be seen as a promising treatment strategy for children with SCD.

All-in-One, Wireless, Nanomembrane Wearable Device for Continuous Health Monitoring of Neonates in Ethiopia

Presenting Author: Lauren Zhou, B.S. Mechanical Engineering, M.S. Mechanical Engineering; Georgia Institute of Technology

Poster Number: 20

ZHOU, LAUREN; Nayak, Likhit; Woodall, Julia; Demissie, Asrat; Fekadu, Abebaw; Kebede Mamo, Yonas; Gleason, Rudolph; and YEO, WOON-HONG

Background: Ethiopia has an alarmingly high rate of neonatal mortality with 30 deaths per 1,000 live births in 2019. A significant portion of these deaths occurred within the first 7 days due to complications arising from preterm birth. Currently, the neonatal intensive care units (NICUs) in Ethiopia are not equipped with any continuous monitoring systems for physiological measurements. Heart rate and respiration rate are counted by hand and limited pulse oximeters are shared among all patients.

Objective: Develop a low-cost, wireless, nanomembrane wearable device that can monitor real-time heart rate (HR), respiration rate (RR), blood oxygen concentration (SpO2), and body temperature (T) in neonates. Data from the device will be transferred in to a cloud-based computation platform when internet connectivity is strong. The aim of this study is to evaluate the system's performance, usability, and acceptability in the NICU of Tikur Anbessa Specialized Hospital (TASH) in Addis Ababa, Ethiopia.

Methods: Physiological measurements from 50 neonates will be collected for 72 hours using our device and compared to the current standard used in the NICUs (HR/RR by hand and SpO2 by peripheral pulse oximetry). 10 patients have been enrolled thus far. In addition, we will also use survey forms filled out by attending nurses and parents to evaluate usability and acceptability, respectively. Nurses will compare the readings from the tablet to the current standard once per hour and log the values.

Results: The device system costs around $50 to produce, improving accessibility. Temperature and SpO2 values have high correlation, but changes to the app allowing more recordable significant figures will improve resolution and correlation. The calculated heart rate and respiration rate values had lower correlation, but it was due to improper placement of the device by the nurses and clearer instructions have been provided. In addition, time was not logged in the recorded values making comparative validation difficult, but it will be included in future testing.

Conclusion: The proposed flexible and wearable system successfully computes real-time health metrics. The low cost of the system improves accessibility, however future work to improve validation testing is needed.

Poster Competition Abstracts

Listed in Alphabetical Order by Presenting Author

Transdermal delivery of microneedles for combacting COVID-19

Presenting Author: Tanisha Manoj Arte, Bachelor's in pharmacy; Mercer university

Poster Number: 31

Arte, Tanisha; Shah, Sarthak; and D'souza, Martin

Background: Emerging SARS-CoV-2 strains threaten global health, and the effectiveness of current vaccines targeting the rapidly changing spike protein is a concern against these new strains. Consequently, vaccines inducing cross-reactive immunity are urgently needed. This “proof-of-concept” study aimed to evaluate the effect of microparticulate vaccine against SARS-CoV virus using microneedles. Study investigated nucleoprotein and spike protein as a model antigen for bivalent vaccine in the microparticulate form delivered using minimally invasive vaccine formulations like dissolving microneedles (MNs). Microneedles are minimally invasive transdermal route of administration which may effectively deliver vaccine across the skin. We hypothesized that a vaccine formulation with both spike and nucleoprotein could induce a cross-reactive immune response against various strains of SARS-CoV-2. Furthermore, administration through transdermal route has multiple advantages, such as i) specialized immune cells in the transdermal and mucosal layers, ii) neutralizing antibodies at the virus entry sites, and iii) compliant than painful intramuscular route.

Methods: Our vaccination strategy involves encapsulating the antigens in a polymeric matrix to form MPs, thereby enhancing immunogenicity while protecting the antigen. Microparticles formed are suspended in microneedle base and using PDMS mold microneedles were formed.

Result: In vitro testing revealed that MPs were safe and immunostimulatory. In vivo testing indicated that an adjuvanted-bivalent microparticulate vaccine could produce robust humoral (antibody), cellular (helper and cytotoxic T cells), and mucosal (secretory IgA) immune responses and cellular memory responses. Immune responses were specific to the bivalent vaccine antigens (spike and nucleoprotein) and SARS-CoV-2 (delta and omicron variants). Thus, our vaccination strategy produced a potent and cross-reactive immune response against the various strains of SARS-CoV-2.

Conclusion: Therefore, our vaccination strategy will pioneer in providing a broader immune response and pain-free vaccination alternatives against the emerging strains of SARS-CoV-2. This vaccine candidate is critical for the development of a universal vaccine against COVID-19.

Valerobetaine is a Microbe-Generated Metabolite that Impacts Epithelial Barrier Integrity in the Colon

Presenting Author: Lauren Askew, BS; Emory University

Poster Number: 21

Askew, Lauren; Gacasan, Anthony; Barbian, Stefi; Jones, Rheinallt

Background: The gut microbiome generates bioactive small molecules and metabolites that impact gut physiology. Recent investigations have focused on identifying the molecular mechanisms through which these gut microbiota-generated metabolites function. Utilizing germ-free mice and mass spectrometry-based metabolomics for analysis of small molecules, our research group demonstrated distinct differences in the metabolome of the liver between germ-free and conventional mice. The most discriminatory metabolite generated by the gut microbiome was δ-valerobetaine (VB). Our previous studies showed that VB suppresses mitochondrial fatty acid oxidation in hepatic cells by decreasing cellular carnitine levels. We showed that VB is a central integrator through which the microbiota influences energy metabolism in the liver. However, little is known about how VB may impact gut physiology. To this end, our initial studies have shown that VB induces mitochondrial biogenesis within ileal crypts. Hypothesis: Through its effect on mitochondrial bioenergetics, VB promotes gut epithelial barrier integrity and intestinal cell homeostasis. Methods: Conventional mice were treated intraperitoneally with 50mg/kg VB or vehicle control. Upon sacrifice, the colon was harvested and analyzed to assess if VB impacts the expression of genes that function in gut epithelial barrier integrity. Cultured human colonic cell monolayers were grown to confluency and scratched to simulate a wound. VB was administered to the media and wound closure rate followed. In addition, the expression of genes that function in gut epithelial integrity was measured in cultured colonic cells treated with VB. To assess barrier integrity, cells were grown on Transwell inserts, treated with VB, and the trans-epithelial electrical resistance (TEER) measured. Results: Germ-free mice treated with VB exhibited lower gene expression of Claudin 1, 2, and 3, but higher expression of Claudin 4. These changes in claudin expression were also corroborated in cultured colonic cells. VB treatment significantly increased wound closure rates, and increased barrier integrity in cultured cells at 48hrs following treatment. Conclusions: Our results show that the microbiome generated metabolite, VB, is a modulator of epithelial barrier integrity, thereby implicating VB as an integrator of host cell and microbe interactions in the gut epithelium.

Attrition Analysis Within a Longitudinal, Autism Spectrum Disorder Research Study

Presenting Author: Hannah Davies, MS, BS; Emory University

Poster Number: 38

DAVIES, HANNAH; Klaiman, Cheryl; Shultz, Sarah; and Pickard, Katherine

Background: Longitudinal research with high- and low-likelihood infants is important for understanding developmental trajectories of children later diagnosed with autism (Szatmari et al., 2016); however, this research is contingent on consistent participation, with accurate clinical characterization at later research visits. Ozonoff and colleagues (2023) found that clinical and demographic factors, such as latest diagnostic impressions and maternal education, impact participant retention rates. To assess possible attrition biases in our longitudinal research sample, we investigated differences in demographic and early clinical presentation between unenrolled and enrolled toddlers.

Methods: Participants with (n=109) and without (n=124) autism family history were enrolled in a developmental research study, spanning 8-9 research visits from 0-36 months old. Unenrolled toddlers (not-retained group, n=44) stopped participation after 12- or 18-month visits while the remaining sample (retained group, n=189) received 24-36-month comprehensive evaluations. Effects of 12- and 18-month Communication and Symbolic Behavior Scales: Developmental Profile (CSBS DP) sub-scores [Social, Speech, and Symbolic] on attrition were determined by independent samples t tests. Binary logistic regressions were used to analyze if family demographics (e.g., race, income, etc.) and early diagnostic impressions predicted study attrition.

Results: Within the 18.9% of not-retained families, there were more families identifying as African American or multi-racial (42% vs. 17%) and receiving government assistance (39% vs. 22%) than retained families, respectively. Study attrition for participants with autism family history was significantly predicted by child race (b=1.70, p=.004) and government assistance (e.g., Medicaid, SSI, WIC, and food stamps) (b=1.15, p=.037), but no attrition predictors were observed for toddlers without autism family history. Symbolic behavior was significantly more delayed for the not-retained group than the retained group at the 12-month visit (p=.043). Other CSBS DP sub-scores collected at 12- and 18-month visits were comparable between groups (ps>.05).

Conclusions: Not-retained toddlers showed similar or more apparent delays to retained toddlers at 12 months, suggesting that later evaluations would have benefited not-retained families. Attending to financial barriers and offering additional support to minoritized and underinvested populations could help improve participant retention to maximize benefits for research families. Future directions include analyzing qualitative data to understand families' specific reasons for study withdrawal.

Geospatial analysis of social determinants of health identifies disparities between asthma patients requiring single versus multiple admissions to a pediatric intensive care unit

Presenting Author: Kaley Desher, MD; Emory University

Poster Number: 23

Desher, Kaley; Grunwell, Jocelyn; and Fitzpatrick, Anne

Background: Social determinants of health (SDOH) are associated with childhood asthma prevalence, healthcare use, and more severe asthma exacerbation outcomes. At Children's Healthcare of Atlanta, approximately one third of children admitted to the pediatric intensive care unit (PICU) have another exacerbation within one year of discharge. The associations between SDOH and multiple pediatric intensive care unit (PICU) admissions have not been examined.

Methods: The Environmental Justice Index (EJI), a composite measure of SDOH, was evaluated in a large regional cohort of 1,364 children aged 6-17.9 years receiving critical care for status asthmaticus from January 2015 to April 2020. Each patient was categorized as having a single PICU admission or multiple PICU admissions during the study period. Residential addresses were geocoded and spatially joined to

census tracts. Composite measures of social vulnerability and environmental burden for each census tract were compared between patients requiring single versus multiple PICU admissions.

Results: A total of 1,187 children had a single PICU admission and 177 children had multiple PICU admissions during the study period. The census tracts of children with multiple PICU admissions were associated with greater racial and ethnic minority status, more indicators of socioeconomic disadvantage, more ozone and particulate matter exposure, greater highway proximity, and more heliox and isoflurane use. Patients with four or more total PICU admissions also had the most air pollution exposure and the greatest use of heliox and isoflurane. There was a small yet significant correlation between the number of PICU admissions and the overall EJI percentile ranking as well as the percentile rankings for the individual domains within the index that involve racial and ethnic minority status, socioeconomic status, and air pollution.

Conclusions: SDOH identified by geospatial analyses are associated with multiple PICU admissions for status asthmaticus and are positively correlated to the number of admissions. Outpatient strategies that address SDOH are needed to care for children with asthma and ideally prevent PICU admissions.

Association of Patient and Caregiver Distress with Referral to a Palliative Care Clinic in Pediatric Oncology

Presenting Author: Jonathan Ebelhar, MD; Emory University

Poster Number: 28

EBELHAR, JONATHAN; Brock, Katharine; Gilleland-Marchak, Jordan; Kavalieratos, Dio; He, Zhulin; Lewis, Rebecca Williamson; and Yeager, Katherine

Background: Children with cancer experience significant distress, impacting patients and caregivers. Pediatric palliative care (PPC), when integrated early, reduces distressing symptoms and improves quality of life. Utilizing screening tools to identify patients and caregivers experiencing distress could lead to earlier PPC. It is unknown if patient and caregiver distress is associated with referral to subspecialty PPC.

Objective: Assess whether overall distress and distress domains are associated with referral to PPC.

Methods: A single-institution retrospective case-control study was conducted comparing children with cancer referred to PPC from 2019-2021 to a matched sample of patients not referred. Matching occurred in a 1:2 ratio using propensity scores based on diagnosis, disease stage, relapse status, race, and sex. Distress scores were measured separately for patients and caregivers by the Pediatric DT and averaged over time. Distress was categorized as low (0-4), moderate (5-7), or high (8-10); emotional, practical, family/social, and spiritual distress concerns were collected. Demographic and disease data were collected. Conditional logistic regression was utilized to assess the association between PPC referral and: (1) high DT scores and (2) DT domains. Van Elteren test was used to compare DT scores and DT domains between the cohorts.

Results: Sample included 135 PPC-referred patients matched to 257 non-referred patients. Average DT scores did not differ for patients (1.36 vs. 1.44; p=0.29) or caregivers (2.52 vs. 2.48; p=0.30). Patients with high distress had higher odds of PPC referral (OR 1.89, 95% CI 1.05-3.39). Caregivers reporting family/social concerns had lower odds of PPC referral (OR 0.56, 95% CI 0.33-0.97). There was no association between PPC referral and DT domains for patients. Emotional concerns were most common with 47.8% and 34.4% of patients feeling anxious and annoyed, respectively.

Conclusion: While pediatric cancer causes distress in patients and families, average DT scores were low regardless of PPC referral. Patients with high distress had higher odds of PPC referral and caregivers reporting family/social concerns had lower odds of PPC referral. High patient DT scores could be used as a criterion for PPC referral. Further research is needed to understand the impact PPC has on patient and caregiver distress scores.

RadChip: A Laminin-Lined Red Blood Cell (RBC) Adhesion Device for Functional Characterization and Clinical Evaluation of Sickle RBCs at Steady-State

Presenting Author: Erica Evans, B.S.; Emory University

Poster Number: 29

Erica Evans, Evelyn Williams, Ashwin Patel, Kirby Fibben, Celeste Kanne, Meredith Fay, Lindsey Abel, Wilbur Lam, Vivien Sheehan

Background: Sickle cell disease (SCD) is caused by a point mutation, producing an abnormal hemoglobin (Hb), resulting in a rigid, sticky red cell. Recently, several new disease modifying drugs have been FDA approved, targeting specific aspects of SCD pathophysiology, including adhesion. There is a need for innovative tools to evaluate RBC adhesion. We propose to model RBC to endothelial adhesion using microfluidics lined with laminin, a physiologically relevant RBC ligand found on the endothelium.

Methods: RBCs were washed and resuspended in PBS to 0.5% hematocrit. A 5ug/ml solution of recombinant laminin was applied to each channel, fabricated with polydimethylsiloxane (PDMS). Adhesion was visualized by inverted bright-field microscopy at 20x (Keyence, Itasca, IL). Adhered cells were counted using the iCLOTS automated cell quantification software.

Results: RAdChip adhesion index was determined for common SCD genotypes: HbSS/SB0: (median ($\tilde{x}$) =756; range (r): 154-1889; n=26) HbSC/SB+: ($\tilde{x}$ =299; r=: 114-731; n=11) HbAA: ($\tilde{x}$) = 13; r= 5-90; n=7). RBC adhesion values were independent of age (p=0.65) and gender (p=0.63).

An increase of 0.1 unit in EImin and EImax decreases RBC adhesion by 214 and 268 cells/mm2, respectively. A 1mm Hg increase in PoS increased adhesion by 19.5 cells/ mm2. sRBC adhesion had a significant positive association with vaso-occlusive events (VOE) (p=0.005), absolute neutrophil count (ANC) (p=0.005), and EIMax (p<0.001). RAdChip produced a mean CV of 0.13 ± 0.94.

Conclusion: RAdChip adds a key component of functional RBC evaluation, adhesion, that conventional labs do not measure. We have demonstrated clinical validity of our device by establishing correlations

with known markers of severity and pain event frequency. RBC adhesion values increase as the number of VOE events increase. RAdChip will be further developed to become a CLIA certified tool for use in SCD care in collaboration with the ADJUST program.

Refining the Dose for a Novel Whole-Cell Inactivated Gonococcal Microparticulate Vaccine

Presenting Author: Amarae Ferguson, B.S. in Biochemistry and Molecular Cell Biology; Mercer University

Poster Number: 22

Ferguson, Amarae; Bagwe, Priyal; Zughaier, Susu; D'Souza, Martin J.

Neisseria gonorrhoeae is the bacteria known for causing Gonorrhea, an STD with an annual infection rate of 106 million worldwide. Over the years, Gonorrhea has rapidly developed antibiotic resistance to many drugs that were used to treat it. Along with Neisseria gonorrhoeae's ability to evade adaptive immunity, it has been increasingly more difficult to treat. Currently, there is no vaccine available for Gonorrhea. Few attempts have been made to create a gonorrhea vaccine, but they have all failed. However, we solved this problem by attacking gonorrhea's greatest strength, its adaptive immune system-suppressing abilities. We have developed a novel whole-cell formalin inactivated gonococcal microparticulate adjuvanted vaccine delivered using pain-free microneedles which could prevent gonorrheal infection. In this study, we wanted to find the optimal dose of our vaccine.

Using four groups of mice, we administered the vaccine using 3 doses (50ug, 100ug, and 200ug), each combined with 50 ug of adjuvants Alum and AddaVax™, while one group remained untreated as a control. Over 8 weeks, we collected biweekly blood samples and harvested the spleen and lymph nodes of the mice to assess humoral and cellular responses respectively. The humoral responses were measured by indirect ELISA for IgG, IgA, IgG1, and IgG2a levels. Then flow cytometry was employed to quantify the cellular response from CD4+ and CD8+ expression.

Our findings revealed that all vaccine doses elicited humoral and cellular responses, but the 200ug dose demonstrated the strongest humoral response and most robust cellular responses when compared to other groups. Additionally, all vaccine groups exhibited bactericidal activity and could clear the infection, but the 200ug dose demonstrated the highest bactericidal activity and fastest clearance.

Overall, the data proves the superiority of the 200ug dose in eliciting a robust cellular and humoral immune response, as well as providing the best bactericidal activity and rapid clearance of the infection. Also, our vaccine was effective in producing an immune response even at lower doses. These findings hold great promise for the development of an effective vaccine against gonorrhea.

Biomechanical Differences in Crawling between Typically Developing Infants and Infants with Limb Loss

Presenting Author: Mark Geil, PhD; Kennesaw State University

Poster Number: 32

GEIL, MARK; Cannoy, Jill; Coulter, Colleen; Williams, Joyc'lynne; Beard, Taylor; and Le, Lisa

BACKGROUND: In 2022, the Centers for Disease Control and Prevention published updates to their checklists for the milestones children should achieve during typical development, and removed crawling entirely, citing a lack of normative data, inconsistent definitions, and variability timing of crawling onset (1,2). This project collected normative kinematic and spatiotemporal data on typically developing (TD) crawling infants and crawlers with limb loss (LL).

METHODS: Eleven TD infants were assessed every two weeks between onset of crawling and transition to walking. Six LL infants were assessed once without the use of a prosthesis. Infants crawled on a pressure-sensing mat that was used to calculate crawling speed, cadence, percent limb support, anterior-posterior pressure ratio, and bilateral pressure ratio.

RESULTS: As TD children grew, crawling became faster, with some reducing speed as they began to walk. Crawling width became narrower, and the percent of each cycle with all four limbs on the ground was significantly reduced. Children in the LL cohort were older than in the TD cohort. They crawled slower, showed significantly narrower stride width, and bore more weight on arms.

CONCLUSIONS: Study outcomes showed demonstrable changes during neuromotor development. Several measures, including speed, width, and percent quadruple limb support, were sensitive to differences in a typical and atypical population. These data fill the gap cited by the CDC and may be useful reestablishing crawling as a development milestone. In addition, understanding of the biomechanics of typical crawling development could enable early detection of some atypical development patterns such as those found in cerebral palsy, which is often not detected until children have progressed to walking.

REFERENCES

[1] Zubler, J.M. et al. Pediatrics. 149(3), 1-29, 2022.

[2] Kretch, K.S. et al. Ped Phys Therap. 34(4), 440-448, 2022.

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Reliability of Caregiver Derived Anthropometric Measurements for Infant Growth Monitoring Studies

Presenting Author: Matthew Heidman, Master of Science - Biology; SPRIM PRO (CRO)

Poster Number: 27

Ly, Jenny; Sosa, Ana; Heidman, Matthew; Dallabrida, Susan M.

Background: Historically, to capture infant formula growth monitoring study (GMS) endpoints (weight, length, head circumference (HC)), caregivers have been required to visit study sites with their infant. To address the burden of site visits, a decentralized clinical trial (DCT) approach for GMS would enable

caregivers to capture endpoints in real time via teleconference with study staff. Given the inherent concern with non-clinical personnel conducting measurements, this study aims to demonstrate reliability between measurements taken among clinically trained personnel and telehealth guided infant caregivers as a direct indicator of data quality.

Methods: Four silicone, non-vinyl dolls with anthropometrics representative of infants were measured. In a crossover design, each doll was issued to three arms of study participants to complete anthropometric measurements (weight (kg), length (cm) and HC (cm)): 1) individuals with no healthcare training (Caregivers; n=7) who were guided via telehealth call with study staff; 2) board certified pediatric health care professionals (HCPs; n=7); and 3) study staff board certified pediatric registered nurses to provide measurement gold scores (n=3). Inter- and intra-observer technical error of measurement (TEM), average bias relative to the gold standard, and coefficient of reliability were calculated.

Results: Inter and intra-observed TEM estimates for caregivers were below the maximum allowed error based on the gold standard (2xTEM Gold Standard) with 95% precision margin, for all measurements. For HCPs, only the intra-observer TEM for length measurement and inter-observer TEM for HC and length measurements were within twice the gold standard TEM. There was no evidence of bias for either the caregivers' or HCPs' measurements compared with the gold standard. Coefficients of reliability were greater than 0.96 for all three measurements.

Conclusion: This study demonstrates telehealth led caregivers can capture accurate and reliable anthropometric measurements, supporting the confidence in and utilization of a DCT approach for infant formula GMS.

Antibody Responses to mRNA COVID-19 Vaccination in Maternal Serum and Breast Milk

Presenting Author: Hui-Mien Hsiao, Master Science of Microbiology; Emory University

Poster Number: 33

Hsiao HM, DiMaggio LS, Perez MA, Chen X, Stephens K, Gibson T, Rostad CA

Background: Developing COVID-19 vaccines has been very critical during the COVID-19 pandemic. Understanding the antibody responses in breast milk following maternal COVID-19 vaccination is important for young infants, as COVID-19 vaccines are only available to infants ≥6 months of age. To study the maternal antibody responses, we therefore collected the sera and breast milk from lactating mothers who received an mRNA COVID-19 vaccine to study the immune responses.

Methods: We conducted a single-center prospective cohort study of lactating mothers who received an mRNA COVID-19 vaccine and collected longitudinal breast milk and sera. To determine the durability and breadth of maternal antibody responses, Meso Scale Discovery (MSD) V-PLEX assays were used to measure the spike IgG and IgA binding antibodies to ancestral and variants (Alpha, Beta, Delta, Gamma) SARS-CoV-2 in breast milk and sera, and pseudovirus neutralization assays were performed.

Results: Specimens from eleven lactating mothers receiving either Pfizer BNT162b2 (7/11) or Moderna mRNA-1273 (4/11) vaccine were collected. The IgG and IgA titers increased in serum (Geometric mean fold-rise (GMFR) above baseline 205-foldin IgG, $p < 0.0001$ and 143-fold in IgA, $p < 0.0001$) and breast milk following each dose, peaking 1-4 weeks after series completion (GMFR=1865-fold in IgG, $p < 0.0001$ and 10-fold in IgA, $p < 0.0001$). In addition, their titers remained elevated through 7-9 months, except the IgA of breast milk decreased to baseline within 1-3 weeks after series completion. Furthermore, MSD results showed antibodies against SARS-CoV-2 variant strains were elevated in breast milk collected 1-3 weeks after series completion. From pseudovirus neutralization assays, there was a strong neutralizing response against ancestral SARS-CoV-2 in serum (GMFR=89-fold, $p < 0.01$) and more modest response in breast milk (GMFR=2-fold, $p < 0.05$). However, neutralizing antibodies against the Omicron variant (BA.4/5) in both specimen types were significantly reduced compared to the ancestral strain.

Conclusion: This study indicated that maternal mRNA COVID-19 vaccination induced IgG and IgA binding and neutralizing antibodies to SARS-CoV-2 ancestral and variant strains in breast milk and sera, although titers to the Omicron variant were reduced. Variant-specific boosters may be required to enhance neutralizing capacity and immune protection for infants.

Works Cited:

Hsiao HM, DiMaggio LS, Perez MA, Chen X, Stephens K, Gibson T, Anderson EJ, Rostad CA SARS-CoV-2 Antibody Profiles in Maternal Serum and Breast Milk Following mRNA COVID-19 Vaccination: A Longitudinal Prospective Observational Cohort Study. Vaccines (Basel). 2023 Oct 26;11(11):1643. doi: 10.3390/vaccines11111643. PMID: 38005975

Batch Correction of Single Cell Transcriptomic Data from Two Pediatric Cohorts of Treatment-Naive or Established Crohn's Disease Subjects

Presenting Author: Yeonjoo Hwang, MS; Emory University

Poster Number: 30

Hwang, Yeonjoo; Maddipatla, Sushma C; Murthy, Shanta; Washburn, Savannah; Koti, Tarun; Dodd, Anne; Kolachala, Vasantha; Matthews, Jason D; Cutler, David J; Gibson, Greg; Qiu, Peng; and Kugathasan, Subra

Background: As single cell transcriptomic datasets have multiplied over the years, integrative analysis of multiple datasets has introduced high-powered opportunities to parse disease mechanisms at the cellular resolution. However, integration of datasets from multiple studies presents challenges, including technical artifacts resulting from differences in sample types, processing protocols, and sequencing machines used. We have compared batch correction methods on single cell data generated from two separate pediatric cohorts to study differences in treatment-naive and established Crohn's disease (CD), a progressive, inflammatory manifestation of the gastrointestinal tract that has no cure.

Methods: Endoscopic ileal biopsies were collected from two cohorts of 38 total consented pediatric subjects (Cohort 1: 5 non-CD control, 6 treatment-naïve CD, 11 established CD; Cohort 2: 16 treatment-

naïve CD) at Children's Healthcare of Atlanta. Biopsies were processed with the 10x Genomics single cell workflow, using 5' chemistry for Cohort 1 and 3' for Cohort 2. Samples were sequenced by Illumina and reads processed with CellRanger. Data were either merged or batch corrected with rPCA or Harmony (v1.2.0) and analyzed using Seurat (v5.0.1). After assessing removal of batch effects, downstream analysis was performed to compare treatment-naïve and established samples.

Results: After merging, rPCA, and Harmony, 151,552 cells were clustered into 33, 29, and 25 cellular subtypes, respectively. In the merged analysis, UMAPs showed clusters separated by patients and by chemistry. After rPCA, clusters did not exhibit major patient- and chemistry-driven batch effects, but a cluster of 12,167 cells did not significantly express published cell-type markers. After Harmony, UMAPs showed removal of chemistry and patient effects, and all clusters expressed markers, enabling manual annotation. Following up on the Harmony batch-corrected data, correlation analysis revealed that plasma cells exhibit differences in transcriptional profiles between the treatment-naïve and established samples. A gene program specific to the established CD samples was enriched for toll-like receptor signaling.

Conclusions: Comparison of batch correction methods showed that the Harmony R package could remove patient- and chemistry-driven batch effects while enabling identification of cell-type markers in each cluster. Downstream analysis identified biologically relevant transcriptional differences in plasma cells between treatment-naïve and established CD across two pediatric cohorts.

Epitranscriptional Regulation of Endothelial-to-Mesenchymal Transition in CF Lung Disease

Presenting Author: Bum-Yong Kang, PhD; Emory University

Poster Number: 40

Kang, Bum-Yong, Ozuna, Hazel; Shrestha, Mahesh; Moran, John; and Kopp, Benjamin

Cystic fibrosis (CF) is multi-factorial disease and a leading cause of pulmonary vascular impairments due to hypoxia and progressive lung damage, especially in an aging population. Evolving evidence suggests that an endothelial-to-mesenchymal transition (EndoMT) response to hypoxia contributes to endothelial dysfunction, inflammation, and vascular remodeling. However, the molecular mechanisms underlying lung damage due to CFTR impairment have not been fully elucidated. Emerging studies indicate that m6A epitranscriptomic modification regulates RNA processing and metabolism, leading to downstream biological effects. However, the functional implications of m6A epitranscriptomic modification on CFTR have not been described. Further evidence demonstrates that alterations in non-coding RNAs, such as microRNAs (miRNAs) play important roles in pulmonary disease and regulate m6A regulatory factors. Recent findings indicate that loss of CFTR function reduces PPARg, a ligand-activated transcription factor, and stimulating PPARg with thiazolidinedione ligands attenuates altered gene expression and reduces disease severity in a CF mouse model. Therefore, we hypothesize that defective CFTR alters PPARγ-miRNA-METTL3 axis by further feedback inhibition of CFTR, thereby perturbing the PPARγ-miRNA axis, which causes EndoMT. To define EndoMT markers during hypoxia, HPAECs were exposed to room air (normoxia, NOR, 21% O2) or hypoxia (HYP, 1% O2) for 72 hours. We found levels of mesenchymal

markers (SLUG and TWIST1) were substantially increased whereas endothelial markers (PECAM1 and VE-Cadherin) were significantly decreased, indicating that hypoxia plays a critical role in HPAECs and vascular remodeling. To define the functional significance of PPARg in i-EndoMT, HPAECs were treated for 6 h with Adenovirus-mediated PPARg (AdPPARg) (25, 50 MOI) for PPARg overexpression or green fluorescent protein (GFP) constructs (25 MOI) then incubated for an additional 72 hours in normoxia or hypoxia. PPARg overexpression mitigated expression of EndoMT markers in hypoxic cells and enhanced expression of EC markers. To further investigate the role of inflammation on EndoMT remodeling, we refined an in vitro model to induce EndoMT (termed induced-EndoMT, i-EndoMT) in HPAECs. HPAECs were treated with inflammatory mediators (IL-1β, TNFα, and TGFβ) in time-/dose-ranging regimens. We found that these inflammatory mediators, which are increased in CF, caused HPAECs to lose cobblestone morphology and became more elongated and spindle-shaped, indicative of EndoMT. Under these conditions, the expression of PPARg and EC markers was decreased, but EndoMT markers were increased. In collagen gel contraction assays, i-EndoMT enhanced gel contraction to a fraction of the control gel contour consistent with mesenchymal rather than endothelial functional characteristics. Further, cells under i-EndoMT had increased expression of mesenchymal markers with decreased EC makers, compared to control. In silico analysis revealed that several miRNAs can target the 3'UTR of mesenchymal markers such as SLUG and TWIST1. Among these, miR-200 was significantly decreased in hypoxia-exposed HPAECs. We revisited our previous study using blood transcriptomic analyses of pwCF and non-CF (n=20 each) and showed that m6A modification factors (writers, erasers, and readers) are differentially expressed between groups. Interestingly, levels of METTL3 (writer) were downregulated in pwCF, whereas levels of YTHDF3 (reader) were upregulated. We also found that miR-21 expression, which putatively binds to 3'UTR of METTL3, is upregulated in pwCF, suggesting that miR-21 regulates METTL3 in feedback inhibition of CFTR. In conclusion, this study allows a new approach to understand CFTR's influence on the airway milieu and the impact of EndoMT in lung disease through separate but related druggable mechanisms.

"Shock and Kill" Cure Strategy: a Combination of AAV9-Delivered Broadly Neutralizing Protein and a Latency Reversal Agent in SIV-Infected Infant Rhesus Macaques

Presenting Author: Alexis King, B.S. Biological Laboratory Science; Emory University School of Medicine

Poster Number: 34

KING, ALEXIS C.; Fonseca, Jairo A.; Farinre, Omotayo; Liang, Shan; Da Costa, Lucas A.B.; O'Hagan, Daniel; Enhert, Stephanie; Wood, Jennifer; Gardner Matthew; Van Rompay, Koen K.A.; Cottrell, Mackenzie; Martins, Mauricio A.; and Chahroudi, Ann.

Background: Latency reversal and clearance represents an HIV cure strategy aimed at reactivating and subsequently eliminating latently infected CD4+ T cells. eCD4-Ig is a fusion protein composed of the ectodomain of CD4, an IgG Fc portion, and the tyrosine-sulfated regions of CCR5 at its carboxy terminus. eCD4-Ig can enhance antibody-mediated cellular cytotoxicity (ADCC), rendering it a promising clearance agent. To improve the recognition of SIV-infected CD4 T-cells by eCD4-IgG, our strategy incorporated the

use of AZD5582, a non-canonical NFκβ stimulator and a latency reversal agent previously studied in adult rhesus macaques.

Methods: 72 infant rhesus macaques underwent screening for neutralizing antibodies against AAV9. Twenty were selected, with 17 exhibiting < 25% and 3 ≤ 35% AAV9 neutralization. These twenty macaques were orally infected with SIVmac251 at 4 weeks of age and ART was initiated 21 days post-infection. Simultaneously, half of the macaques received an intramuscular injection of AAV9-eCD4-IgG1. An IgG1 version of eCD4-Ig was chosen for its enhanced antibody effector functions. Previous studies indicated that the latency reversal effect of AZD5582 was less pronounced in infants compared to adults due to drug metabolism differences. Pharmacokinetic modeling was conducted to determine the appropriate infant dose before administering AZD5582 to the infant macaques 41 weeks post-infection.

Results: All animals exhibited peak SIV RNA levels in plasma of ≥10^7, with ART initiation resulting in at least a 3-log reduction of viral loads within the first two weeks of therapy. eCD4-IgG1 expression exceeding 10 µg/ml was observed in all treated macaques, with sustained protein expression for at least 10 weeks. Pharmacokinetic modeling revealed that higher doses and longer infusion durations are required to replicate the adult pharmacokinetics of AZD5582.

Conclusions: AAV-9 demonstrates promise as a delivery platform for HIV-neutralizing molecules, including bNAbs, due to its long-lasting transgene expression. Higher doses and longer infusion durations are necessary to replicate the adult pharmacokinetics of AZD5582 in infant macaques. Currently, the ability of a higher AZD5582 dose to induce SIV antigen expression is under evaluation. We hypothesize that this novel cure strategy will lead to the clearance of reactivated latently infected cells via eCD4-IgG1-mediated ADCC.

Bioengineering a Novel Recombinant Humanized L-asparaginase with Superior Enzymatic Properties Using Ancestral Sequence Reconstruction.

Presenting Author: Kristopher Knight, Bachelor of Science, B.S.; Emory University

Poster Number: 35

KNIGHT, KRISTOPHER; Brown, Harrison; White, Kinnede; Spencer, H. Trent; Doering, Christopher; and Raikar, Sunil

Background: L-asparaginase (L-ASNase) is an indispensable biotherapeutic enzyme used in the treatment of pediatric acute lymphoblastic leukemia (ALL). Discontinuation of L-ASNase treatment due to immunological or adverse reactions results in significantly inferior disease-free survival. Current clinical L-ASNases are bacterial in origin and thus highly immunogenic. Additionally, concurrent glutaminase activity seen in bacterial asparaginases exacerbates liver and pancreatic toxicity. Therefore, the development of a less immunogenic L-ASNase with favorable biochemical features remains paramount. Human L-ASNase has evolved to have inferior catalytic properties restricting its candidacy as a therapeutic enzyme. Characterization of guinea pig (GP) L-ASNase demonstrates significant anti-tumor properties, improved enzyme kinetics and no glutaminase co-activity, despite a 69.8% amino acid

sequence identity with human L-ASNase, as compared to 30% for bacterial L-ASNases. GP L-ASNase is therefore an ideal ortholog to serve as a template for optimization to create a more humanized less toxic L-ASNase variant. Ancestral Sequence Reconstruction (ASR) is an innovative protein drug discovery and optimization platform that can be leveraged to improve the pharmaceutical properties of L-ASNase.

Methods: ASR was performed utilizing 54 extant L- ASNase sequences, aligned using MUSCLE and an evolutionary tree inferred using MrBayes. 53 ancestral L-ASNase sequences were identified and ten ancestral variants spanning the ancient primate and GP lineage resurrected. Codon optimized cDNA sequences were subcloned into an expression vector and transformed into E. coli BL21 (DE3) cells for protein expression. An-ASNase candidates were isolated through Ni2+ and Co2+ affinity chromatography and activity assessed using a modified Nessler's reagent assay.

Results: At an enzyme concentration of 0.1 mg/mL and an asparagine substrate concentration of 1 µM, An-88, An-104, and An-107 exhibited outstanding L-ASNase activity, comparable to clinically relevant E. coli and Erwinia L-ASNases. An-88 has 81% similarity, while both An-104 and An-107 ASNases shared an 88% identity with human L-ASNase. Assessments of An-104 and An-107 on T-ALL cell lines, CCRF-CEM and MOLT-4, demonstrated comparable IC50 to existing bacterial L-ASNases.

Conclusion: We have shown that ASR is a viable platform to bioengineer a less toxic humanized L-ASNase drug candidate. Lead candidate toxicity profile will be defined, and chemotherapeutic potential will be measured against ALL.

ALTERED INFLAMMATORY MUCOSAL SIGNATURES WITHIN THEIR SPATIAL AND CELLULAR CONTEXT DURING ACTIVE, ILEAL CROHN'S DISEASE.

Presenting Author: Vasantha Kolachala, PhD; Emory University

Poster Number: 36

KOLACHALA, VASANTHA L; Maddipatla, Sushma Chowdary; Murthy, Shanta; Hwang, Yeonjoo; Dodd, Anne F; Koti Tarun; Yin, Hong; Lopez, Chrissy A; Cutler, David J ; Qiu, Peng; Matthews, Jason and Kugathasan, Subra.

Background: Crohn's disease (CD) is an inflammatory disease of the gastrointestinal tract with variable clinical course. The complex architecture of the intestinal mucosa requires spatial resolution of single cells to better understand the heterogeneous nature of CD, especially during active disease. We examine the impact of inflammation on changes in cellular crosstalk in the intestinal mucosa using single cell and spatial transcriptomics.

Methods: Terminal ileal biopsies were processed for single cell transcriptomics (scRNA-seq) and resected surgical ileal tissue from CD patients were processed for spatial transcriptomics (ST) on 10x Genomics Visium slides. Single-cell data were anchored onto spatial tissue to understand spatial context and cell-cell communication. Cellular milieu per spatial spot was determined by Conditional AutoRegressive-based Deconvolution (CARD), receptor-ligand interactions were analyzed by CellChat, and pathway

analysis was performed using the KEGG database. We further assessed RNA and protein expression in patient-derived organoids and tissue sections.

Results: We provide evidence that cell proportions and cell-cell communications are altered in inflamed tissue compared to non-inflamed CD. Combinatorial analysis of scRNA-seq and ST data allowed us to explore communication among epithelial, stromal, and immune compartments. Our data suggest alterations in BMP, ncWNT, NOTCH, CD74-MIF signaling pathway alterations in cellular repair. In CD, the mucosal microenvironment comprises of CD74:MIF interactions which were confirmed by an increase in CD74 during active inflammation. Differential gene expression analysis identified increased MHCII activity in inflamed mucosa, and CD74-MIF-MHCII expressing spots revealed enriched antigen presentation, stress response, and fibrotic pathways. Sites with more active inflammation in the mucosa had increased proportions of early enterocytes, Paneth cells, macrophages, B-cells, and T-cells. Regions of inactive ileal disease were characterized by a greater fraction of differentiated enterocytes. These findings suggest that changes in CD74 expression within the epithelium during CD regulate its interactions with other molecules.

Conclusion: Our multimodal approach captures the impact of active CD on the cellular networks within the intestinal mucosa and offers new insight into complex molecular interplay, patient heterogeneity, and inflammatory signatures associated with CD, revealing potential drug targets.

Deletion of Biliary Atresia Candidate Gene Pkd1l1 Leads to Enhanced Pro-inflammatory Cytokine Expression in Murine Cholangiocytes In Vitro

Presenting Author: David Lee, Doctor of Medicine; Emory University/Children's Healthcare of Atlanta

Poster Number: 24

LEE, DAVID; Klindt, Caroline; Hellen, Dominick; Bennett, Ashley; Dawson, Paul; and Karpen, Saul

Background: A multicenter effort featuring genomic sequencing of patients with biliary atresia splenic malformation syndrome found several patients with genetic variants of the ciliary gene PKD1L1(polycystic kidney disease 1 like 1), currently the first validated candidate BA gene. We developed a mouse model with liver-specific deletion (LKO) of Pkd1l1. Histological analyses of LKO mouse livers revealed delayed biliary maturation and increased peribiliary fibroinflammation. RT-PCR of isolated bile duct RNA showed increased expression of genes that comprise a reactive ductular phenotype, such as Cxcl1 and Tnfa. Whether or not Pkd1l1 deficient cholangiocytes are inherently pro-inflammatory as a basis for inducing the BA phenotype is unknown. We hypothesized that Pkd1l1-deficient cholangiocytes in isolation would reveal a reactive ductular phenotype, characterized by pro-inflammatory secretory protein expression.

Methods: LKO and CTL cholangiocytes were isolated using cell sorting based on established cell markers, then cultured on Transwell inserts. Cholangiocytes were subsequently exposed to vehicle, chenodeoxycholic acid (CDCA), lipopolysaccharides (LPS), or both to induce a reactive biliary phenotype.

Secreted cytokines and chemokines were quantified by multiplex immunoassays. RNA was isolated and analyzed by qRTPCR and RNA-Seq.

Results: RNA expression of multiple cytokines and chemokines including CCL2, CXCL15, CCL17, CXCL10, was increased up to 7-fold in LKO compared to CTL cholangiocytes. LKO cholangiocytes treated with LPS showed enhanced RNA expression for chemokines such as CCL2 (6-fold increase), CXCL2 (12-fold increase), and CXCL5 (134-fold increase). Multiplex data showed similar increases in CCL2 expression, along with multiple chemokines, in response to LPS treatments in LKO cholangiocytes.

Conclusion: These studies indicate that compared to CTL cholangiocytes, LKO cholangiocytes inherently demonstrate increased expression of multiple pro-inflammatory cytokines and chemokines, both basally and in response to LPS. These findings in isolated Pkd1l1-deficient cholangiocytes support altered reactivity of Pkd1l1-deficient cholangiocytes leading to increased peribiliary fibroinflammation in the livers of Pkd1l1-deficient mice. These studies also support a recent shift in thinking of the causes of BA—as an inherent genetic cholangiopathy leading to reactive cholangiocytes that recruit reactive proinflammatory and fibrotic cells. Future studies exploring the interaction of these reactive cells with liver inflammatory cells will further identify the cellular mechanisms underlying pathogenesis of BA.

Avascular Necrosis Following Hematopoietic Cell Transplantation in Pediatric Patients with Sickle Cell Disease

Presenting Author: Robert Lisac, MD; Emory University

Poster Number: 25

LISAC, ROBERT; Stenger, Elizabeth; Haight, Ann; Watkins, Benjamin; Williams, Kirsten; and Qayed, Muna

Background: Avascular necrosis (AVN) is a common morbidity of sickle cell disease (SCD) due in part to recurrent vaso-occlusion and bone ischemia. Hematopoietic cell transplantation (HCT) is a curative treatment for SCD and reduces vaso-occlusive events. However, there is limited literature on AVN post-HCT for SCD. We hypothesized that pediatric patients undergoing HCT for SCD have stabilization of pre-existing AVN and limited development of de novo AVN post-HCT, except when exposed to steroids for the treatment of graft-versus-host disease (GVHD).

Methods: In this IRB approved retrospective study, consecutive pediatric recipients of HCT for SCD at a single institution between 2011 to 2019 were included and analyzed for appendicular AVN.

Results: Seventy eligible patients were identified with a median age of 8 years old (range 2-20) at HCT. Median follow-up post-HCT was 5 years (IQR 3-7). Seven (10%) patients had pre-HCT AVN; 2 had progression of pre-existing AVN neither of whom were exposed to steroids post-HCT, 1 developed de novo AVN having received 392 mg/kg prednisone equivalents (PE) post-HCT, and 4 without progression or de novo AVN received a median of 5 mg/kg PE (range 0-44) post-HCT. Five (8%) patients developed de novo AVN post-HCT without pre-HCT AVN and received a median of 138 mg/kg PE (range 62-635) post-HCT. Among the 8 patients with progressive or de novo AVN, the median number of joints involved was 2.5 (range 1-6). Median time to first de novo AVN was 9 months (IQR 4-20) post-HCT and 4/6 patients

developed de novo AVN in >2 joints. Steroid exposure post-HCT was significantly higher in patients with de novo AVN (median: 225 mg/kg PE, IQR 107-372) compared to those without de novo AVN (median: 0 mg/kg PE, IQR 0-5; p<0.001).

Conclusion: While the effect of HCT on pre-existing AVN in pediatric patients with SCD remains unclear, our findings suggest steroid exposure is a significant risk factor for the development of de novo AVN post-HCT. This study highlights the need to mitigate steroid exposure post-HCT and utilize steroid-sparing agents for the treatment of GVHD to avert this HCT-related morbidity.

Role of Insulin-like Growth Factor Binding Protein-3 (IGFBP3) in Fetal Hemoglobin Induction in Primary CD34+ Hematopoietic Stem and Progenitor Cells from Patients with Sickle Cell Anemia

Presenting Author: Anupama Priyadarshini, PhD; Emory University

Poster Number: 39

PRIYADARSHINI, ANUPAMA; Paikari, Alireza; Zhang, Yankai; Zgodny, Jordan; Kostamo, Zak; Sheehan Vivien

Role of Insulin-like Growth Factor Binding Protein-3 (IGFBP3) in Fetal Hemoglobin Induction in Primary CD34+ Hematopoietic Stem and Progenitor Cells from Patients with Sickle Cell Anemia

Background: Induction of fetal hemoglobin (HbF) is a key therapeutic strategy to treat individuals with SCD. We have identified Forkhead Box O3 (FOXO3) and Insulin-like growth factor binding protein 3 (IGFBP3) as positive regulators of gamma–globin in two independent genomic studies; they are part of the same pathway. The role of FOXO3 in HbF regulation has been confirmed with functional studies in erythroid culture (Zhang, Blood 2018). We propose to investigate the role of IGFBP3 in HbF regulation, through similar means, and determine if both IGFBP3 and FOXO3 act through the same pathway.

Method: Two phase erythroid culture was performed on three unique SCD patient samples. The effect of exogenous, IGFBP3 treatment of erythroid culture at 1µg/ml on HbF levels was determined by HPLC, flow cytometry, RT-qPCR, and western blot analysis on day 21 of culture. FOXO3 knockout CD34+ cells were generated using LentiCRISPR/Cas9 knockout strategy to test the FOXO3 dependence of IGFBP3 mediated HbF induction.

Results: Addition of purified IGFBP3 increased HbF levels by day 21 of culture. IGFBP3 did not alter the expression of known HbF regulators (BCL11A, KLF1, and MYB), and did not alter erythroid maturation as measured by flow cytometry with CD71, GPA, and Band3. Western blot analysis of transduced CD34+ cells was performed, and it was confirmed that FOXO3 was knocked down.

Conclusions: Our genomic data, in combination with functional studies, supports a role for IGFBP3 in HbF induction. Next steps include determining if FOXO3 knockdown removes IGFBP3's ability to increase HbF levels in erythroid culture, and treatment of a xenograft mouse model containing human sickle stem cells with agents like vitamin D, which increase IGFBP3 levels, to determine if the IGFBP3 induction of HbF occurs in vivo.

Developing a Bioreactor Housing Model to study 3D bioprinted In Vitro Vascular Models

Presenting Author: Maher Saadeh, B.Sc. in Biomedical Engineering; Emory University

Poster Number: 37

DeBord, Wyatt; Saadeh, Maher; Tomov, Martin; Serpooshan, Vahid; and Bauser-Heaton, Holly

INTRODUCTION: Vascular disease affects around 7% of the world population, and its pathogenesis stems from numerous causes. Currently, 3D in vitro models may use microfluidic devices to recapitulate the hemodynamic environment found in capillary and small vasculature tissue. However, these models do not accurately demonstrate the extracellular remodeling that occurs in various hemodynamic conditions due to the inability for microfluidic devices to be tuned mechanically. Therefore, the usage of 3D bioprinting is essential to develop accurate micromechanical environments; however, there has not been a developed process for macrofluidic housing synthesis for pulsatile flow.

METHODS: To address these limitations, we propose to develop a high-throughput process on manufacturing 3D printed housing chambers for vascular modeling. This will allow in vitro models to be in a closed, sterile system that enables macrofluidic flow to accurate recapitulate physiological hemodynamics. Utilizing CAD software, stereolithography 3D printing, peristaltic pump system, and a developed sterile technique, we have enabled the ability to create effective in vitro vascular model housings. Specifically, we have ensured the ability to develop a distinct, cellularized bilayer model. Our hypothesis is that utilizing these housing chambers enables accurate bilayer synthesis in complex bioprinted interstitial models as compared to other methods.

RESULTS: Full endothelilaization and formation of distinct layering between the endothelial cells and the encapsulated smooth muscle cells of the bioprinted model. Perfusion sustainability with no leakage from 1 mL/min to 20 mL/min. Ability to perform imaging during perfusion without sacrificing construct.

CONCLUSION: This work represents a new optimized process for in vitro vascular modeling because it will allow us to broaden the ability to model, in an interstitial fashion, complex structures found in numerous vascular diseases. This multifunctional housing chamber can be applied to facilitate uncovering pathological cell signaling and translational advancements in treatment of vascular diseases.

Rheological Benefits of GBT021601 Improve Pathological Angiogenesis and Ineffective Erythropoiesis in the Sickle Mouse Bone Marrow

Presenting Author: Justin Yoo, MD; Emory University

Poster Number: 26

YOO, JUSTIN; Hernandez, Britney; Zgodny, Jordan; Priyadarshini, Anupama; Kostamo, Zachary; Zhang, Yankai; Patel, Ashwin; Shen, Huifeng; Sheehan, Vivien

Background: In sickle cell disease (SCD), the abnormal sickle hemoglobin (HbS) causes hypoxic injury to the bone marrow (BM) and pathologic angiogenesis. The BM niche is critical in stem cell maintenance and effective erythropoiesis; its health is important for the success of gene therapy (GT). Chronic transfusion reverses pathologic angiogenesis and hypoxic injury. However, years of transfusion for possible future GT is not sustainable. GBT021601 is an oral drug that increases Hb. We hypothesize that GBT021601 will reduce hypoxic injury to the BM, improve ineffective erythropoiesis, and preserve the BM vasculature similar to transfusion.

Methods: Townes HbSS mice were fed with chow containing either 0.2% or 0.4% of GBT021601, or control chow. After 12 weeks, a CBC, and flow for mitochondrial retention was obtained from peripheral blood. Spleen weight per body weight was obtained as a proxy for extramedullary erythropoiesis. Erythroblast populations and apoptosis were measured by flow cytometry of the BM. Femoral vasculature was assessed using 3D confocal microscopy staining for Sca-1 and immunoblot was performed on plasma for proangiogenic markers VCAM-1, Ang-1, Ang-2, and VEGF.

Results: GBT021601 increased Hb in a dose dependent manner (0.4%: 16.5 g/dL, $p<0.001$; 0.2%: 13.4 g/dL, $p=0.03$; vs control 8.9 g/dL), reduced mitochondrial retention (8336 MFI vs 11377 MFI, $p=0.01$) and spleen-to-whole body weight ratio (3.19 vs 5.73, $p<0.001$) compared to control mice. In the BM, GBT021601 increased percent mature RBCs while decreasing percent ortho/polychromatic erythroblasts, and percent apoptotic cells (4.4% vs 7.2%, $p=0.003$), suggesting a reduction in ineffective erythropoiesis. GBT021601 reduced markers of hypoxia and angiogenesis VCAM-1 and Ang-1 ($p<0.05$) and reduced arterial marker SCA-1 on confocal microscopy compared to controls (3.11% vs 5.13%, $p=0.04$).

Conclusions: GBT021601 effectively modifies HbS in the sickle mouse model, extending sickle RBC survival and reducing stress erythropoiesis. Our findings show the additional benefit of GBT021601 on reducing hypoxic injury to the BM, preserving the BM vasculature, and providing a more effective niche for erythropoiesis, while avoiding the risks associated with transfusions. GBT021601 is a promising oral agent that could be used to modify the sickle BM and BM niche improving stem cell health and GT outcomes.

Poster Abstracts

Listed in Alphabetical Order by Presenting Author

Investigating the Impact of Early Evaluations in Alleviating Racial Disparities in Developmental Outcomes for African American Toddlers with Autism Spectrum Disorder

Presenting Author: Motunrola Adebogun, BA; Emory University

Poster Number: 81

Adebogun, Motunrola; Hines-Wilson, Mackenzie; Pulver, Stormi; Marrus, Natasha; Abbacchi, Anna; Lowe, Jennifer; Constantino, John; Klin, Ami; Jones, Warren; Geschwind, Daniel; Klaiman, Cheryl

Background: Racial disparities in diagnoses of autism spectrum disorder (ASD) and developmental outcomes are well-documented. Autistic African American (AA) children are twice as likely to have a co-occurring intellectual disability (ID) compared to their White counterparts. Therefore, research targeted toward the reduction of racial discrepancies in developmental outcomes among autistic children is needed. Early evaluation onset has been shown to improve cognitive outcomes, thus making it an important factor to consider in reducing racial differences in developmental outcomes.

Methods: Participants included autistic AA toddlers enrolled in a study through a community referral system (group 1) (n= 40). Autistic AA (group 2) (n = 12) and White toddlers enrolled in a longitudinal research study (group 3) (n = 47) were also included. Toddlers in all groups received an ASD diagnosis at 29.73 (4.84) months (M (SD)). Groups 2 and 3 received their first developmental evaluation at 16.25 (7.79) months, while group 1 received theirs at 28.68 (7.55) months. Developmental skills were assessed using age-equivalent scores on the Mullen Scales of Early Learning (MSEL) at the age of diagnosis.

Results: T-test analyses showed RL scores were lower for group 1 (M = 11.40, SD = 7.01) compared to group 3 (M = 28.93, SD = 8.66); t(84) = 10.32, p = <.001. EL scores were lower for group 1 (M = 13.63, SD = 7.45) in comparison with group 3 (M = 27.91, SD = 13.63); t(84) =8 .14, p = <.001. VR scores for group 1 (M = 17.95, SD = 5.48) were lower than those of group 3 (M = 31.36, SD = 8.16); t(81 = 9.11, p <.001. Lastly, FM scores were lower for group 1 (M = 19.97, SD = 4.94) than group 3 (M = 26.66, SD = 4.68); t(81) = 6.44, p = <.001.

T-test results revealed no difference in MSEL RL, EL, VR, and FM age equivalence scores between groups 2 and 3.

Conclusions: Findings suggest that for AA toddlers, early onset of evaluations measuring cognitive abilities aid in reducing the burden of ID among those later diagnosed with ASD and can improve cognitive outcomes.

Advances in Emotion Recognition-AI to Identify Pediatric Psychiatric Severity Rapidly to Address Health Equity

Presenting Author: Yared Alemu, Ph.D.; Morehouse School of Medicine

Poster Number: 54

Alemu, Yared and Cárdenas Bautista, Elizabeth

Background/Problem: 1.9 billion children in the world make up 27% of the world's population. More than 13% of adolescents aged 10-19 live with a diagnosed mental disorder, as defined by the World Health Organization, representing 89 million adolescent boys and 77 million adolescent girls. Almost 46,000 children and adolescents between the ages of 10 and 19 end their own lives - about one every eleven minutes. There is a mental health crisis for Children and adolescents globally; this crisis has been exacerbated by COVID and the lack of trained mental health providers—the high rate of mental health issues for children and adolescents partly driven by undiagnosed and untreated trauma symptomology. Exposure to trauma has a pernicious impact on the development of children and adolescents, including signs of attention span dysregulation, distractibility, and disorganized attachment.

Solution: Addressing this crisis requires AI-enabled augmented clinical intelligence to support providers and patients. TQIntelligence is leveraging its patented voice biomarker technology for real-time decision support and triaging. The TQIntelligence solution enables care providers and caregivers to arrive at the severity of the psychiatric problem and a care plan quickly and effectively. Within minutes, TQIntelligence can assess the severity of the risk and route individuals to the right resources and care.

Objective: This study aims to develop and evaluate automated methods for detecting the intensity of emotions (anger, fear, sadness, and happiness) in audio recordings of patients' speech. We also demonstrate the viability of deploying the models. Our model was validated in a previous publication by Alemu et al. with limited voice samples. This follow-up study used significantly more voice samples to validate the previous model.

Methods: We used audio recordings of patients, specifically children with high adverse childhood experience (ACE) scores; the average ACE score was 5 or higher, at the highest risk for chronic disease and social or emotional problems; only 1 in 6 have a score of 4 or above. The patients' structured voice sample was collected by reading a fixed script. In total, 4 highly trained therapists classified audio segments based on a scoring process of 4 emotions and their intensity levels for each of the 4 different emotions. We experimented with various preprocessing methods, including denoising, voice-activity detection, and diarization. Additionally, we explored various model architectures, including convolutional neural networks (CNNs) and transformers. We trained emotion-specific transformer-based models and a generalized CNN-based model to predict emotion intensities.

Results: The emotion-specific transformer-based model achieved a test-set precision and recall of 86% and 79%, respectively, for binary emotional intensity classification (high or low). In contrast, the CNN-based model, generalized to predict the intensity of 4 different emotions, achieved test-set precision and recall of 83% for each.

Innovation: Among the multitude of digital innovations to identify a biomarker for psychiatric diseases currently, as part of the macro-level digital health transformation, speech stands out as an attractive candidate with features such as affordability, non-invasive, and non-intrusive. TQI has developed a unique methodology, establishing a link between trauma, stress, and voice types partly related to the

automatic nervous system changes, including disrupting speech-based characteristics. The patented voice biomarker algorithm is trained to understand behavioral and emotional tendencies and to anticipate future behaviors to determine if a child's vocal utterances deviate from age-appropriate linguistic and speech patterns.

Conclusions: Automated emotion detection from patients' speech using artificial intelligence models is found to be feasible, leading to a high level of accuracy. The transformer-based model exhibited better performance in emotion-specific detection, while the CNN-based model showed promise in generalized emotion detection. These models can serve as valuable decision-support tools for pediatricians and mental health providers to triage youth to appropriate levels of mental health care services.

Do Behavioral Profiles of Children Presenting to Intensive Multidisciplinary Intervention Differ by Food Allergy Status? An Electronic Medical Record Review Study

Presenting Author: Tanya Auguste Jones, PsyD; Emory University School of Medicine

Poster Number: 102

Auguste Jones, Tanya; Cato, Terreca; Hipp, Shannon, Davidson, Taylor; PROCTOR, KAITLIN

Background: Pediatric food allergy (FA) is a chronic, potentially life-threatening medical condition affecting ~5.6 million US children. A review found that children with children with FA are more likely to demonstrate food refusal/aversion, anxiety with eating, and poor intake. The occurrence of aversive experiences with eating, neuroendocrine and immune sensing, and predisposing biopsychosocial factors place children at risk for developing a debilitating feeding disorder, avoidant-restrictive food intake disorder (ARFID). ARFID is an eating/feeding disorder diagnosed when food avoidance is prolonged or severe and results in significant weight loss/growth failure, nutritional deficiency, reliance on formula, and/or significant psychosocial impairment. This study aims to examine specific differences in behavioral profiles of children diagnosed with severe ARFID presenting for treatment in an intensive multidisciplinary intervention (IMI) program for children presenting with and without diagnoses of FA.

Methods: Children ages 6 months to 21 years diagnosed with ARFID admitted to the CHOA IMI Feeding Program between the dates of 7/1/2019-1/31/2022 were included in a retrospective chart review (n=353). A team of trained coders abstracted data from the electronic medical record on child demographic, medical, nutritional, and behavioral variables from the child's multidisciplinary team intervention. Approximately 28% of the sample had a documented FA. Interim analyses with a subset of 150 participants were conducted using SPSS. For this study, behaviors profiles include active and passive refusal behaviors, aggressive behaviors, and neophobic responses.

Results: Interim results showed no significant differences in behavioral profiles by FA status. However, after controlling for neurodevelopmental disorders, such as autism spectrum disorder and developmental delays, children with FAs were more likely to experience gags, a neophobic response.

Conclusion: The interim analyses suggest that at baseline, children with FA do not significantly differ in behavioral profile from children without FA. Since CHOA IMI's primary intervention is behavioral, this

suggests that current behavioral model is appropriate for children with the severity level of AFRID that requires day treatment and is likely to have similar outcomes to those without FA. However, given the higher risk of gags, it would be beneficial for providers to explore neophobic responses within a cognitive-behavioral model.

Modeling Health Education Through the Elementary Pediatric Health Curriculum

Presenting Author: Lucy Avant, BS Global Public Health and Biology; Emory Univeristy

Poster Number: 113

AVANT, LUCY; and Ohamadike, Chiagoziem; and Pendley, Andy; and Myers, Kirstin; and Rothbaum, Alex

Background: Most resources in US healthcare are devoted to managing chronic disease in adults, rather than prevention during formative years. Evidence-based healthy behaviors are rarely taught in primary education, especially in low-income communities. In 2018, Emory and Morehouse students and physicians developed the Elementary Pediatric Health Curriculum (EPHC), a novel longitudinal health curriculum based on Georgia Health Education standards. However, children lack the individual, social, and structural ability to incorporate behaviors at home as they rely on under-resourced adult caregivers. As a result, Emory students created supplemental videos targeting caregivers to reinforce the curriculum at home.

Methods: The classroom curriculum consists of 10, 30-minute monthly lessons across the K-5 experience. Monthly classes focus on key topics, and reference previous teaching to increase retention via spaced repetition. In 2023, Emory students developed supplemental videos to reinforce the key points from the lessons. The videos are around 5 minutes in duration, delivered at a 5-7th grade literacy level, and incorporate longitudinal characters and themes appealing to both children and adult audiences. The characters model conversations between a parent and child. The parental figure speaks as a peer to the adult viewer, describing how to model healthy behaviors for their child. Utilizing the fundamental principle of the Social Learning Theory, the videos demonstrate behaviors caregivers can model for their children to observe and emulate.

Results: A program evaluation plan is developed such that surveys will be disseminated to parents, teachers, and child psychiatrists to quantify the efficacy of the videos and revise content to create a more rigorous, disseminable curriculum. Since EPHC became a site for the Community Learning Social Medicine course at Emory SOM, the evaluation plan will be feasibly maintained by medical students.

Conclusion: The videos are designed to be a potential preventative intervention reinforcing the evidence-based healthy behaviors students learn at school. This resource promotes transmission of healthy practices home to create generational lifestyle changes in low income communities. Such reinforcement may amplify the ability of elementary students to adopt healthy lifestyle education, behaviors, and enthusiasm within at-risk communities, providing a grass-roots public health platform for the betterment of society.

Exploring the Relationship between Social Determinants of Health and Outcomes in Pediatric Gunshot Wounds to the Head

Presenting Author: Leslie Avellaneda, Neuroscience B.S.; Georgia State University

Poster Number: 96

AVELLANEDA, LESLIE; Blackwell, Laura; Reisner, Andrew; and Mulugeta, Makda

Background: Pediatric gunshot wounds to the head (GSWH) are highly lethal injuries seen in children with varying recovering rates. Although patients with GSWH are at risk for poor health outcomes, disparities based on social determinants of health (SDH) exist. According to the Centers for Disease Control and Prevention, SDH are defined as the conditions in the environments where people are born, live, learn, work, play, worship and age that affect a wide range of health, functioning, quality-of-life outcomes and risks. Currently, limited data exists on the influence of SDH on outcomes following pediatric GSWH. This study aims to descriptively explore the relationship between SDH and GSWH outcomes.

Methods: Retrospective data collection of patients presenting to the ED at Children's Healthcare of Atlanta with GSWH from January 2014 to April 2023 (n=82). Demographic and clinical information was obtained from electronic medical records. The Child Opportunity Index (COI) was used as a measure of SDH, including very low, low, moderate, high, and very high levels based on patient zip code.

Results: Average age of patients was 8.5 years. Majority of patients were Black (70.7%) and male (72%). Patients were predominantly from low and very low areas of opportunity (74. 39%). Mortality rates differed across COI groups, with higher rates of mortality in the moderate and high/ very high groups (60%) compared to very low/low groups (18%). Rates of patients being admitted to the inpatient rehabilitation was similar across COI groups (32.78% vs. 30%). Time spent in the ED was also similar across patients from low COI neighborhoods (2:05 hours) and high/very high COI neighborhoods (1:47 hours).

Conclusion: Disparities exist based on race and SDH in children with GSWH. Further research should explore the relationship between other possible SDH variables (e.g., insurance status, income, healthcare resources, community resources) and longer-term outcomes in GSWH.

Exploratory Analysis of Pilot Data From CBT Clinic for Co-occurring Anxiety and Autism Spectrum Disorder in Youth

Presenting Author: Dorothy Balser, Bachelor of Arts; Emory University School of Medicine, Marcus Autism Center

Poster Number: 107

BALSER, DOROTHY; Klaiman, Cheryl; and Ferguson, Jonathan

Background: Anxiety is highly co-occurring among youth with autism spectrum disorder (ASD). The neurodevelopmental differences characteristic of ASD may overlap or mask presentations of anxiety, complicating measurement and treatment of anxiety in this population. Randomized clinical trials have demonstrated efficacy of modified cognitive behavioral therapy (CBT) in treating youth with co-occurring anxiety and ASD, though these samples were primarily white, and anxiety measures were normed with typically-developing children. This exploratory analysis aims to measure effectiveness of CBT for a diverse clinical population of youth using two anxiety measures, one specifically developed for children with ASD. Further, we aim to elucidate potential associations between family demographic characteristics and treatment outcomes to identify areas for future focus and improvement.

Methods: Participants include 68 children ages 8-17 with primary diagnoses of ASD who completed intake for treatment in the CBT Anxiety Clinic. Pre-treatment survey data measured family demographics and parent-reported child anxiety symptomatology via the SCARED and the PRAS-ASD. Parents completed both measures post-treatment to measure children's anxiety symptom reduction. For children with data pre- and post-treatment, paired-samples t-tests and ANOVAs were conducted in SPSS.

Results: Demographic data indicated a diverse sample regarding race and family characteristics. Of 16 children with pre- and post-treatment SCARED data, average total scores post-treatment were significantly lower than pre-treatment, indicating a reduction in anxiety symptoms, $t(16)=3.486$, $p=.003$. Of 12 children with pre- and post-treatment PRAS-ASD scores, average total scores decreased post-treatment, $t(11)=3.508$, $p=.005$. A one-way ANOVA revealed a statistically significant difference in symptom reduction based on caregiver employment, $F(6,9)=4.654$, $p=.02$, though this result should be interpreted with caution due to small sample size (n=16).

Conclusions: Findings support past work indicating the success of modified CBT for children with co-occurring anxiety and ASD, as well as demonstrate congruence between an autism-specific measure of anxiety and one normed with typically-developing youth. Additionally, results suggest that caregiver employment status may impact treatment effectiveness, indicating the need for further research into caregiver characteristics and family dynamics as mediators of treatment success. Analysis is limited by small sample size, so future work should utilize more robust data to understand these potential effects.

Intraoperative Utility of Continuous Non-Invasive Finger Arterial Pressure Monitoring in Pediatric General Anesthesia

Presenting Author: Carolyn Bannister, MD; Emory University, Associate Professor Emeritus

Poster Number: 91

BANNISTER, CAROLYN; Schwann, Christopher; and Bhattacharjee, Abhishek

Background: Continuous arterial blood pressure monitoring is crucial in many pediatric anesthesia cases. Invasive arterial lines are the gold standard blood pressure (BP) monitors but have known complications and often pose difficult placement in pediatric patients. Non-invasive finger arterial pressure (FAP) monitors are FDA-approved for adults, but not for children. Previous studies have not evaluated FAP

devices for the full duration of anesthesia cases in pediatric patients and report measurements during very short periods of time in the anesthetic. This study evaluated feasibility of a continuous finger arterial pressure device for clinically reliable use in pediatric general anesthesia cases.

Methods: IRB approved study in Wolfson Children's Hospital, Jacksonville, Florida.

25 patients, Age 3 months-17 years. Mean age: 6.5 years.

Equipment: EV1000 Monitor with ClearSight Cuff - Edward Lifesciences, Irvine, CA.

Invasive arterial pressure at radial or femoral artery. Data from simultaneous FAP not used for clinical decisions.

Measurements for each device recorded at 1 minute intervals in electronic medical record for entire case.

Results: 5271 Measurements from each monitor system.

Device Correlation R values: Systolic Blood Pressure (SBP): 0.83, Mean Arterial Pressure (MAP): 0.80, Diastolic Blood Pressure (DBP): 0.80.

Mean Difference Between Devices: SBP: 2.597 mmHg, MAP: -2.437 mmHg, DBP: -3.44 mmHg.

P value for Mean Difference: SBP: 0.019, MAP: 0.001, DBP: <0.001.

Conclusions: FAP underestimated SBP and overestimated DBP and MAP compared to invasive arterial monitor with statistical significance.

FAP demonstrated no mean difference greater than 3.5 mmHg compared to invasive arterial monitor; we conclude that the small overestimation and underestimation noted is not clinically significant.

This study agrees with previous studies; FAP shows acceptable accuracy in infants and children.

Limitations: Study required dedicated team member to capture data with FAP monitor which is time inefficient.

Pediatric sized cuffs are currently unavailable; adult cuffs were modified for use in pediatric patients.

Measurements recorded once per minute may not capture acute BP changes.

This study supports feasibility of using FAP device for full anesthetic cases and may have clinical relevance for pediatric ICU patients requiring continuous BP monitoring.

Studies with greater patient numbers and pediatric sized FAP cuffs are needed.

Caregiver Reflections on Early Intervention Research: Giving Voice to the Family

Presenting Author: Cynthia Belfleur, Bachelor's of Arts; Emory University

Poster Number: 97

Belfleur, Cynthia; Gonzalez Laca, Alexa; Adebogun, Motunrola; Yohannes, Millena; Dunlevy, Megan; Pickard, Katherine; and Shultz, Sarah

Background: To expedite access to diagnosis and services, autism research has expanded by using baby-sibling study designs. This design compares the development of infants with and without biologically diagnosed older siblings with autism. However, this research has yet to explore caregiver perspectives regarding participating in baby sibling research aimed at identifying early biomarkers of autism. Addressing this limitation will help align research with the goals of families and communities and consider barriers to care. This study retrospectively examines the motivation, challenges, and impact of developmental monitoring research on caregivers' perception of their baby sibling's development.

Methods: Participants received study information and a link to an online survey to obtain information on service utilization and completed the Scales of Treatment Perception, modified for research. Of the 509 caregivers from the original study, 91 participants completed the survey. After completing the follow-up survey, caregivers had the option to participate in an interview or focus group about their experiences. Seventeen research caregivers consented to complete a focus group or interview. Rapid debriefing occurred after each focus group, followed by thematic analysis to summarize themes related to caregiver experiences.

Results: Caregivers did not find the research to place additional burdens on their families (M= 2.34, SD= 1.84) or cause their child discomfort (M=1.85, SD=1.37). Caregivers would suggest this research to other families (M= 7.24, SD= 1.59). Qualitatively, caregivers reported that the opportunity to give back and the potential for developmental monitoring were motivators to participate. However, they shared that logistical barriers such as the length of study visits impeded participation. Caregivers reported valuing learning about the research findings from their participation and suggested various mediums to share study findings and to improve study communication more broadly.

Conclusion: Caregivers' perspectives will allow early autism research protocols to address family needs. By making intentional improvements that increase accessibility and center the experiences of diverse families, we hope to improve the diagnostic process that will ultimately improve the lived experiences of children and their families during research and in their day-to-day lives.

Impact of Vaso-Occlusive Crises on The Transcriptomes of Patients with Sickle Cell Disease

Presenting Author: Varsha Bhat, MS; Georgia Institute of Technology

Poster Number: 82

BHAT, VARSHA; Potdar, Alka A; Patel, Ashwin P; Gibson, Greg; Yu, G Karen; and Sheehan, Vivien A

BACKGROUND: SCD is an inherited, multisystem blood disorder that affects millions of people worldwide. VOCs or acute pain events involving complex interactions among sickled erythrocytes, endothelial cells, and leukocytes are hallmark symptoms of SCD. Over time, patients with acute VOC may develop chronic pain. At present, there are no biomarkers that can aid VOC diagnosis or distinguish

between acute and chronic pain. In this study, we aimed to examine transcriptome alterations in CD45+ cells of individuals with SCD during a VOC event compared to steady state.

METHODS: Patients were aged <33 years and were receiving care at Texas Children's Hospital. Patients were categorized as having either acute pain or chronic pain. CD45+ cell (lymphohematopoietic lineage) samples were collected from 158 patients with SCD under steady state conditions, during a VOC event, and at a follow-up visit after a VOC. RNA-Seq was performed using a 101-base pair, paired-end protocol on the NovaSeq 6000 system. We used SNM to adjust the normalized gene expression values for the effect of multiple covariates. Differential gene expression analysis was performed using limma with an FDR threshold of $P<0.05$. We used fgsea for gene set enrichment analysis with the Hallmark gene sets in the MSigDB database for reference.

RESULTS: Analyses of RNA-Seq data showed enrichment of the TNFα signaling via NFKB, IL-6/JAK/STAT3 signaling, complement activation, and coagulation pathways in CD45+ cells during VOCs compared with steady state. In acute pain patients, 384 genes were upregulated, and 170 genes were downregulated at VOC when compared to steady state. In contrast, we found a smaller number of differentially expressed genes in patients with chronic pain. Four differentially expressed genes (FAM20A, IL1B, MS4A4A, and SERPINB2) exhibited relatively higher expression during a VOC event when compared to steady state in longitudinal samples, irrespective of pain status. These four genes can be potentially used to assist VOC diagnosis in SCD.

CONCLUSIONS: Samples collected during a VOC event showed significant changes in the transcriptome of CD45+ cells compared with steady state. Exploratory analyses of longitudinal transcriptomes of SCD with multiple VOC events revealed four genes with elevated expression in VOC compared to steady state patients.

Cytokine profiling analysis for HIV+ and SARS-CoV-2+ pregnant women and in vitro investigation of HIV-1 antiretroviral drug exposure on pro-inflammatory gene expression in human placental cells

Presenting Author: Dara Brena, MS; Morehouse School of Medicine

Poster Number: 98

BRENA, DARA; Huang, Ming-Bo; Schuch, Viviane; Badell, Martina; Floyd, Riaun; Hossack, Daniel; Wilson, Cristina; Richardson, Alyssa; Bond, Vincent and Johnson, Erica

Background: In the cART era, the prognosis for people living with HIV (PLWH) has radically shifted from a progressively lethal disease to a chronic infectious disease. However, there is no cure and cART suppressed PLWH face a disproportionate risk for non-AIDS-related morbidities, including adverse pregnancy outcomes. The etiology of this clinical burden is unknown. The purpose of this study is to examine cytokine profiles of pregnant cART-suppressed PLWH with SARS-CoV-2 as compared to healthy pregnant controls and to evaluate the in vitro effects of ART exposure on placental cell pro-inflammatory gene expression. Additionally, given the recent evidence suggesting a role of placental extracellular

vesicles (EVs) in dysfunctional immunological changes and adverse pregnancy consequences, EV trafficking of placental cells post-ART exposure was explored.

Methods: HIV+ and SARS-CoV-2+ maternal peripheral plasma and umbilical cord plasma were acquired through the Study of Pregnancy Outcomes in women with Respiratory illness due to suspected or confirmed coronavirus infection (SPORE) biorepository. Controls were obtained from uninfected pregnant women recruited from Grady Memorial Hospital. Multiplex cytokine analysis was conducted through Eve Technologies. Placental cells were treated with antiretroviral drugs. EVs were isolated from the supernatant via sequential ultracentrifugation. Total cellular RNA was extracted, cDNA generated, and RT-qPCR was conducted targeting NLRP3, IL-6, and NFKB. The quantity and size distribution of the EVs were evaluated with nanoparticle tracking analysis (NTA).

Results: Interestingly, maternal and cord blood plasma cytokine profiles of each group (infected and uninfected) did not always exhibit a positive correlation but rather had differential cytokine profiles between the mother and fetus. This could indicate a possible protective immunological role. For the in vitro experiments, DTG significantly decreased NLRP3 and NFKB expression. Placental cell exposure to ART impacted EV trafficking with effects on EV release and population size distribution.

Conclusions: This study seeks to address the knowledge gap for non-AIDS-related morbidities specific to pregnancy. The chronic immune activation with accelerated immunosenescence experienced by cART-suppressed PLWH could similarly be occurring within the in utero/placental environment. Exploring placental immunology and EV-based intercellular communication at the maternal-fetal interface could aid in the identification of therapeutic targets.

Social Visual Engagement Differences in Infants with Elevated Likelihood for Autism Spectrum Disorder During Caregiver Interactions

Presenting Author: Ainsley Buck, Neuroscience, B.S.; Emory University

Poster Number: 83

Buck, Ainsley; Kushner, Elizabeth; Jones, Warren; Shultz, Sarah; Edwards, Laura

Background: Younger siblings of children with autism spectrum disorder (ASD) are at an elevated likelihood (EL) of being diagnosed with ASD and displaying the broader autism phenotype (BAP), traits paralleling diagnostic criteria for autism sub-clinically. Previous work focused on children with ASD indicates that social attention differences may affect child-caregiver interactions (Adamson et al., 2012), but there is a paucity of work on this with children exhibiting BAP. This study aims to compare how EL infants later classified as TD, BAP, or ASD visually engage with their caregivers in live interactions.

Methods: EL younger siblings (n=99) attended eye tracking visits at 3 and/or 6 months old. They completed diagnostic assessments at 24- or 36- months of age and received diagnoses of ASD (n=39), BAP (n=30), or no diagnosis (n=30). In eye-tracking procedures, infants and caregivers participated in a live interaction during which infants' visual engagement was collected using eye-tracking technology. Regions of interest (ROIs; eyes, mouth, body, objects) were defined for each interaction. Linear mixed

models assessed effects of age and diagnostic group on fixation to ROIs during caregiver-infant interaction.

Results: Analyses revealed a main effect of age in which mouth-looking increases significantly over time (p=.001) and a significant interaction between age and diagnostic group (p=.03). This interaction was driven by significantly higher mouth-looking at 6 months than 3 months in both ASD (p=.01) and BAP groups (p=0.001). Within the 6-month time point, BAP children trended toward higher levels of mouth-looking than the ASD group (p=.08 after Tukey post-hoc correction).

Conclusion: Results suggest that differences in BAP children's social engagement begin in infancy. Differences in levels of mouth-looking between 3- and 6-months distinguished BAP and ASD from UN children. In typical development, infants shift their attention to the mouth as babbling begins (Lewkowicz & Hansen-Tift, 2012), and mouth-looking has been linked to concurrent expressive language skills (Habayeb et al., 2021). Previous research has also indicated that elevated mouth-looking may support language development among children with autism (Jones et al., 2008). Future research will explore the relationship between mouth-looking in infancy and later language development across diagnostic groups.

Pediatric Laparoscopic versus Percutaneous Gastrostomy Tube Placement: A single center review

Presenting Author: Julia Byrnes, Bachelor of Science; Emory University School of Medicine

Poster Number: 48

Rumbika, Savanah; Dantes, Goeto; BUCHANAN, MORGAN; Byrnes, Julia; Harriott, Ashley; He, Zhulin; and Alemayehu, Hanna

Background: The optimal technique for gastrostomy tube (GT) placement in pediatric patients remains controversial. Percutaneous endoscopic gastrostomy (PEG) was the preferred approach over open gastrostomy. With the advent of laparoscopy, many advocate for laparoscopic (LAP) placement to avoid potential visceral injury. However, PEG patients may undergo an additional procedure for conversion to a low-profile button. We sought to compare outcomes including complications, need for subsequent procedures, and anesthesia exposure in LAP vs. PEG patients.

Methods: Patients (ages 0-18) who underwent GT placement at our pediatric healthcare system between 2018-2021 were retrospectively reviewed to achieve appropriate sample size, determined by power analysis. Patients were excluded if they underwent fundoplication, gastro-jejunostomy tube placement, open placement, tube placement in concurrence with other intestinal procedures, or failed primary attempt at gastrostomy placement. Data related to demographics and GT placement were recorded. Our primary outcomes were complications, need for subsequent procedures, discrete anesthesia exposures, and cumulative anesthesia exposure.

Results: 688 patients underwent GT placement during the study period, 234 (34.0%) LAP and 454 (66.0%) PEG. LAP patients were younger and weighed less than PEG patients (p=0.005 and p=0.002 respectively). Gender distribution, primary insurance status, and ASA classification were similar. Within

the group excluded, 5 were failed PEG placements, while 0 failed LAP GT attempts (p=0.173). Major complication rates were comparable (1.3% vs. 2.4%, p=0.401); however, PEG patients were more likely to have skin erythema/local infection (p=0.006). PEG patients trended toward undergoing subsequent procedures (10.9% vs. 6.5% for LapG, p=0.061) such as GT revision or conversion to gastro-jejunostomy tube. Additionally, 60.5% of PEG patients required >2 anesthesia events, most often due to exchange of PEG to a low-profile button, while 93.6% of LAP patients required only one (p<0.001).

Conclusion: PEG technique is associated with more discrete anesthesia exposures and may also require more subsequent operations related to its placement, however, at our institution, overall major complications are similar in both techniques while PEG tubes are prone to skin erythema/local infection.

Strategies for Successful Research Recruitment and Program Implementation in Pediatric Emergency Medicine (PEM)

Presenting Author: Jacob Calamaro, BS; Emory University

Poster Number: 116

Calamaro, Jacob G; Benedit, Laura; Abdallah, Calvin; Akinsola, Bolanle; Berkowtiz, Tal; Bora, Natoli; Burger, Rebecca K; Cameron, Melissa; Daniel, Jordan; Francois, Sandy; Grell, Robert; Griffiths, Mark A; Gutierrez, Peter; Hatabah, Dunia; Hoyos, Ashley;

Background: Difficulties in performing research and program implementation in the emergency department (ED) setting are well documented in adult literature yet there is a paucity of information for pediatrics. Program implementation and clinical study recruitment in PEM is particularly difficult in a fast-paced environment treating sick and injured children. Understanding key strategies that assist in successful and timely research recruitment and program implementation in this setting is important.

Objective: To describe key strategies utilized by a PEM research team at an academic children's hospital from January-December 2023.

Methods: We conducted a cross-sectional study examining research and implementation program staff opinions on key strategies for success in recruitment, study operations and program implementation. Thirty-two members of the PEM research team including research coordinators (RCs), managers, trainees/post-doctoral fellows and physician-investigators were asked to list key research strategies for success. Thirty-two initial strategies were identified and then themes were condensed into 18 items. Staff were then asked to complete an anonymous Qualtrix survey ranking the 18 items in order of importance. The top 10 choices were ranked in order of importance with weighted points (10-1 points for top 1-10 respectively); items were then ranked based on accumulated points determining top 10 strategies.

Results: Thirty responses were recorded, a 93% response rate. The top 3 weighted strategies were: 1. Boots on the ground presence of research team in the emergency department (ED), 2. Physician and ED Staff study education, and 3. Key leadership and institutional support. Other top themes included use of technology, team communication, PEM staff incentives for research participation, and interdisciplinary

collaboration. These and other strategies contributed to over 1500 patient enrollments into PEM research studies and >1880 patients into PEM implementation projects in 2023 at Children's Healthcare of Atlanta.

Discussion: Despite known challenges in PEM research and program implementation, multiple strategies can be employed to cultivate success. Specifically, boots on the ground enrollment with a diverse enthusiastic team, staff education, and various uses of technology for streamlined enrollment, have led to successful pediatric research and program implementation in the digital age with a focus on innovation, collaboration and translation.

Pediatric Emergency Department Identifies the Prevalence of Sexual Assault Trends in Adolescents Living with HIV

Presenting Author: Melissa Cameron, MPH; Emory Univeristy

Poster Number: 75

CAMERON, MELISSA N.; Middlebrooks, Lauren; François, Sandy; Daniel, Jordan E.; Wynn, Bridget A.; Brown, Sara P.; Thompson, Sarah; Carter, Rebeka G.; DeNaples, Kelly; Kandaswamy, Swaminathan; Orenstein, Evan; Camacho-González, Andrés; Morris, Claudia R. an

The National Sexual Violence Resource Center states that 30.1% of sexual assault (SA) victims experience their first rape between the ages of 11-17. HIV-related stigma often links HIV status to behaviors that increase the chances of contracting HIV and does not account for adolescents who have been sexually assaulted, as this demographic is rarely researched. As of July 2023, Children's Healthcare of Atlanta (Children's) started a new clinical implementation of emergency department-based opt-out HIV screening in adolescents ≥13 years receiving a venipuncture. This initiative is identifying adolescents living with HIV (ALHIV) and their sexual history. The aim is to demonstrate that some ALHIV in Atlanta are not engaging in behaviors that increase their chances of getting HIV, but they are being assaulted.

From July 2023 to March 2024, Children's electronic medical record EPIC was used to identify newly diagnosed ALHIV, ages 13-24, and their documented sexual history. HIV disclosure notes and sexual history were thoroughly reviewed. Data was extracted and trends were analyzed.

Since the start of the clinical implementation, 6 newly identified ALHIV have been disclosed to, linked to care, and had their sexual history documented. The average age was 15.8 with their assignments at birth being 5 male and 1 female. Of the six patients, 50% experienced SA (2 males, 1 female). SA history was reported in 40% of males and 100% of females.

Sexual assault research amongst young children is well documented, but adolescents are often left out. HIV diagnoses is often associated with adolescents engaging in promiscuous behaviors that increase chances of HIV contraction. Our data showed that more than half of newly identified ALHIV at Children's were SA victims. This new initiative can aid in decreasing stigma and assumptions surrounding ALHIV behaviors and provide more insight into sexual violence against adolescents.

Neonatal Extracorporeal Membrane Oxygenation (ECMO) Epidemiology by Social Drivers of Health (SDoH)

Presenting Author: Swati Chandhoke, MD; Emory University School of Medicine

Poster Number: 103

Chandhoke, Swati; DiGeronimo, Robert; Levy, Philip; Hamrick, Shannon; Zaniletti, Isabella; Murthy, Karna; Padula, Michael; Grover, Theresa; and Moynihan, Katie

Introduction: SDoH impact numerous neonatal and pediatric outcome domains. ECMO is a life-sustaining therapy susceptible to SDoH influences. We studied neonates supported on ECMO leveraging the Children's Hospitals Neonatal Consortium Database of 36 US level 4 NICUs.

Methods: Neonates >34 weeks gestational age (GA) with birth weight >1.8kg supported on ECMO from 2010-2021 with a maternal zip code and race were identified. We examined clinical characteristics, outcomes, and SDoH including Child Opportunity Index (COI) quintiles, maternal race (non-Hispanic white, non-Hispanic Black, Hispanic, Asian, and other), payer, and travel distance. Univariate analyses identified associations with the primary outcome of NICU mortality. Associations between SDoH and NICU mortality were adjusted for diagnoses.

Results: Of 2254 neonates on ECMO (23% venovenous [VV]), 32% were supported for congenital diaphragmatic hernia (CDH), 27% for meconium aspiration syndrome (MAS), 13% for cardiac, and 28% for other diagnoses. Overall 29% of neonates were in the very low COI quintile (vs 14% very high), 55% had public payer and 51% were white, 25% Black, and 17% Hispanic. Small for GA and MAS were more common in low COI (versus high) and Black races (versus white). White and Hispanic races had more preterm births, while conditions such as preeclampsia were common in underrepresented races. NICU mortality was 31%. The median NICU length of stay (LOS) was 32 days [IQR 17,61] and ECMO duration was 7 [4,12]. CDH and cardiac disease had greater mortality (vs MAS, Hazard ratio [HR] 3.8 [2.8,5.0] and 2.8 [2.0,4.0]) as did preterm birth, while VV cannulation was protective (HR 0.6 [95%CI 0.4,0.7]). We found no association between COI or travel distance with mortality. Higher mortality was seen in private (HR 1.3 [1.1, 1.5]) and self-pay (HR 2.8 [1.7, 4.4]) patients vs public. Black race was associated with lower mortality (HR 0.8 [0.7, 0.9]) vs white but not when adjusted for diagnosis. Run duration and LOS were similar across SDoH.

Conclusions: We identified different epidemiological characteristics among neonates supported on ECMO according to SDoH. Relationships between social drivers, clinical variables, health access, and outcomes in the neonatal ECMO population are complex, deserving of future study.

Novel Noninvasive Test For MASLD in the Pediatric Population

Presenting Author: Kelsey Chatman, MD; Emory University

Poster Number: 114

CHATMAN, KELSEY; and Vos, Miriam (PI)

Background: Metabolic dysfunction-associated steatotic liver disease (MASLD), formerly referred to as nonalcoholic fatty liver disease, stands as one of the most prevalent liver conditions worldwide. The pediatric prevalence of this disease has risen dramatically in recent years with estimates ranging from 10% to 80% depending on ethnicity, age, and the presence of other comorbidities. Unfortunately, clinicians are witnessing an alarming trend of earlier disease onset, with patients as young as five years old displaying signs of advanced liver pathology and concurrent comorbidities, including type 2 diabetes and cardiovascular disease. Currently, liver biopsy is the definitive diagnostic test for MASLD; however, its invasiveness and non-negligible risks render it a suboptimal diagnostic tool in pediatric cases. As such, there is a growing emphasis on developing innovative approaches for diagnosing, monitoring, and predicting MASLD that circumvent the need for invasive and costly testing.

Methods: We are conducting a prospective validation cohort study designed to test the performance of a noninvasive screening panel in detecting pediatric MASLD. This targeted metabolomics-based biomarker, discovered by our lab, has been retrospectively validated in two separate pediatric cohorts. In this study, new patients presenting to hepatology clinic for an evaluation of elevated liver enzymes are asked to provide an additional blood sample alongside the standard of care work-up. Using metabolomic profiling, blood samples are processed and combined with clinical data including weight and waist circumference to produce a serologic phenotype that is assessed using the screening panel. Performance of the test against methods in standard of care will be analyzed using sensitivity and specificity measures.

Conclusion/Proposed Outcomes: A growing number of children are grappling with long-term complications stemming from MASLD due to its early onset, emphasizing the mounting clinical burden and profound impact on their quality of life. This screening panel is an exciting discovery that has the potential to reduce cost and inconvenience for the evaluation of children with suspected liver diseases. We expect that in an even more undifferentiated population than the previous retrospective cohorts, this novel test will perform similarly to the more invasive standard of care which will further validate the effectiveness of the test.

Pilot Implementation of an Inclusive Social Engagement Curriculum in Preschool Classrooms

Presenting Author: Emma Chatson, B.A.; Emory University School of Medicine, Marcus Autism Center

Poster Number: 76

Chatson, Emma; Cardenas, Jennifer; Kushner, Elizabeth; Belfleur, Cynthia; Islam, Nailah; Pickard, Katherine

Background: Early Childhood Education (ECE) classrooms are an excellent setting for the social-emotional development of children, as there are naturalistic opportunities for learning during interactions with peers and teachers (Siller et al., 2023). Student engagement in the classroom is important to cultivate because it has been shown to predict academic success (Guo et al., 2011; Ponitz et al. 2009). The

objective of this study is to use a “train-the-trainer" framework to implement a coaching framework to increase student engagement and enhance student-teacher relationships in inclusive ECE classrooms. The framework is based on the Social Emotional Engagement – Knowledge and Skills for Early Childhood (SEE-KS-EC) and has been adapted to include culturally responsive and trauma-informed practices.

Methods: Pre-implementation interviews occurred in May 2023 to understand the alignment of the adapted SEE-KS-EC with other school initiatives and potential barriers to delivering and sustaining the coaching framework. Survey, observational, and qualitative measures will evaluate the feasibility and acceptability of SEE-KS-EC delivery and impact on teacher-coach relationships and teacher self-efficacy. Participants include 12 ECE Instructional Support Specialists (ISS) and 30 ECE Teachers within Atlanta Public Schools (APS). Descriptive statistics, qualitative coding, and bivariate correlation analyses were used for preliminary analyses.

Results: Pre-implementation interviews indicated a strong appreciation for the adapted coaching framework. Interviews also indicated a need to integrate the adapted SEE-KS-EC materials into school mandates and to foster continuous consultation and strong relationships between school representatives and the study team. Baseline survey results indicated that teacher burnout did not predict teachers’ self-efficacy building student engagement, using instructional strategies, and managing classroom behavior (ps > .05). Self-contained special education classrooms had the largest range of observational classroom engagement scores at baseline (1.3-3.45). Co-Taught classrooms had the smallest range of observational classroom engagement scores (3.1-3.6) and the highest average scores out of a 5-point Likert scale (M = 3.16).

Conclusion: While the adapted SEE-KS-EC coaching framework was positively received by APS coaches, implementation strategies indicate a need for strong investment and rapport between school representatives and the study team. Analyses are ongoing and data will be collected through the end of the 2023-2024 school year.

Enhancing Oro-nasal Fistula Healing: Targeted Treatment with Probiotic Bacterial Supernatant

Presenting Author: Keerthi Priya Chinniampalayam Sekar, PhD; Emory University

Poster Number: 66

Keerthi Priya Chinniampalayam Sekar1, Toma Afra2, Gacasan, Camilo Anthony2,Hope Robinson2, Sundus Kaimari2, Tim cha2,Rheinallt Jones 1,Steven L Goudy1**

Background: Oral cavity healing takes place amid persistent physical trauma, bacterial challenges, and a diverse array of microorganisms such as bacteria, fungi, parasites, and viruses. This process is particularly crucial following incidents of traumatic injury, cancer resection, and the correction of congenital anomalies, such as cleft palate. Unfortunately, adverse healing outcomes are observed in a significant proportion of cases after cleft palate repair, affecting up to 60% of children (1 in 700 births). This often results in the formation of an Oro-nasal fistula (ONF), characterized by a direct opening between the mouth and nose. Repairing such complications typically necessitates multiple surgeries. Our hypothesis

revolves around the potential impact of the oral microbiome on enhancing the healing of Oro-nasal fistulas.

Methods: A critical-sized defect, representing a 1.5mm Oro-nasal fistula (ONF) injury, was replicated in the hard palate of NOD /SCID mice. A hydrogel containing L.Lactis cremoris(LLC) bacteria and ThP1 cells was then implanted at the ONF injury site. Harvesting of healing tissue and hard palate mucosa was conducted at days 1, 3, 5, and 7. Evaluation of the healed area and histological analysis aimed to explore the impact of LLC bacteria with ThP1 cells on pro-regenerative cell infiltration during the wound healing process of ONF. Additionally, multiplex assays were employed to assess cytokine production in ThP1 cells and macrophages treated with LLC bacteria.

Results: We observed that immune cell response (monocyte and macrophage) to oral wound healing with greater effects on pro-regenerative subsets following probiotic bacterial treatment along with THP1 cells. Invitro cytokine analysis of human THP-1 cells stimulated with supernatant from LLC culture induced the production of increased anti-inflammatory cytokines(IL-10 &1L-27) responsible for tissue regeneration. Endoscopic images showed 9 out of 10 (90%) of mice, compared to healing rates of between 50% and 75% in the control groups on Day 7 following PEGMAL hydrogel with bacterial supernatant.

Conclusion: This research not only advances our understanding of oral wound healing but also opens avenues for future interventions that leverage the oral microbiome to enhance regenerative processes, particularly in challenging cases such as cleft palate repair-associated Oro-nasal fistulas. The implications of our findings extend beyond the realm of experimental studies, offering promise for the development of innovative strategies to improve clinical outcomes in patients undergoing oral cavity reconstruction.

Investigating the correlation between plasma cytokines and levels of virus rebound post-ATI in SIVmac251 infected infant rhesus macaques

Presenting Author: Tehillah Chinunga, Bachelor of Science Biology; Emory University

Poster Number: 55

CHINUNGA, TEHILLAH; Coirada, Fernanda; Bruno Fernanda; Medeiros Giuliana; Del Rio Estrada, Perla; Bricker, Katherine; Chahroudi, Ann; RIBEIRO SUSAN

During HIV or if modeled in non-human primates (NHPs) SIV infection, in addition to viral replication and CD4+ T cell depletion, inflammation persists. Anti-retroviral therapy (ART) suppresses viral replication, however, upon analytical treatment interruption (ATI), virus rebound occurs. Despite known effects of ART in lowering inflammation, the role of cytokines that contribute to persisting inflammation and their correlation with viral rebound dynamics, is yet to be determined. Moreover, literature on the cytokine profile of children living with HIV (CLWH) lacks an understanding of a mechanism by which viral rebound dynamics occur between high vs low rebounders during ATI.

We determined the plasma cytokine levels in SIVmac251-infected infant rhesus macaques (RMs) by using the Mesoscale discovery (MSD) assay. Twenty-nine (29) cytokines (IFN-γ, IL-10, IL-12p70, IL-17A, IL-1β, IL-

2, IL-4, IL-6, IL-8, TNF-α, CTACK, Fractalkine, ITAC, IFN-α-2a, IL-15, IL-18, IL-7, IP-10, MCP-1, MIP-1α, TGF-β1, TGF-β2, TGF-β3, GRO-α, IL-22, IL-9, MCP-2, MIP-3α and MIP-3β) were measured in plasma from eight SIVmac251-infected infant macaques, infected at 4 weeks old, at five-time points; 1-6 weeks post infection (wpi) pre- and early-ART, 62wpi late ART, 68wpi early-ATI and late-ATI and 82-83 wpi late ATI for all eight RMs. Analysis was performed in R studio and GraphPad Prism. First, we determined the dynamics of these cytokines over time; second, we determined cytokine clusters; third we determined cytokine correlations at various time points with viral load post-ATI and virologic readouts.

We observed increased levels of IP-10, CTACK, ITAC (pre-ART), IL-2 (late-ART), and MIP3β (pre-ART and early-ATI) whereas low levels of TGF-β3, IFN-α2a (late- ART), and MCP-1 (late ART, early-ATI, late-ATI). Interestingly, we identified three cytokine clusters grouped into: pro-inflammatory, anti-viral/migratory and homeostatic biologic profiles. Pro-inflammatory cytokines such as GRO-α, IP-10 and CTACK measured at early-ART, late-ART, and late-ATI respectively, were significantly inversely correlated with viral rebound while MCP-1 and MIP-3β at late-ART and late-ATI respectively, were significantly directly correlated with log plasma viremia at 16 weeks post ATI (ie, viral set point). This data suggests a role of cell trafficking in viral replication post-ATI. Additionally, IP-10(late-ART), MCP-1 and MIP-3β (early-ATI) and IL-6, MIP-3β and CTACK were significantly and either directly or inversely correlated with viral load AUC post-ATI.

Postoperative Arrhythmia in Patients Following the Norwood Operation

Presenting Author: Emma Kate Costanza, B.S. Biomedical Engineering; Emory University

Poster Number: 60

Amedi, Alan; COSTANZA, EMMA KATE; Masotti, Ryan; Rodriguez-Morales, Paola; Seitter, Brooke; Whitehill, Robert; Whitehill, Robert; Beshish, Asaad; and Lin, Michael.

Background: Arrhythmias are recognized complications following congenital heart surgery and have been shown to be independently associated with increased morbidity and mortality. We aim to report the prevalence of arrhythmias in this population at our center and describe the use of antiarrhythmic treatments.

Methods: Single-center retrospective study at quaternary children's hospital between 2010 and 2023. All neonates who underwent the Norwood operation were included. Pre-operative, intra-operative and post-operative data including arrhythmia data were abstracted via electronic medical record. Only arrhythmias requiring intervention were included. Descriptive analysis was performed to characterize the prevalence of arrhythmias and anti-arrhythmic therapies.

Results: There were 323 patients who underwent the Norwood operation. Median age 5 days (IQR 4 - 7d) and weight of 3.2kg (IQR 2.8-3.5kg). The most common primary diagnosis was Hypoplastic Left Heart Syndrome (n=234, 72.4%), and 9 (2.7%) had heterotaxy syndrome. Systemic right ventricle was the most common 276/323 (84.5%), and the most common source of pulmonary blood flow was Sano shunt 229/323 (70.9%).

Arrhythmia was present in 109 patients (33.7%). The most common arrhythmia was tachyarrhythmia in 102/109 patients (93.6%), and 2 or more tachyarrhythmias occurred in 18/102 (17.6%) of patients. Re-entrant supraventricular tachycardia (SVT) occurred in 37/102 (36.3%), ectopic atrial tachycardia (EAT)/atrial ectopy in 49/102 (48%), junctional ectopic tachycardia (JET) in 18/102 (17.6%), atrial flutter in 8/102 (7.8%) and ventricular tachycardia (VT) in 11/102 (10.8%). Common therapies for EAT/atrial ectopy include procainamide 32/49 (65.3%) and esmolol 20/49 (40.8%). Common therapies for JET include procainamide 9/18 (50%) and amiodarone 10/18 (55.6%). Lidocaine was used in 6/11 (54.5%) for VT. Bradyarrhythmia occurred in 12/323 (3.7%) of the patients, 6/12 (50%) had sick sinus syndrome, 5/12 (41.7%) had either 2nd degree or complete heart block. 7/12 (58.3%) of these patients required the placement of a permanent pacemaker.

Conclusion: Tachyarrhythmias are common in the postoperative period following the Norwood operation. Re-entrant SVT, EAT and JET are the most prevalent. Procainamide, amiodarone and esmolol are common therapies. Ventricular arrhythmias and bradyarrhythmias are rare. Future studies will need to be performed to evaluate the risk factors for developing arrhythmias and their associated outcomes.

Feasibility of Detecting Daily Infant Cry Rhythm in Autism from Home Audio Recordings: A Pilot Study

Presenting Author: Danny Dagher, None; Innovation Academy

Poster Number: 99

Dagher, Danny; and Ramsay, Gordon

Background: Neurological disorders like autism are known to impact early vocal development, including cry, and are often accompanied by disruptions of circadian rhythms affecting sleep and other processes. Patterns of vocal distress signals throughout the day may serve as potential biomarkers of risk and predictors of outcome, but research on this topic is lacking as sufficient data have not been available to date in the first year of life. The goal of this pilot study was to examine daily rhythms of cry behavior in an infant with autism, in order to establish the feasibility of measuring disruptions of diurnal vocalbehavior as early indicators of autism risk.

Methods: As part of an NIH-funded Autism Center of Excellence (P50 MH100029), all-day home audio recordings were collected from more than 500 infants every month from 0-36 months. To establish the feasibility of analyzing rhythms of infant cry in autism, cry episodes were exhaustively hand-labeled from two of those recordings collected in the first two months of life from an infant later diagnosed with ASD, as part of a high-school project. Inter-cry intervals and cry durations were calculated from 2930 individual cry vocalizations. The distribution of each measure was determined for each quarter of the day, using t-tests and Kolmogorov-Smirnov statistics to test for significant differences in mean values and distributions throughout the day.

Results: Significant differences ($P<0.05$) in both cry duration and inter-cry interval were found between the 2nd and 3rd quarters with the 1st and 4th showing no significant difference. Based on previous

studies of typical development, we expected no difference in cry rate or an increase towards the end of the day.

Conclusion: Analysis of home audio recordings can be used to detect changes in daily rhythms of cry relevant to ASD. Future research will focus on automating the analysis, using the entire corpus to compare infants later diagnosed with autism against typically developing and developmentally delayed controls.

Impact of Linkage-To-Care Coordinator on Establishing Care for Newly Diagnosed Adolescents Living with HIV

Presenting Author: Jordan Daniel, MPH; Emory University

Poster Number: 117

DANIEL, JORDAN E.; Griffiths, Mark A.; François, Sandy; Cameron, Melissa N.; Wynn, Bridget A.; Brown, Sara P.; Thompson, Sarah; Carter, Rebeka G.; DeNaples, Kelly; Kandaswamy, Swaminathan; Orenstein, Evan; Camacho-González, Andrés; Morris, Claudia R. and

Ideal linkage-to-care rates for adolescents living with HIV (ALHIV) is 95%, however the Centers for Disease Control and Prevention reported rates of 80%. The lowest linkage-to-care rates observed are within emergency departments and adolescents. This creates a challenge for Children's Healthcare of Atlanta (Children's) new implementation of opt-out HIV Screening for patients in the pediatric emergency department (ED). The objective is to show the necessity for a specialized linkage-to-care coordinator (LC) for newly diagnosed ALHIV to increase linkage rates.

Children's electronic medical record EPIC was used to identify the newly diagnosed 13–24-year-old patients beginning on July 6th, 2023. All new ALHIV status was disclosed and linked to care, via the LC, to Grady's Ponce de Leon Center. The LC attended the first appointment at the Grady Center with the ALHIV and their guardian. Linkage rates were measured from the date of disclosure to the date of first appointment. The data was reviewed using descriptive statistics.

A total of five new ALHIV were identified since the beginning of the clinical implementation. The median age was 15.8, and their assignment at birth was 5 male and 1 female. The linkage-to-care rate was 100% with an average of 12.6 days from disclosure to first appointment: with a range of 1 to 48 days. All but one ALHIV was linked within 1 month of disclosure, however all were linked within 3 months of disclosure.

The push for HIV screening in ED's has grown, as well as testing for adolescents; both with the intention of earlier diagnosis and improved clinical outcomes. Having a linkage-to-care coordinator who can focus on the patient can led to successful linkage to care of ALHIV. The new implementation will continue to identify new ALHIV and having a dedicated LC to provide linkage-to-care specialized to the patient can lead to an increased linkage-to-care rates and retention.

Natural Airway Sedation for Pediatric Patients Receiving Iodine 131 MIBG Therapy in the Pediatric Intensive Care Unit

Presenting Author: Jordann Dhuse, M.D.; Emory University

Poster Number: 109

Dhuse J; Cash T; Elges SM; Alazraki A; Beer RJ; Jergel A; Goldsmith K; Hall M and Kamat PP

Background: Children with high-risk neuroblastoma receiving I-131 metaiodobenzylguanidine (I-131 MIBG) therapy often require sedation and analgesia prior to MIBG and adherence to strict radiation safety guidelines during MIBG infusion and clearance to ensure patient and staff safety. We evaluated the sedation-analgesia trends of patients undergoing I-131 MIBG therapy using the Pediatric Health Information System (PHIS) database and describe our own institutional sedation practice.

Methods: Retrospective data from 476 patient encounters from the PHIS from 2010-2019 as well as a case series of 13 patient encounters from Children's Healthcare of Atlanta were reviewed.

Results: Using PHIS data, we discovered considerable variability in the medications used for sedation in patients undergoing I-131 MIBG therapy at 16 PHIS institutions. Although benzodiazepines and opioids were the most used agents, there was a trend towards decreasing use of benzodiazepines and opioids in these patients after 2016. Furthermore, there has been an increasing trend in the use of dexmedetomidine and ketamine after 2016. When broken down into age groups 0-3 years and older than 3 years of age, dexmedetomidine was used more frequently in the younger age group (14.19% vs. 5.80%), while opioids were used more frequently in the older age group (36.23% vs.23.87%) (both $p < 0.05$). Our institutional case series describes the use of propofol by pediatric intensivists for the initial procedural sedation in patients undergoing I-131 MIBG therapy. We also report the use of ketamine and dexmedetomidine for prolonged sedation in these patients. Only 2/13 patients in our institutional cohort required midazolam because of the difficulty of sedation with other agents.

Conclusion: Pediatric intensivists can sedate patients undergoing I-131 MIBG therapy using propofol and fentanyl for bedside procedures without anesthesiologist or operating room resources. Ketamine and dexmedetomidine, with proper procedural monitoring, can be used for prolonged natural airway sedation without serious adverse events in the PICU.

Early Trajectories of Parenting Stress in Autism: Comparing Caregivers Across Infant Diagnostic Outcomes

Presenting Author: Josie Dylan Douglas-Brown, Bachelor of Science, Psychology; Marcus Autism Center

Poster Number: 77

DOUGLAS-BROWN, JOSIE DYLAN; Kushner, Elizabeth; Goodman, Sherryl H.; Paredes, Jose Luis; Walum, Hasse; Edwards, Laura A.; Shultz, Sarah; and Jones, Warren

Background: Caregivers of children with autism report greater parenting stress than the general population (Hayes & Watson, 2013). Parenting stress predicts caregiver's mental health outcomes and delays in children's social-emotional development (Ridgeway et al., 2024; Thomason et al., 2014). Infants with autistic siblings are at elevated likelihood (EL) of being diagnosed themselves; longitudinal cohort studies following these infants are commonly used to study early autism development. Despite this population's high rates of stress, services focused on promoting caregiver wellbeing are limited. Understanding caregivers' stress within the postpartum period may provide a unique opportunity to support caregivers as their children begin receiving services. Thus, we aim to characterize parenting stress trajectories for caregivers of children with varying diagnostic outcomes.

Methods: Participants included caregiver-infant dyads participating in a longitudinal study from birth to three years of age. Throughout, caregivers completed the Parenting Stress Index (PSI), which measures caregiving-related stress (Abidin, 1995). Children underwent diagnostic evaluations at 21 and 30 months. Infants' classifications reflect elevated- or low-likelihood status (EL; LL) and final diagnostic outcome (autism/no autism), producing three groups with a total of 168 dyads: EL-AUT (n = 33) , EL (n = 50), and LL (n = 85). At the time of PSI completion, infant age averaged 422 days (range: 3–1118 days). Using a 2nd degree polynomial mixed model, we evaluated associations between infant age, diagnostic outcome, and parenting stress. We hypothesized parenting stress would be highest for caregivers of EL-AUT infants and lowest for those of LL infants.

Results: There were significant main effects of diagnostic outcome ($F(2,591) = 18.243$, $p < .001$, $\eta 2 = 0.072$) and infant age on PSI scores ($F(2,591) = 4.504$, $p = .011$, $\eta 2 = 0.018$), such that scores increased over time for all groups. Post-hoc analyses indicate significant differences between all groups; EL-AUT caregivers' scores being highest and LL caregivers' lowest.

Conclusions: Caregivers of EL-AUT infants demonstrated the highest stress levels, even before children were diagnosed with autism. Across diagnostic outcome groups, stress levels were non-linear across development. Additional research may clarify the relationship between child development over time and caregiver stress.

Predictors of Temperament in Infants with Suspected Abusive Head Trauma

Presenting Author: Ashley Fournier-Goodnight, PhD; Emory University

Poster Number: 92

Mohamed, Rania; and FOURNIER-GOODNIGHT, ASHLEY

Background: Infants with abusive head trauma (AHT) typically exhibit short term deficits involving early linguistic as well as visuospatial processing and motor skills, which is particularly true for infants with severe brain injuries admitted to inpatient rehabilitation units (IRU). Short term deficits in early emotion and behavior regulation are also common for this clinical group, but formal characterization of this through testing has received little attention in the literature. The goal of this study was to investigate

short term outcomes regarding emotional and behavioral regulation or temperament among this clinical population using valid and reliable tests.

Method: The medical records of 13 infants with suspected AHT admitted to an IRU were reviewed. Data from premorbid ratings on the Adaptive Behavior Assessment System, 3rd Edition (ABAS-3) as well as the postmorbidly administered Mullen Scales of Early Learning, AGS Edition (Mullen) and Baby Pediatric Symptom Checklist (BPSC) were included. Descriptive statistics and Pearson correlations were conducted to characterize the sample and determine predictors of temperament.

Results: Caregiver ratings of premorbid adaptive functioning were average (ABAS-3 General Adaptive Composite scaled score [SS] M=93.53). Though early learning capacity was below average (Mullen Early Learning Composite SS M=74.76), emotion and behavior regulation were consistent with age expectations following injury (BPSC Inflexibility summed score [SmS] M=1.30, Irritability SmS M=1.92, Difficulty with Routines SmS M=1.30). Time from injury was the best predictor of temperament (BPSC Inflexibility r=0.42, Irritability r=0.35, Difficulty with Routines r=0.37), but moderate to strong correlations were also observed with other predictors (injury severity with BPSC Inflexibility r=0.72, Difficulty with Routines r=0.58; Mullen with BPSC r range=0.76-0.33; age at injury with BPSC Inflexibility r=0.60, Difficulty with Routines r=0.33; age at assessment with BPSC Inflexibility r=0.65, Difficulty with Routines r=0.37).

Conclusion: Global premorbid adaptive functioning is slightly lower than expected among infants with suspected AHT receiving inpatient rehabilitation, which may negatively influence short term neurobehavioral outcomes following brain injury. Postmorbid emotion and behavior regulation or temperament are comparatively intact despite significant deficits with other neurobehavioral systems. Temperament is best predicted by time since injury and injury severity with regard to short term outcomes.

Exploring Energy Dysfunction-Induced Acetylation of Cyclophilin D: Implications for a Novel Mode of Mitochondrial Permeability Transition Pore Regulation

Presenting Author: Nasab Ghazal, MS; Emory University

Poster Number: 67

GhAZAL, NASAB; Huang, Benjamin; Gokhale, Avanti; Faundez, Victor; Kwong; Jennifer Q.

BACKGROUND: Mitochondria hold the key to cellular life and death by switching from their primary function as a main source of cellular energy to serving as a central hub for the activation of cell death pathways in response to pathogenic stressors. In addition to cell death via apoptosis, mitochondria can trigger cell death through the action of the mitochondrial permeability transition pore (MPTP). The MPTP is a non-specific channel activated by oxidative stress and calcium overload. Acute opening of the MPTP allows solutes up to 1.5kDa into the mitochondria leading to mitochondrial swelling and rupture, and ultimately, cell death. Critically, this mode of cell death is particularly important to conditions like cardiac ischemia-reperfusion injury and neuronal excitotoxic damage. Cyclophilin D (CypD) is a

mitochondrial protein that is well-known to regulate MPTP sensitivity. Thus, understanding CypD regulation is a research area of high interest. This study explores how post-translational acetylation of CypD impacts MPTP regulation.

METHODS: Using a mouse model of mitochondrial cardiomyopathy, we identified novel CypD acetylation sites that inhibited MPTP opening, an effect that differs from previous studies that suggest that CypD acetylation enhances MPTP activation. Our study aims to assess the functional impact of CypD acetylation at these novel sites. We employed CypD-deficient cells re-expressing acetylation mimics (K86Q and K67Q) to investigate their functional consequences.

RESULTS: Our findings reveal that acetylation at these specific lysines inhibits CypD function, rendering the MPTP less sensitive to calcium overload and potentially protecting cells from death. Furthermore, preliminary mass spectrometry data suggests these modifications disrupt CypD's interaction with other key mitochondrial proteins, potentially influencing MPTP function.

CONCLUSIONS: These findings highlight the multifaceted role of CypD acetylation in regulating cell fate. While CypD inhibition has been proposed as a therapeutic target, our work suggests that targeting specific acetylation sites could offer a more nuanced approach. By understanding how CypD modifications influence its function and interactions, we pave the way for novel therapeutic strategies in diseases where MPTP inhibition holds promise.

Assessment of Peri-Operative Risk Factors Associated with Post-Operative Acute Kidney Injury in Neonates

Presenting Author: Matthew Gillen, MD; Emory University

Poster Number: 68

GILLEN, MATTHEW; He, Zhulin; Gauthier, Theresa; Patel, Ravi; Greenbaum, Larry; Poindexter, Brenda; and Shin, H Stella

Background: Acute kidney injury (AKI) affects about one-third of critically ill neonates and is associated with increased morbidity and mortality. Peri-operative risk factors that predict post-operative AKI require further investigation.

Objective: To describe the epidemiology of post-operative AKI in neonates undergoing small bowel resection and to compare peri-operative risk factors for post-operative AKI.

Methods: We performed a retrospective observational cohort study for neonates (≤ 28 days) undergoing small bowel resection between 1/1/17-6/30/22 at the Children's Healthcare of Atlanta Egleston and Scottish Rite Level IV NICUs. Death within 24 hours of surgery, prior renal replacement therapy, and congenital anomalies of the kidney and urinary tract (CAKUT) were exclusion criteria. The incidence of post-operative AKI and the contribution of birth weight, binarized at 1500g was evaluated.

Results: In total, 244 neonates underwent small bowel resection. Fifteen patients were excluded (2 died; 13 had CAKUT); 229 patients met inclusion criteria. One-hundred thirty-three patients (58%) were male.

Median gestational age was 33 weeks (IQR 26 to 36), and median age at surgery was 5 days (IQR 2 to 14.5). Median birthweight (BW) was 1960g (IQR 983 to 2755). Ninety-four patients (41%) had BW ≤ 1500g, while 135 patients (59%) had BW > 1500g. Sixty-two patients developed post-operative AKI (overall incidence 27.1%; 95% CI 21.3% to 32.9%). Pre-operative mechanical ventilation (P<0.001), pre- and post-operative blood transfusions (P=0.001), and peri-operative vasoactive medications (P=0.02) were associated with post-operative AKI. Post-operative AKI was associated with in-hospital mortality (P=0.002). Forty percent of patients with BW ≤ 1500g had post-operative AKI while 18% of those with BW > 1500g developed post-operative AKI (P<0.001).

Conclusions: Post-operative AKI is estimated to occur in ~1 in 4 neonates undergoing small bowel resection and the risk is higher among infants ≤1500 g. Pre-operative identification of surgical neonates at risk for post-operative AKI could guide peri-operative risk mitigation strategies and improve patient outcomes.

Adherence to HIV Protocols to Prevent Maternal-Child HIV Transmission among Birthing Hospitals in Alabama

Presenting Author: Divya Goel, B.S.; University of Alabama at Birmingham Heersink School of Medicine

Poster Number: 84

GOEL, DIVYA; Ball, Amy; Cedergren, Britta; Poole, Claudette; Jackson, DeAnne; and Hill, Samantha

Background: Mother-to-Child transmission accounts for 0.10% of HIV incidence in Alabama. The Center for Disease Control and Prevention's (CDC) HIV Prevention of Maternal-to-Child Transmission (PMTCT) protocol aims to reduce HIV incidence to less than 1:100,000 live births. This study evaluates Alabama hospitals where individuals give birth (birthing hospitals/BH) adherence to the CDC PMTCT protocols.

Methods: Staff at 46 Alabama BH were contacted to complete a CDC-informed HIV PMTCT protocol survey specific to their department (laboratory, pharmacy, labor and delivery (L&D), nursery, obstetrics (OB)). Survey domains assessed written policies related to PMTCT, HIV screening practices, availability of antiretrovirals, and follow-up of infants with HIV exposure. Each department's responses were scored 1 (nonadherence or incomplete) or 2 (adherence). Multiple scores from the same BH department were averaged. Adherence categories were created using maximum and minimum score tertiles for each department. L&D and pharmacy scores were categorized as low adherence- 10-12, partial adherence- 13-16, and high adherence- 17-20. OB provider scores were categorized as low adherence- 7-9, partial adherence- 10-12, and high adherence- 13-14. Lab scores were categorized as low adherence- 4-5, partial adherence- 6, and high adherence- 7-8. Nursery scores were categorized as low adherence- 13-16, partial adherence- 17-21, and high adherence- 22-26. Each BH received a score which combined all departments, categorized as low adherence- 44-58, partial adherence- 59-73, and high adherence- 74-88.

Results: From 46 hospitals, 12, 12, 24, 10, and 2 surveys were received from laboratory, pharmacy, L&D, nursery, and OB providers respectively. One hospital completed surveys from every department. The

score for laboratory surveys was 5 (low adherence). The scores for pharmacy, labor and delivery, nursery, and OB surveys were 16, 14, 21, and 12 respectively (partial adherence). Lack of knowledge, access to recommended HIV testing for pregnant people and recommended treatment for an infant who has been exposed to HIV showed the lowest adherence to the protocol.

Conclusion: These results show adherence to CDC HIV PMTCT protocols in Alabama is lacking. There is a need to implement interventions that improve BH knowledge of and access to treatment for pregnant people with HIV in Alabama to eliminate PMTCT.

Taking a Closer Look at Diagnostic Accuracy Studies Using the M-CHAT Autism Screening Tool

Presenting Author: Alexa Gonzalez Laca, Bachelors in Science, Master in Public Health (May 2024); Emory University Rollins School of Public Health

Poster Number: 44

GONZALEZ LACA, ALEXA and Brian Barger

The M-CHAT is a population level autism screening tool thought to be “high quality”, but longitudinal studies suggest it is weaker than earlier cross-sectional studies suggested (Guthrie et al., 2019). This study critically analyzes diagnostic accuracy metrics from reported cross-sectional studies in a recent meta-analysis: "Sensitivity and Specificity of the Modified Checklist for Autism in Toddlers (Original and Revised)” (Wieckowski 2023). Specifically, this study applies prevalence-based adjustments to determine the likely number of children incorrectly classified as a false negative (i.e., have autism but M-CHAT missed). Further, to address two different types of potential bias (demographic and methodological), this study also conducted analyses to determine if reported accuracy is impacted by participant background variables associated with delays in early identification (e.g., % Black) and originator effects (i.e., stronger effects for studies from original M-CHAT authors). This study was guided by Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Fifty articles were selected from Wieckowski (2023), 10 articles were cross-sectional population level screening studies.

Four diagnostic accuracy outcomes representing different assumptions were analyzed and compared: i) non-adjusted original, ii) epidemiological adjusted, iii) adjusting for positive screen cases missed to follow up, iv) epidemiological adjusted with positive screen cases missed to follow up. The primary hypothesis was that epidemiological adjustments will decrease sensitivity estimates similar to longitudinal studies. All analysis was conducted with functions from the Meta-Analysis of Diagnostic Accuracy (MADA) R-statistical package. Reitsma models were used to calculate pooled diagnostic metrics and predictors (i.e., background and author affiliation) and data are visualized with stratified receiver operating curves (ROC) with Guthrie et al.’s reported sensitivity as a benchmark (0.40). As hypothesized, epidemiological adjustments resulted in lower mean estimated sensitivity (0.58) followed by epidemiological positive screen adjustments (0.78), non-adjusted original (0.82), and original with positive screen adjustments (0.85). Racial/ethnic demographic was not available in most studies. The use of epidemiological adjustments can provide a more accurate representation that can improve early screening outcomes. Improving diagnostic standard measurement properties and developing

appropriate thresholds for screening instruments can efficiently improve early identification efforts and lead to improving child outcomes.

Addressing Latino Disparities in Autism via Culturally Responsive Caregiver Coaching Groups

Presenting Author: Karen Guerra, Master of Science; Marcus Autism Center

Poster Number: 100

Guerra, Karen; ValladarezOrtiz, Selena; and Pickard, Katherine

Addressing Latino Disparities in Autism via Culturally Responsive Caregiver Coaching Groups

Karen Guerra, M.S., CCC-SLP, Selena Valladares Ortiz, Katherine Pickard PhD

Background: Research has shown that Latino caregivers of autistic children experience a range of services disparities (Magaña et al., 2012; Magaña et al., 2015; Montes & Halterman, 2011). For example, Spanish-speaking (SS) Latino children are less likely than non-Latino children to be diagnosed with autism before the age of 4 years (Christensen, Baio, Braun, et al., 2020). Following diagnosis, SS Latino children/caregivers receive fewer evidence-based treatments and less medical specialty care than their Non-Latino White counterparts (Zuckerman, 2020). The goal of this abstract is to describe the outcomes of a research project that developed and evaluated caregiver support groups for SS Latino caregivers of autistic children when delivered by culturally and linguistically responsive facilitators.

Methods: 12 SS Latino parents of autistic children (2-5 years) were recruited from a center that provided autism-related services in an urban area. Families participated in virtual support groups facilitated by a SS Latina speech-language pathologist once a week for 12 weeks. Groups provided caregivers with education on autism, service navigation, developing routines, sleep, speech milestones, bilingualism, and self-care. Caregivers completed empowerment and social support measures at pre and post time points with the option of completing an exit interview regarding their experiences in the support group.

Results: Caregivers reported high satisfaction with the virtual caregiver groups (M=94.6%). Additionally, caregivers indicated significantly higher self-efficacy supporting their child after participation in group (p=0.08). Qualitatively, participants noted that the presence of a SS Latina facilitator and other SS Latino parents was positively received by participants, fostering cultural identity and support. Parents revealed that having sessions in Spanish facilitated their learning and connection to other parents. Despite having children with different needs, parents found shared experiences helpful in anticipating future challenges, navigating institutional systems, and advocating for appropriate autism related services.

Conclusion: The following study highlights the need to address disparities in autism care for SS Latino families by developing culturally responsive coaching/support groups. Participants reported high satisfaction with our virtual Spanish led groups and emphasized the need for more accessible and culturally responsive care in other settings and across the autism lifespan.

Statistical Power and Estimation for the Partially Overlapping t-test

Presenting Author: Zhulin He, PhD; Emory University

Poster Number: 122

He, Zhulin; Westbrook, Adrianna Lynn; and Bai, Shasha

Background: The t-test is indubitably the most frequently used statistical procedure for comparisons between the means of two groups. Paired t-tests and two-sample t-tests are used for paired and unpaired observations, respectively; however, in practice, observations may overlap due to non-mutually exclusive groups, missing visits, or loss to follow-up. Partially overlapping t-test was developed to handle these scenarios but it is mathematically more complicated, not widely known, and not easy to implement.

Methods: We present simulation results of point estimation and statistical power on the performance of three t-tests in the scenario of partially overlapping dataset: two-sample independent t-test, paired t-test and partially overlapping t-test. Our simulations consider multiple scenarios in a variation of mean differences, equal and unequal variances, and overlapping rates.

Results: When the overlapping rate is high, the paired t-test performs similarly to the two-sample t-test and partially overlapping t-test. Conversely, when the overlapping rate is low, the paired t-test produces overly biased estimates of the true difference and p-value compared to the two-sample t-test and overlapping t-test. The two-sample t-test and overlapping t-test performed similarly in all simulation settings.

Conclusions: The partially overlapping t-test is developed for a mixture data structure. However, the two-sample t-test is a comparable alternative when the partially overlapping t-test is inaccessible due to lack of knowledge or software options.

Selection of Second Line Therapies for Sickle Cell Disease Based on Red Cell Function

Presenting Author: Britney Hernandez, Bachelor of Science; Emory University

Poster Number: 56

HERNANDEZ, BRITNEY; Evans, Erica; Patel, Ashwin; Williams, Kendall; Fibben, Kirby; Fay, Meredith; Lam, Wilbur; Sheehan, Vivien

Background: In sickle cell disease (SCD), abnormal red blood cells (RBCs) sickle upon deoxygenation due to polymerization of hemoglobin S (HbS). Sickle RBCs exhibit increased density, poor deformability, increased viscosity relative to hematocrit, and increased adhesion in the microvasculature. We hypothesize that there is significant variability of rheology biomarkers between individuals with SCD on standard of care therapy, and that the most severe aspects of their red cell pathophysiology can be identified and targeted by novel SCD second line therapies if needed for clinical optimization.

Methods: Peripheral blood was collected from 312 hydroxyurea-treated pediatric patients with SCD. Whole blood viscosity, %DRBC, complete blood count, and deformability using an oxygen gradient ektacytometer were measured. Washed red blood cells were analyzed for adhesion to a laminin-lined microfluidics network. Venn diagrams were constructed comparing overlap between the top 25% most severe biomarker values.

Results: Values for red cell function in a pediatric SCD population varied by individual. High PoS, adhesion index, %DRBC, and low EImin and EImax, low HVR, are associated with disease severity and clinical complications in SCD; biomarker values were stratified from high to low severity association. The most severe quartile subjects from each biomarker were compared to the most severe quartile subjects from another. Only 4 individuals out of 312 were in the top severity quartile for all biomarkers.

Conclusions: An individual with SCD's RBC phenotype can be assessed with existing devices; more rigid, adherent, dense, low oxygen carrying capacity, or easily sickled at high oxygen tension. It is possible to choose the appropriate second agent to be added to HU based on individual patient RBC phenotype, according to the principles of precision medicine. These same RBC function biomarkers used to phenotype the individual's red cells can then be used to monitor response to therapy. It is encouraging that these RBC biomarkers and others are secondary or exploratory endpoints in several ongoing pharmacologic and gene-based therapy trials. Future goals are to obtain CLIA certification for novel devices like the oxygen gradient ektacytometer and adhesive microfluidics at major academic SCD centers, and use these biomarkers in routine patient care.

Oocyte Cryopreservation in Adolescents: Navigating Complications Amidst Hematological Challenges

Presenting Author: Alexandra Herweck, MD, MPH; Emory University

Poster Number: 118

Herweck, Alexandra; SANCHEZ-MEDINA, MARIANA; Schirmer, Austin; Lee, Jacqueline; and Sokkary, Nancy

Background: Oocyte cryopreservation for adolescent females undergoing hematological stem cell transplantation is gaining prominence, necessitating a closer look at potential complications and perioperative considerations. There are implications for this procedure and postoperative course based on hematologic status. Benign symptoms like abdominal bloating and discomfort are common making evaluation of postoperative complaints challenging. Therefore, pediatric services should be aware of these complications as patients may present to their institutions.

Methods/Results: A 17-year-old female with aplastic anemia underwent oocyte cryopreservation in preparation for an allogenic bone marrow transplant. She underwent an antagonist stimulation protocol followed by a GnRH agonist trigger with 11 oocytes retrieved. On post-operative day 1, she presented to the pediatric ER with right lower quadrant pain and nausea. Vitals signs were normal. She had pancytopenia (ANC 80, PLT 61, Hbg 8.2). Abdominal/pelvic ultrasound showed bilateral ovarian enlargement, prominent follicles, and preserved doppler flow and cholelithiasis without cholecystitis. Pediatric surgery was consulted, and she was discharged home after monitoring and improvement in

symptoms, assumed to be due to constipation and expected post-retrieval discomfort. She was readmitted two weeks later for planned BMT. During her stay, she continued to have abdominal pain, repeat imaging revealed appendicitis and persistently enlarged bilateral ovaries with follicles. She was managed conservatively and discharged home. Nine days later she was readmitted due to fevers and found to have bacteremia and a right adnexal hematoma with ongoing appendicitis. She was then taken to the OR by surgery who found right ovarian torsion and bilateral hemorrhagic cysts and appendicitis. Detorsion, drainage of right hemorrhagic cyst as well as appendicitis was performed. Her pain improved and she was discharged home after resolution of her bacteremia.

Conclusions: This case emphasizes a need for pediatric practitioners to be aware of post-operative complications following oocyte cryopreservation in patients with thrombocytopenia (i.e. hemorrhagic cyst and ovarian torsion). As oocyte cryopreservation becomes more common in adolescents, it is imperative to prioritize these complications in differential diagnoses for abdominal pain post-procedure. Rapid detection and treatment of ovarian torsion is crucial for patient outcomes. Gynecologic practitioners should also weigh potential risks in pancytopenic patients before cryopreservation.

Characteristics and Outcomes in Children with Down Syndrome Admitted to the Cardiac Intensive Care Unit following Cardiac Surgery

Presenting Author: Rachel Holstein, BA, MPH; Emory University School of Medicine

Poster Number: 69

HOLSTEIN, RACHEL; Keane-Lerner, Kasey; McLaughlin, Sarah; Shamah, Rebecca; Beshish, Asaad; Saini, Ashish

Background: Congenital heart disease (CHD) occurs in 40-60% of patients with Down Syndrome (DS), with a majority requiring surgical intervention. Associated comorbidities affecting various organ systems further influence their clinical course. Prior studies have shown that children with DS require more organ support than expected for the severity of the disease than in the general population, some of which worsen over time.

Methods: This was a single-center, retrospective descriptive study of children with DS and CHD who underwent cardiac surgery between January 2010 and December 2019 at the Children's Healthcare of Atlanta. The primary outcome was to describe the epidemiology of CHD and to characterize comorbidities, therapeutic interventions, and outcomes following surgical management of CHD. Analysis was performed using appropriate statistics.

Results: Our study cohort included 193 patients. The median age was 4.9 months, and the median weight was 5.3 kg at the time of surgery. 55.4% were female and 29.2% were preterm. The most common cardiac diagnoses were complete atrioventricular canal defect (CAVC) (45.1%) and ventricular septal defect (VSD) (19.2%). All but 24 (13.4%) underwent complete repair at the initial surgical encounter. The median duration of cardiopulmonary bypass and cross-clamp time were 100 minutes and 71 minutes, respectively. Eight patients developed complete heart block postoperatively with 7 requiring

permanent pacemaker (PPM) placement. All but 3 patients (1.6%) survived until hospital discharge. Pulmonary hypertension was evident in 25.7% of the patients at hospital discharge and 6.7% at the last follow up. At the time of discharge, 95% required diuretic therapy and 35.4% required afterload reduction with an angiotensin-converting enzyme inhibitor. The median age at last follow up was 7.3 years.

Conclusion: We describe our center's experience of children with DS and CHD showing that the most common diagnosis is CAVC (45.1%) followed by VSD (19.2%). Seven patients (3.6%) required PPM implantation and all but 3 patients (1.6%) survived hospital discharge. More research is needed to understand short- and long-term outcomes of children with DS.

APE: Allocation of Pre-specified Error For Sample Size Correlation Calculation with Heterogeneous Populations

Presenting Author: Paul Horton, MS, MBA, PhD Student; Georgia Tech

Poster Number: 110

HORTON, PAUL; Mei, Yajun

Background: Sample size calculation is an integral part of planning a well-controlled clinical trial. Previous methods for calculating sample size have either been limited to homogeneous populations or do not factor in the cost of acquiring samples. Our proposed method for sample size calculation is motivated by the problem of validating a novel device or treatment that requires comparisons to an established standard. The performance of the new process may depend on characteristics of a subgroup within the population necessitating multiple comparisons. We can consider an example of a diagnostic device which needs to demonstrate efficacy on children, adults, and the elderly.

Methods: We demonstrate that the global Type I/II error rates can be controlled through the independent local error rates. We construct an optimization problem using the constraints established from the Union-Interval construction. We show this is a convex problem and then solve it using a convex optimization algorithm which gives a cost optimal single stage method for sample size estimation which we call the Allocation of Pre-specified Error (APE) method. When then provide a heuristic to apply this method within the context of a group sequential design.

Results: We show the APE method minimizes costs for acquiring samples between subgroups while maintaining both Family-Wise Error Rate (FWER) and local Type I/II error rates. We prove that our proposal always has a cost less than or equal to the popular Bonferroni method. We give two scenarios where the APE method reduces costs relative to the Bonferroni method by 3.5% and 9%. Additionally, we use simulations to show where the APE method reduces the cost by 30% in a group sequential design compared to the Bonferroni method in a fixed design.

Conclusion: We provide a new method for minimizing the cost of clinical trials that is valuable for researchers and practitioners given the financial and ethical implications of conducting clinical trials. In

pursuit of personalized medicine, there will be a growing emphasis to demonstrate efficacy on subgroups of a population and thus an increased need for managing the multiple testing policy.

Examining Part-C Providers' Participation in Training of Early Intervention through RE-AIM framework

Presenting Author: Nailah Islam, B.S.; Emory University

Poster Number: 85

ISLAM, NAILAH; Yohannes, Millena; Hendrix, Nicole; Davies, Hannah; Buck, Ainsley; Pickard, Katherine

Background: State funded Early Intervention (EI) programs serve families of children birth to three years of age with developmental delays. EI systems often emphasize using family coaching models, including parent-mediated interventions, to enable and empower caregivers in their child's treatment (Stahmer et al., 2020). With evidence supporting the efficacy of manualized PMIs for autism (Rogers et el., 2022), Part-C systems are beginning to widely implement these programs. This study uses mixed methods to examine the lesser known broader implementation outcomes of an autism PMI within an EI system using the RE-AIM framework (Glasgow et al., 2019).

Methods: Forty-eight EI providers within Georgia's Part C system participated in training in Project ImPACT and attended group consultation. Providers represented diverse disciplinary backgrounds, including special instruction, speech language pathology, and occupational therapy. Quantitative data included training and consultation participation rates, Project ImPACT fidelity, and intentions to sustain the program. Semi-structured exit interviews were conducted at the end of training and consultation and focused on: 1) overall impressions; 2) how providers delivered and adapted Project ImPACT; 3) whether the intervention was delivered to families outside the context of the research study (i.e., reach); 4) the feasibility of learning and implementing Project ImPACT; and 5) intent to sustain Project ImPACT.

Results: Qualitative and quantitative data indicated providers were highly satisfied with learning Project ImPACT and delivered to families representative of population level demographics, including toddlers with and without autism. Participation in training initiatives showed high interest with 85 providers but less consistent enrollment and retention with 56% enrolled in training and 43% continuing in group consultation. Providers reported perceiving Project ImPACT as effective for children on their caseload. Consistent with other research, provider fidelity was variable and providers reported a high level of adaptation. Although no follow-up data was available for this study, providers reported high intentions to maintain their use of Project ImPACT.

Conclusions: Results suggest the need for more systematic strategies supporting the uptake and use of evidence-based PMIs in EI systems. Findings also suggests the need for more tailored training approaches, potentially embedded in the onboarding process for new EI providers.

A Methodology Template for Constructing Variables and Applying Survey Weights in Complex Survey Design Studies using R

Presenting Author: Andrew Jergel, Bachelor of Science in Biology; Master of Public Health in Epidemiology; Department of Pediatrics, Emory University

Poster Number: 93

JERGEL, ANDREW; Gillespie, Scott; Zapata, Lilian; and Fraser Doh, Kiesha

Background: Using The Future of Families and Child Wellbeing Study (FFCWS) database, we aimed to analyze the relationships between Healthcare Utilization (HU), Adverse Childhood Experience (ACE) scores, and Gun Violence Exposure (GVE) in adolescents. The FFCWS follows 4,898 teens and their families and currently spans 6 different years in the focal child's life (Birth-Years15). Each time-point may contain items from parents, caregivers, teachers, focal child, and other sources (e.g., GVE data); moreover, the FFCWS contains national- and city-level survey weights with replicate weights available by year and survey. With complex survey design (CSD) considerations and thousands of variables available, CSD datasets like FFCWS can quickly become daunting and costly to analyze. Sources for proper variable selection/creation, applying the appropriate survey weights, and methods to analyze the final data are few–especially in niche topics. Outlined here, we hope to provide a R methodology template for using data from CSD databases.

Method: Variables were selected based on their importance to our research topic. We used data from nine surveys from Birth-to-Year15 to construct our variables for HU, ACE, GVE, and Demographics. Some variables were created from data across multiple years/surveys. We only used the focal child's survey weights, as they are our population of interest. Lastly, observations that did not fit the inclusion criteria were removed, in the analytical phase, to ensure the retention of CSD information. This study used the R packages survey and gtsummary.

Results: Our final dataset contained variables for ACE scores, HU, GVE, and the focal child's survey weights associated with the least missingness (e.g., removed participants with no GVE data). The use of replicate weights improves the estimation of 95% confidence intervals (CI) and p-values. Results were tabulated using tbl_svysummary() from gtsummary, as the function calculates survey-weighted, streamlined tables with customizable summary and inferential statistics. Replicate weight incorporation is not available with tbl_svysummary(); therefore, other functions like svyby() from survey may be required.

Discussion: The methods employed help guide researchers on important statistical and analytical approaches and answer questions like "What survey weights do I use?" that seem simple but can quickly increase analysis time and costs.

Secondary Analysis of Emergency Department Utilization and Discharge Outcomes in Autistic Patients Presenting with Psychiatric Complaints

Presenting Author: Margaret Johnson, BSN; Nell Hodgson Woodruff School of Nursing

Poster Number: 41

Johnson, Maggie; Pelkmans, Jordan; and Brasher, Susan

Background: Autism spectrum disorder (ASD) is characterized by the presence of communication challenges, social interaction difficulties, and restricted behavior. These core ASD features pose unique challenges, particularly when coupled with psychiatric co-morbidities, often leading to frequent Emergency Department (ED) visits. Studies indicate upwards of seven times higher ED utilization rates among autistic individuals, yet the specific psychiatric reasons and subsequent discharge outcomes remain unclear. The purpose of this study was to identify psychiatric reasons among autistic individuals visiting the ED and explore associated discharge outcomes.

Methods: Using R statistical software a retrospective, cross-sectional study design was implemented to evaluate ED hospital data from the AHRQ NJ SEDD 2016. A total of 8,632 autistic patient encounters were identified using ICD-10 codes. Descriptive statistics summarized ED visits of autistic patients presenting with and without psychiatric complaints. Logistic regressions were conducted to predict discharge outcomes and factors influencing psychiatric visit reason by age, gender, race, payment method, and readmission status.

Results: Psychiatric reasons accounted for 26% of ED visits for autistic patients. These included suicidal ideation, conduct disorder, and anxiety. A majority (84.9%) of psychiatric ED visits were discharged home. Higher odds of being discharged home were associated with low income. Lower odds of being discharged home were associated with increased age, readmission and increased length of stay.

Conclusion: Disparities in discharge outcomes for those with a psychiatric complaint were observed based on age, income, and payment methods highlighting the intersectionality of socioeconomic factors and mental health service access. Identifying psychiatric visit reasons and discharge outcomes among autistic individuals in the ED can lay the groundwork for future research. Further evaluation is need to assess policy and additional factors which may contribute to the decision to discharge home and their impact on mental health outcomes. Addressing reliance on the ED for mental health crises among autistic patients, particularly those from low income and older adolescents, is crucial for achieving equity and better outcomes.

Modulates Nrf2 Expression in Placental JEG-3 Cell Line to Decrease HCMV- Induced Oxidative Stress at the Placental Barrier

Presenting Author: Tyana Joseph, B.S.; Morehouse School of Medicine

Poster Number: 57

Joseph, Tyana T.; Kunnatha, Anjali; Hossack, Daniel J.; Johnson, Erica L.

Background/ Significance: Human Cytomegalovirus (HCMV) is the most common congenital infection passed from pregnant mothers to babies during pregnancy because it can target and infect the placental barrier. Therefore, HCMV infection disrupts the homeostatic balance of ROS and antioxidants, which induces oxidative stress in the host cells. Moreover, melatonin can reverse the effects of viral-induced infection and oxidative stress due to its potent anti-inflammatory and antioxidant properties. As a result,

basal and exogenous melatonin sources can reduce HCMV-mediated oxidative stress through its anti-inflammatory and antioxidant properties by activating the Nrf2 pathway. Therefore, we hypothesize that melatonin activates the Nrf2 signaling pathway, thus reducing oxidative stress in the placenta.

Methods: JEG-3 cells were cultured and treated/infected as follows: No Treatment, Vehicle, HCMV, 0.1nM Melatonin, HCMV + 0.1nM Melatonin, HCMV + 1uM Melatonin, 0.1nM Melatonin + HCMV, and 1uM Melatonin + HCMV. In dual-treated cells (HCMV + 0.1nM Melatonin, HCMV + 1uM Melatonin, 0.1nM Melatonin + HCMV, and 1uM Melatonin + HCMV), cells were infected with HCMV for 24hrs and treated with melatonin for 24 hours each. RNA and protein were isolated from the cells to determine gene and protein expression via qRT-PCR and western blot.

Results: From the data, we found that Nrf2 expression was upregulated in HCMV-infected cells and melatonin-treated cells (HCMV + 0.1nM Melatonin, HCMV + 1uM Melatonin, 0.1nM Melatonin + HCMV, and 1uM Melatonin + HCMV) comparison to HCMV-treated cells. This demonstrates that melatonin increases Nrf2 activation, thus downregulating viral-induced oxidative stress and upregulating antioxidants at the placenta.

Conclusions and Implications: This data suggests that melatonin is essential in regulating HCMV-induced oxidative stress at the maternal-fetal interface by inducing the Nrf2 pathway to activate antioxidant proteins and enzymes. Further research is needed to interpret further how melatonin increases Nrf2 expression and reduces oxidative stress in placental cells. Understanding melatonin's role at the maternal-fetal interface during HCMV infection is crucial in reducing adverse pregnancy outcomes.

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Characterizing Risk Factors of Pediatric Inflammatory Bowel Disease Severity

Presenting Author: Christine Kaba, MD; Emory University School of Medicine

Poster Number: 94

Christine Kaba, MD; Kelsey Chatman, MD; Barbara Niklinska-Schirtz, MD

Background: The incidence of pediatric-onset Inflammatory Bowel Disease (IBD) has increased significantly during recent decades, particularly among non-White individuals. African Americans, specifically, have been shown to have higher risk of disease complications and worse disease outcomes than Caucasians. Given the tremendous impact IBD can have on the overall growth and nutritional status of a child, early recognition and risk stratification is important. While many of the earliest presenting signs and symptoms of IBD (i.e. hematochezia, weight loss or low BMI, abdominal pain) can be nonspecific and difficult to recognize, socioeconomic factors including race, zip code, and insurance status can likely aid in the early identification of patients at higher risk for severe disease. Other presenting findings such as albumin and BMI at the time of diagnosis may also vary by demographic factors including race and are often used as markers for disease severity. For example, hypoalbuminemia

has specifically been shown to be associated with earlier initiation of biologic therapies. As such, we aim to describe potential indicators of IBD severity and/or poor outcomes within our pediatric population.

Design/Methods: We are conducting a retrospective chart review on patients with IBD in the Children's Healthcare of Atlanta network. Data will be largely collected from the ImproveCareNow (ICN) registry, a learning health network for pediatric IBD utilized by multiple institutions across the country. This data set includes patients with a diagnosis of IBD for at least one year prior to October 2021. Data being collected include race, insurance type, zip code, and presenting findings, as well as longitudinal data such as BMI, albumin, and other indicators of disease outcome and severity (i.e. emergency department visits, abdominal surgeries).

Proposed Results/Conclusions: Children's Healthcare of Atlanta is the only pediatric hospital system in Atlanta and serves a diverse pediatric IBD population that includes about 36% African American patients. This provides a unique opportunity to view various presenting phenotypes of IBD and highlight how both social determinants and genetic predispositions can affect the overall presentation and severity of disease. We hope to use this data to support early risk stratification of IBD severity in pediatric patients.

Demographic Predictors of Early Autism Diagnosis in Measurements of Social Visual Engagement and Clinical Experts

Presenting Author: Savanna Kiefer, MS; Children's Healthcare of Atlanta

Poster Number: 61

Kiefer, Savanna; Mattera, Jennifer; Rosenblat, Taylor; and Klaiman, Cheryl

Background: Children with early signs of autism often experience delays in formal evaluations—especially those from disadvantaged backgrounds (Kanne & Bishop, 2021; Mandell et al., 2009). This can prevent children from receiving interventions at a young age when their brains are especially malleable. Recent research suggests that eye-tracking measurement of social visual engagement shows potential as a performance-based biomarker of autism (Jones et al., 2023), which could aid in earlier diagnoses. This study examines demographic predictors of agreement levels between eye-tracking-based measurement of social visual engagement and autism diagnosis by clinical experts to determine whether this new measure may be more reliable for certain populations.

Methods: Children ages 16-30 months (N = 86) presenting for an autism diagnostic evaluation from August 2023 to March 2024 watched social videos to measure social visual engagement using an eye-tracking-based index led by staff blind to clinical results. Children participated in a standardized assessment with a clinical expert.

Results: Preliminary findings reveal variability between clinician and eye-tracking diagnostic agreement regarding binary diagnostic outcome. However, it was relatively fair (Cohen's Kappa = .313). Logistic regression analysis examined the relationship between gender, age, and ethnicity and diagnostic agreement. Results suggest gender (Wald = 0.098, df = 1, p = .75) and age (Wald = 3.54, df = 1, p = .06) do not significantly affect agreement. Ethnicity was associated with an increased likelihood of

disagreement (Wald = 3.79, df = 1, p = .04). Analysis revealed somewhat more likely diagnostic agreement in White children (n = 36, odds ratio [OR] = 2.47, p = .056), than Black (n = 43, OR = 0.54, p = .19) or other ethnicities (n = 7, OR = 0.32, p = .30). However, these results did not meet statistical significance.

Conclusions: This suggests that diagnostic decision making should incorporate multiple information sources, particularly with non-White children. Diagnostic results across different measures are not always congruent with each other and should be interpreted cautiously. Data being analyzed as to what developmental areas may lead to greater likelihood of mismatch so as to help clinicians use the information they have in diagnostic decisions.

Neat1 inhibition alleviates the pathology of Duchenne muscular dystrophy

Presenting Author: Kyungmin Kim, Ph.D.; Emory university

Poster Number: 42

Kyungmin, Kim; Sarang, Arun; Sangyoon, Lee; and Hyojung, Choo

Background: Duchenne muscular dystrophy (DMD) is an X-linked genetic disease characterized by progressive muscle degeneration and weakness, primarily affecting male children with 1/5000 prevalence. Although gene therapy is promising to treat a subset of DMD patients, no effective treatment is available to cure it. Recently, long non-coding RNAs (lncRNAs) have emerged as critical regulators of gene expression and cellular processes. One such lncRNA, nuclear paraspeckle assembly transcript 1 (Neat1), has been implicated in inflammation and fibrosis in various diseases. In this study, we elucidate the role of Neat1 in muscle pathology in DMD. Ultimately, we will propose a novel therapeutic approach targeting Neat1 to alleviate the pathology of DMD.

Methods: We conducted experiments using the widely utilized mdx mouse model in DMD research. To validate the impact of Neat1, we generated Neat1 knockout (KO)/mdx mice by crossing mdx mice with Neat1 KO mice. We then compared and analyzed the pathological phenotype of Neat1 KO/mdx mice with that of mdx mice. We examined the histology of the diaphragm and limb muscles to evaluate muscle damage, immune cell infiltration, and fibrosis. Additionally, we analyzed serum samples to measure creatine kinase activity levels as a muscle membrane damage indicator. Furthermore, we elucidated the potential mechanism using qRT-PCR.

Results: Increased expression of Neat1 was observed in the diaphragm of mdx mice. Histology analysis of muscles of Neat1KO/mdx mice revealed a decrease in muscle damage along with reduced immune cell infiltration and fibrosis compared to mdx mice. The decrease in serum creatine kinase levels also suggests Neat1KO/mdx mice exhibit alleviated muscle membrane damage compared to mdx mice. The RNA analysis revealed a decreased inflammatory signaling response in Neat1KO/mdx mice, which may contribute to the improvement in the phenotype of Neat1KO/mdx mice.

Conclusions: Our study elucidates the pivotal role of Neat1 in Duchenne Muscular Dystrophy (DMD). By utilizing the mdx mouse model and generating Neat1 knockout (KO)/mdx mice, we demonstrate that

targeting Neat1 leads to significant improvements in muscle pathology. These findings underscore the therapeutic potential of targeting Neat1 as a novel approach to alleviate DMD pathology.

Understanding How Social and Psychological Determinants of Health (SPDH) Impact Family Needs and Resource Utilization in a High-Risk Infant Follow-Up Clinic

Presenting Author: William Kjeldsen, BM; Emory University

Poster Number: 49

Kjeldsen, William; Vaughan, Adele; Walker, Keecia; Barahona, Joselyn; Vied, Ruby; Kendrick-Allwood, Salathiel, Murphy, Melissa; and Maitre, Nathalie

Background: For infants at high-risk of neurodevelopmental delay, adverse social and psychological determinants of health (SPDH) can jeopardize their health and resilience. Systematic screening of SPDH can provide insight into families' needs and allow for recommendation of suitable resources based on an individual family's social condition. The nature of the utilization of recommended resources is unknown. The present study examined the frequency and type of resources accessed, additional family-reported resources accessed, and barriers to resource utilization.

Methods: The Developmental Progress Clinic (DPC) is a high-risk infant follow-up clinic serving the 38 northernmost counties of Georgia. Families of DPC patients seen from 9/2022-9/2023 were assessed for SPDH at clinic visits using a standardized procedure. Caregivers were administered a screening questionnaire at each visit to assess family needs, such as food and housing security, symptoms of caregiver psychological stress, and adverse childhood experiences (ACEs). Families with at least 1 adverse SPDH concern received a follow-up call at least 3 months after the visit and were surveyed with open-ended questions about resource utilization and barriers to accessing resources. Chart review was used to obtain information for families unreachable by phone or text. Descriptive statistics were used to determine the frequency and type of resource utilization.

Results: Of SPDH assessments completed across 1380 visits (90% of all clinic visits), 46% (n=642) were identified as positive for at least 1 adverse SPDH. Preliminary results revealed that of families surveyed (n=334), 18% reported accessing the DPC-provided resources. Resources with the highest reported need were mental health (n=302), day care (n = 190), government benefits (n = 141), and food (n = 121), yet reported access for each was 8%, 20%, 12%, 3% respectively. Other resource needs included medical equipment (9% reported need), transportation (17%), housing (13%), car seats (15%), and parental employment (22%). Rates of access for these also remained low (with 0%-20% of families accessing each). Analysis of open-ended responses (n=390) identified activation energy and uncertainty as leading barriers.

Conclusion: Results demonstrated a low number of families accessing DPC-recommended resources. Implications for clinical practice and potential solutions for addressing barriers will be discussed.

Development and Initial Implementation of a Needs Assessment Tool for a Vascular Anomalies Multidisciplinary Clinic in Tanzania

Presenting Author: Anusha Kothari, Undergraduate Student working toward B.S.; Emory University

Poster Number: 86

Kothari, Anusha; Odugbemi, Moyosoreoluwa; Shemwetta, Mwivano; Naif, Azza; Musa, Balowa; Karatas, Turkan Banu; George, Paul E.; and Shah, Jay

Background: Vascular Anomalies (VA), which primarily affect children, are prevalent in low- and middle-income countries (LMICs), yet only 8 of the 99 Multidisciplinary VA teams recognized by the International Society for the Study of Vascular Anomalies are based in a LMIC. In the U.S., Vascular Anomalies Multidisciplinary Clinics (VAMCs) have been proven to improve patient outcomes because they allow pediatric providers to collaborate and streamline care for the patient. Thus, we aimed to develop an interview tool that assesses the current care of VAs and readiness for the development of a VAMC in Dar Es Salaam, Tanzania.

Methods: This needs assessment tool was developed in an iterative process, involving feedback from providers in both the United States and Tanzania. The tool was adapted from the Consolidated Framework for Intervention Research, which contains five domains: intervention characteristics, outer setting, inner setting, characteristics of individuals, and implementation process. These domains were explored through semi-structured interviews, which were transcribed and subjected to thematic analysis.

Results: Five providers at Muhimbili National Hospital (MNH) in Dar Es Salaam, Tanzania were interviewed from specialties including interventional radiology, pediatric general surgery, otolaryngology, pediatric hematology/oncology, and oral/maxillofacial surgery. Several themes emerged: (1) surgical management was more common than medical management because patients seemed to prefer quick cures over long-term treatments; (2) providers would sometimes learn procedures not directly under their specialty to improve patient care; (3) the current referral system between VA care disciplines at MNH could be inconvenient for patients/families; (4) the social stigma of VAs was high and could prevent patients/families from seeking care; (5) belief in religious and/or traditional explanations of disease was common and could often coexist with medical treatment.

Conclusions: Our research highlights the distinct challenges and opportunities of VA care in Dar Es Salaam, Tanzania and provides support for the need and feasibility of VAMCs in this context. Our results will help enable the further refinement of the needs assessment tool in accounting for the common themes identified in VA care in LMICs. Ongoing research will include additional semi-structured interviews with providers that care for VA patients.

Provider Referrals for Outpatient Mental Health Services: The Importance of Looking at Who is Referred When and Why

Presenting Author: Carolyn Lasch, MA; University of Minnesota, Twin Cities

Poster Number: 62

Lasch, Carolyn; Dilly, Laura

Background: Children with medical conditions frequently also present with mental health concerns and are referred to mental health clinics (Child Mind Institute, 2023). An understanding of who is referred and for what co-occurring conditions can assist outpatient clinics in developing programming to support treatment plans. In particular, many children are referred to mental health services due to disruptive behavior (DB), and therefore, an understanding of the landscape of this patient population is needed to improve treatment outcomes (Kaminski & Claussen, 2017).

Methods: Referral information from an outpatient clinic was extracted from EMR, including patient age and provider-selected referral concerns (0-8 listed, mean=1.6, sd=1.12). Overall, 1,855 referrals from 482 different providers were extracted for patients aged 0-22 years (mean=13.0, sd=4.1). Given the sample size, only effects of +/- 0.1 were considered meaningful and reported.

To characterize overall referrals, correlations (Pearson's phi) between listed referral concerns measured co-occurring concerns. Developmental trends in referral concerns were also examined. Analyses in a sub-sample with DB referrals (n=305) specifically examined developmental trends in co-occurring concerns for this referral reason.

Results: P-values <.001 for all reported effects. The most common referral concerns were anxiety (42%), depression (26%), DB (16%), and hyperactivity/ inattention (HI;14%).

Most common co-occurring concerns were H/I and DB (r(1,871)=.26), depression and anxiety (r(1,871)=.22), and H/I and social concerns (r(1,871=.14).

Referrals listing anxiety increased with age (r(1,871)=.19), as did referrals for depression (r(1,871)=.29) and mental health concerns for LGBTQ patients (r(1,871)=.10). Referrals listing DB decreased with age (r(1,871)=-.33), as did referrals for H/I (r(1,871)=-.27) and social concerns (r(1,871)=-.10).

In the DB sub-sample, H/I co-referral was less common in older patients, r(303)=-.21. DB was more likely to be co-referred with anxiety (r(303)=.21) and depression (r(303)=.25) in older patients.

Conclusions: Clarifying referral composition allows clinics to meet the specific needs of a patient referral population. Specifically, understanding common co-occurring concerns for a behavioral referral such as "disruptive behavior" across development informs the selection and delivery of evidence-based care models.

Efficient Segmentation of Infant Brain MRIs using Scalable Synthetic Data Generation

Presenting Author: Isabelle Le, currently pursuing B.S. in Psychology; Georgia State University

Poster Number: 121

LE, ISABELLE; DOAN, MANH; Bachevalier, Jocelyne; Shultz, Sarah; Calhoun, Vince; Plis, Sergey

Accurate segmentation of brain structures is essential for research on brain functions, and medical applications. While there are existing methods for automatic segmentation of the human brain, the segmentation of infant brains remains a complex challenge due to incomplete tissue formation compared to adult brains and differences in contrast and resolution on MRI images. Manual labeling is prohibitively expensive and often produces unreliable results. To address these challenges, we propose Wirehead, a novel distributed machine learning framework that enables scalable synthetic data generation for infant brain MRI segmentation. Utilizing data provided by the Marcus Autism Center, along with the outputs from available automated segmentation tools, our methodology achieves extensive whole-head and brain segmentations, enabling thorough comparison and correction. Coupled with custom Python scripts designed for labeled voxel modifications and dimension adjustments, our approach streamlines the generation of training data, significantly reducing the need for manual editing before being put into Wirehead's generator. Wirehead's architecture allows for the efficient creation of large, diverse datasets with little to no manually labeled data, making it feasible to train deep learning models specifically tailored for the unique challenges posed by the developing infant brain. By leveraging a fully multi-threaded database and separating read and write components, Wirehead achieves horizontal scaling and faster data generation, enabling the training of models in a reasonable amount of time. Moreover, Wirehead's performance scales with the available computational resources, ensuring that the framework can adapt to the growing needs of the research community. A deep learning model trained entirely on synthetically generated infant brain MRIs using Wirehead demonstrated comparable performance to models trained on adult brain data, highlighting the potential of this approach. Wirehead has the potential to revolutionize the field of pediatric neuroimaging by providing a powerful tool for studying early brain development, ultimately facilitating the development of more accurate and reliable segmentation methods that can better capture the unique challenges posed by the developing infant brain. By enabling researchers to efficiently generate large, diverse datasets and train models on synthetically generated data, Wirehead can contribute to a deeper understanding of neurodevelopmental processes and potential abnormalities in infants.

Circulatory Cytokines Profile as Predictors of Risk of Disease Crisis in Pediatric Hemolysis-associated Diseases

Presenting Author: CECILIA LEKPOR, BSc in Medical Laboratory science, MSc in Immunology; University of Ghana, Morehouse School of Medicine

Poster Number: 70

Cecilia Lekpor, Felix Botchway, Alaijah Bashi, Adel Driss, Asamoah Kusi, Godfred Futagbi, William Agbozo, Wesley Solomon, Adriana Harbuzariu, Andrew A. Adjei, and Jonathan K. Stiles

Background: This study explores the potential of various circulatory biomarkers to predict fatal disease outcomes in pediatric patients with Sickle Cell Disease (SCD). This condition is characterized by pronounced intravascular hemolysis, triggering pathophysiological responses, including endothelial cell activation, oxidative stress, and systemic vascular inflammation. A critical focus is on the systemic increase of circulatory markers, whose levels tend to be higher during heightened hemolysis. We

hypothesized that circulatory proinflammatory and neuronal injury factors could predict fatal disease outcomes in children with hemolysis-associated diseases, exploring relevant inflammatory markers as predictors of SCD severity.

Methods: Our research comprised 377 children aged 3-8 years with various conditions, including SCD, Sickle Cell Trait (SCT), and other hemoglobinopathies. These participants were recruited from the Child Health Department at Korle-Bu Teaching Hospital in Accra, Ghana., West Africa, between 2021-2022. A range of biomarkers in plasma, including cytokines (CXCL10, CCL11, TNF-α, IL-6, IL-10, IFN-8, MDC, MIP-1β, MCP-1, TNF-α, IL-1α, IL-16 IL-12p40), and markers indicative of vascular injury (Ang-1, Ang-2, ICAM-1, VCAM-1, CRP). Additionally, we evaluated the levels of cell-free heme, its associated scavengers (Hpx, Hp, HO-1), BDNF, and angiogenic factors (VEGFA, VEGF-D, PlGF, bFGF, Flt-1, and Tie 2). We stratified the biomarkers and assessed their capacity to predict the risk of SCD fatal outcomes. We used the FunRich analysis tool to assess any interactive pathways of the cytokines, specifically between SCA and control groups.

Results: Our investigation revealed distinct biomarker expression patterns in children with SCD compared to healthy controls. Particularly in BDNF, Ang-2, CXCL10, TNF-α, and IL-6 in patients with the HbSS compared to other genotypes (HbSC, HbAS, HbAC, and HbCC). A positive correlation was also observed between CXCL10, TNF-α, Ang 2, BDNF, Ang 1, and IL-6 with Hb, WBC, and RBC among the individual Hb genotypes. Similarly, HO-1, Hpx, and Hp expression levels significantly correlated with Hb, WBC, and RBC. Based on FunRich, a network prediction model revealed multiple interactions between BDNF, Ang 2, CXCL10, CCL11, TNF-α, IL-6, IL-10, IL-12A, ICAM1, VCAM 1, Tie -2, and VEGFA, which could be explored therapeutically.

Conclusion: Our findings revealed that circulating levels of specific biomarkers could serve as predictive indicators of SCD crises and facilitate more effective disease outcome monitoring. This underscores the potential of these biomarkers to complement traditional clinical management approaches.

Impaired Epithelial-Mesenchymal Crosstalk In Inflamed Perianal Fistulizing Crohn's Disease.

Presenting Author: Sushma Maddipatla, MS; Emory University

Poster Number: 50

MADDIPATLA, SUSHMA CHOWDARY; Murthy, Shanta; Anbazhagan, Murugadas; Hwang, Yeonjoo; Dodd, Ann; Kolachala, Vasantha; Koti, Tarun; Cutler, David J; Matthews, Jason; KUGATHASAN, SUBRA

Background: Perianal Crohn's disease (CD) promotes severe mucosal damage and often requires surgical intervention. It is hypothesized to involve pathological changes in epithelial and mesenchymal cells especially any changes in epithelial and mesenchymal abundance and receptor-ligand interactions during active disease (inflamed), and how these profiles appeared in patients with inactive perianal disease (non-inflamed), CD but no perianal disease, or non-IBD controls. Methods: Rectal mucosal biopsies were obtained endoscopically from patients (n=31, 6 inflamed, 25 non-inflamed) at Children's Healthcare of Atlanta and processed for single cell RNA sequencing. Phenotypic and unsupervised analysis on cells

from the major mucosal compartments, epithelium, immune, and stromal. Receptor-ligand analysis was performed with CellChat. Results: Based on ~140k cells isolated from the rectum this tissue is comprised of 33 distinct cellular subtypes originating from the epithelium (17), immune (8), and stromal (1) compartments. Principle component analysis showed that most of the patient samples separated their disease phenotype. Further decomposition revealed that the epithelial cells separated with the patients' phenotypic differences (inflamed vs non-inflamed),surprisingly, cells from the stromal and immune compartments did not. Specifically, we observed significant decreases in secretory (Mature FCGBP+ Goblet, EEC1, EEC2) and absorptive lineages (Absorptive progenitors, immature colonocytes, CA1+ late colonocytes, Mature BEST4+), along with increased levels of immune mediating microfold cells. We detected concomitant increases in CD4+T, CD8+T and macrophages in inflamed patients, but the absolute number of significantly differential genes in the immune were not as large as the epithelial and stromal during active disease. Receptor-Ligand analysis predicted 127 pairs between epithelium and stromal cells across the inflamed and non-inflamed groups, with 98 in common, 25 unique to non-inflamed and 4 pairs unique to inflamed. Of particular interest was the lack of NOTCH and GDF15 signals in the inflamed, along with CD44 interactions with collagen/laminin genes related to ECM signaling that were detected in only controls but not in perianal CD or established-CD lacking signs of rectal inflammation. CONCLUSION: Active perianal CD showed major changes in the proportions of epithelial subtypes and in their overall transcriptional profiles that were likely caused by the changes in epithelial-mesenchymal crosstalk during inflammatory conditions.

Exploring the Genetic Interaction between Slc25a1 and Tbx1 in the Context of Cardiac Development: Unraveling a Shared Pathway in 22q11.2 Deletion Syndrome through Congenital Heart Disease

Presenting Author: Adam Malik, High school Diploma; Bachelor of Science currently in progress; Emory University

Poster Number: 87

Malik, Adam; Sohani, Fateemaa; Gayle, Ashley; Ohanele, Chieme; and Kwong, Jennifer

As outlined by the CDC, congenital heart defects, or congenital heart disease (CHD), are a widespread birth condition that affects 1 in every 100 infants annually in the United States and is considered "a leading cause of birth defect-associated infant illness and death" (1). DiGeorge Syndrome, also known as 22q11.2 deletion syndrome (22q11DS), is a prevalent cause of CHD characterized by hemizygous microdeletions on the long arm of chromosome 22. As of yet, no cure has been identified. Tbx1, a T-box transcription factor that resides within the 22q11.2 microdeleted region, has been well established to regulate cardiac development and contribute to the CHD associated with 22q11DS. However, hemizygous loss of Tbx1 alone is not sufficient to recapitulate the full spectrum and severity of 22q11DS-associated cardiac malformations, suggesting that additional factors may contribute to cardiac pathology in 22q11DS. Our laboratory has recently identified Slc25a1 (the mitochondrial citrate carrier) as another 22q11DS deleted gene that regulates cardiac development, but the mechanisms by which loss of Slc25a1 causes CHD are not known. This study aims to investigate the potential genetic interaction between the Slc25a1 and Tbx1 genes and determine if they function along a shared pathway, contributing to the

emergence of CHD. Through the use of Slc25a1 and Tbx1 knockout mouse models, we will examine heart development to determine the outcome of transheterozygotic loss of Slc25a1 and Tbx1. Discovering a link between these two genes through a shared pathway holds a variety of implications; namely, it would establish these genes as co-effectors of heart morphogenesis and provide insight on the molecular mechanisms behind CHD to inform future treatment methods and possibly a cure.

Ethanol Exposure during Cardiomyocyte Differentiation of Human-induced Pluripotent Stem Cells Reduces Cell Proliferation and Cardiomyocyte Generation

Presenting Author: Kun Man, Doctoral; Emory University

Poster Number: 78

MAN, KUN; Fu, Longping; Lane, Alicia; Harris, Frank; Armand, Lawrence C.; Forghani, Parvin; Faundez, Victor; Wu, Ronghu; Brown, Lou Ann and Xu, Chunhui

Ethanol Exposure during Cardiomyocyte Differentiation of Human-induced Pluripotent Stem Cells Reduces Cell Proliferation and Cardiomyocyte Generation

Man, Kun; Fu, Longping; Lane, Alicia; Harris, Frank; Armand, Lawrence C.; Forghani, Parvin; Faundez, Victor; Wu, Ronghu; Brown, Lou Ann; Xu, Chunhui

Background: Prenatal alcohol exposure is known to interfere with fetal development, elevating the risk of congenital heart diseases (CHDs). Currently, there is a lack of clarity regarding the impact of alcohol exposure on early-stage cardiogenesis, and how any disruption during this critical period subsequently leads to heart defects in late stages. We hypothesized that identification of alcohol effects on early-stage cardiogenesis could potentially yield novel prevention/treatment strategies. To this end, we took advantage of in vitro cardiomyocyte (CM) differentiation from human induced pluripotent stem cells (hiPSCs), during which the gene expression patterns are similar to that of cardiogenesis in embryo, to study alcohol effects on early-stage cardiogenesis.

Methods: The hiPSC line SCVI273 was used for hiPSC-CM differentiation using Wnt signaling activator CHIR-99021 and inhibitor IWR-1. The cells were treated with ethanol at final concentrations of 17, 50, and 100mM, from day 0 to day 12 of the differentiation. At day 12, cell number and cell viability were measured using trypan blue assay. The cells were replated in 96-well plates and cell proliferation were examined by immunocytochemical analysis of Ki67, and cardiomyocyte generation was analyzed by using immunocytochemical analysis of cardiomyocyte markers NKX2-5 and GATA4.

Results: Significant decreases in both viable cell number and cell viability were observed in cultures treated with 100mM ethanol compared with untreated cultures. The proportion of Ki67-positive cells decreased in cultures treated with ethanol compared with untreated cells, and the levels of decrease were ethanol-concentration dependent. The proportion of Ki67-positive cells in NKX2-5-positive cell population also decreased concentration-dependently in ethanol-treated cells compared with untreated cells. There were no significant differences in the proportions of NKX2-5- or GATA4-positive cells among the groups. However, the number of NKX2-5-positive cells decreased in cultures treated with 100 mM

ethanol and the number of GATA4-positive cells decreased in cultures treated with 50 and 100 mM ethanol compared with untreated cultures.

Conclusion: Ethanol exposure during hiPSC-CM differentiation reduced cell number and viability and caused decrease of cell proliferation in an ethanol-concentration-dependent manner, and caused a concentration-dependent decrease in the generation of cardiomyocytes.

The Burden of Constipation and Ileus Among Pediatric Patients Undergoing Treatment for Acute Lymphoblastic Leukemia

Presenting Author: Avery Morse, Bachelor's of Science; Emory University

Poster Number: 71

Morse, Avery; DeGroote, Nicholas; Stevenson, Jason; Khanna, Anjali; Jordan, Katherine; Detweiler, Annika; Kuhn, Amanda; Castellino, Sharon; and Miller, Tamara

Background: While certain chemotherapeutic agents are known to cause constipation and paralytic ileus, these treatment-related complications are understudied among pediatric patients with acute lymphoblastic leukemia (ALL). It is important to understand the burden of these adverse events (AE) to identify who may benefit from increased supportive care to prevent morbidity.

Methods: A retrospective manual chart review was performed of patients aged 1 through 21 years who received at least one complete chemotherapy course at Children's Healthcare of Atlanta between January 2010 and August 2022. Patient demographics and data on the occurrence and highest grade of ileus and constipation in each course of chemotherapy were abstracted from the medical record. Grading was per National Cancer Institute Common Terminology Criteria for Adverse Events definitions. Differences in ileus and constipation by demographic factors were analyzed at the patient level using chi-square tests.

Results: The cohort included 815 patients (3673 chemotherapy courses). Of these patients, 637 (78.2%) had documented constipation and 33 (4.0%) had documented ileus. By patient, 367 (45.0%) were Female, 197 (24.2%) were Black, and 213 (26.1%) were Hispanic/Latino. There were no significant associations between race, gender, or ethnicity and development of constipation or ileus. Constipation was more likely to be a lower grade; 608/637 (95.4%) of patients with constipation had a highest grade≤2, compared to only 18/33 (54.5%) of patients with ileus (grade≤2). Of patients with ileus, 15/33 (45.5%) had a highest grade>3. There were no occurrences of either AE directly attributed to death. Nearly all patients with constipation (n=617, 96.7%) received at least one laxative for treatment.

Conclusion: This study shows that most ALL patients experience constipation and while rarer, ileus is more severe when it develops. Despite usually being a low-grade AE, patients who develop constipation require treatment, which increases the burden on patients as they need additional medications to control this complication. Further, in this study, patients were at an equal risk of developing constipation and ileus, regardless of race, gender, or ethnicity. Future analyses will evaluate chemotherapy regimens in each course to further delineate risk of timing in development of constipation and ileus.

The Association of GFAP and UCH-L1 with Head Computed Tomography Imaging Findings in Pediatric Traumatic Brain Injury.

Presenting Author: Makda Mulugeta, B.S.; Children's Healthcare of Atlanta

Poster Number: 45

MULUGETA, MAKDA; Reisner, Andrew; and Blackwell, Laura

Background: Glial Fibrillary Acidic Protein (GFAP) and Ubiquitin C-terminal Hydrolase-L1 (UCH-L1) are acute blood-based biomarkers validated for use in adults to aid in the management of Traumatic Brain Injuries (TBI), including determining the need for a head Computed Tomography (CT) scan. For pediatrics, a non-invasive marker of intracranial injury would reduce unnecessary radiation resulting from CT. Understanding how blood biomarkers differ across types of head CT findings is important for management of children with TBI. This study aims to examine the association of GFAP and UCH-L1 with Head CT imaging results as categorized by only intracranial injuries, only skull fractures, combined findings (both intracranial and skull), and negative findings.

Methods: A prospective sample of patients admitted to the Emergency Department at tertiary children's hospitals for TBI (GCS 3-15) who received head CTs (n=384) between 2018 and 2021. Plasma samples taken ≤6 hours of ED arrival were analyzed using the Quanterix SiMoA platform, and GFAP and UCH-L1 values were obtained. Kruskal-Wallis H and Dunn's post-hoc tests were performed for analysis.

Results: The sample ranged in age (0-18 years, $\bar{x}$=8.3±5.3), gender (65.6% male; 34.4% female), and race (49% White; 33.9% Black; 11.2% Hispanic). In terms of CT findings, 18.8% (n=72) of patients had only intracranial injuries, 11.5% (n=44) had only skull fractures, 33.9% (n=130) had combined findings, and 35.9% (n=138) had negative findings.

Significant differences in GFAP values across head CT findings were found ($H(3)=42.10, p<0.001$). Post-hoc tests revealed that GFAP values differed between negative findings versus intracranial only, skull only, and combined findings ($p<0.001$). Although UCH-L1 values differed across head CT findings ($H(3)=11.24, p=0.011$), post-hoc tests revealed the biomarker values only differed between negative findings and combined findings ($p<0.001$).

Conclusion: This study suggests that blood biomarkers can differentiate between findings on head CT following pediatric TBI, albeit at varying levels. Further investigation into the clinical utility of these markers is warranted.

Colorism as a Barrier to Health Behaviors Among Adolescent-aged Childhood Cancer Survivors and their Caregivers

Presenting Author: Johannil Napoleon, PsyD; Emory University School of Medicine/ Children's Healthcare of Atlanta

Poster Number: 104

Napoleón, Johannil; Bundy, Łucja T; Kegler, Michelle C; Upshaw, Naadira; Effinger, Karen E; and Marchak Gilleland, Jordan

Background: The childhood cancer survivor (CCS) population is diverse across many dimensions and inclusive of many racial/ethnic groups. In the general population, colorism is prejudice or bias based on the lightness or darkness of one's skin color, and it occurs among individuals of the same racial/ethnic group. While colorism within the general population is known to be associated with adverse mental health and psychosocial outcomes, how this might impact health behaviors in CCS who are racially/ethnically diverse has not yet been studied. This study sought to understand the relationship between health behaviors and colorism among CCS in minoritized communities.

Methods: Adolescent CCS (13-17.99 years, ≥1 year off therapy) recruited from the Aflac Survivor Program and their caregivers completed dyadic interviews focused on how colorism impacted their access to healthy foods or places to engage in physical activity. Interviews were teleconferenced and transcribed.

Results: N=16 participants including, N=8 CCS (M=14.75 years old, 50% male, 62.5% Black non-Hispanic/Latino, 25% Hispanic/Latino, 12.5% Asian non-Hispanic/Latino, 50% survivors of Leukemia) and N=8 caregivers (M= 42 years old, 100% female) participated in interviews. Qualitative thematic analyses related to colorism and health behavior outcomes are underway.

Conclusions: Overall, preliminary analyses suggest that adolescent CCS and their caregivers did not report colorism (i.e., within-group prejudice or bias based on lightness or darkness of skin color) as a barrier to health behaviors. Yet, many families discussed structural racism as a barrier to healthy eating after cancer therapy. More research is needed as it relates to structural racism as a barrier to accessing healthy foods in minoritized communities of cancer survivors.

Understanding Human Papillomavirus (HPV) Vaccination Demographics Before and After the COVID-19 Pandemic Using Project NeLL

Presenting Author: Aditi Narayan, MN, RN; Emory University

Poster Number: 119

Narayan, Aditi R.; and Buchanan, Stacy B.

Background: Healthcare systems in the U.S. and worldwide faced massive disruptions due to the COVID-19 pandemic. Assessment of the full impact on public health and healthcare systems is still ongoing, but an area of particular interest is human papillomavirus (HPV) vaccination uptake which had issues surrounding uptake prior to the COVID-19 pandemic. HPV is the most common sexually transmitted infection in the U.S. and is associated with cancers of the cervix and oropharynx among others. There is a vaccine to prevent HPV infections and while uptake of adolescents receiving recommended doses had been increasing prior to the COVID-19 pandemic, nationally it remained short of the Healthy People

2030 goal of 80% at 52.3%. While in Georgia, 67% of adolescents initiated the vaccine series and 45.6 % of adolescents completed the series prior to the COVID-19 pandemic. Currently, there is a need of research studies outlining the effects of COVID-19 pandemic on HPV vaccination and elucidating demographic areas where initiatives for catch-up vaccination would be helpful.

Methods: Deidentified EMR demographic data from Emory University's Project NeLL big data repository will be used to examine differences in HPV vaccine uptake in children and young adults ages 9- 21 in the Metro-Atlanta area before and after the height of the COVID-19 pandemic.

Results: Analysis is currently underway, and results are forthcoming.

Conclusions: Conclusion pending results and forthcoming.

Incidence, Risk Factors and Outcomes of Acute Kidney Injury in Neonates Following Cardiac Surgery

Presenting Author: Chau Nguyen, MD; Emory University/Children's Healthcare of Atlanta

Poster Number: 51

NGUYEN, CHAU P; Holstein, Rachel; Patel, Shayli; Brady, Maximilian; Golloshi, Klevi; Shin, Stella; Sutherland, Scott; Garcia, Richard U; Beshish, Asaad G

Background: The onset of acute kidney injury (AKI) following pediatric cardiac surgery has been reported previously. However, perioperative risk factors and short-term outcomes have varied significantly between reports. We aimed to describe the behavior of postoperative AKI in neonates at our institution.

Methods: It was a single center, retrospective cohort study of neonates who underwent STAT (The Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery) category 3, 4, and 5 cardiac surgeries between 01/2016 and 12/2021. The primary outcome was to reveal the incidence of AKI, defined using the KDIGO scoring system, at our institution. We divided the cohort into patients with stage 2 or 3 AKI and those with stage 1 AKI or no AKI. Secondary outcomes were to describe postoperative morbidity and mortality between the two groups. P-values of <0.05 were considered statistically significant.

Results: Our study included 519 patients, of which 118 (22.7%) developed stage 2 or 3 AKI. Patients in the stage 2 or 3 AKI group were older (7 vs 6 days, p=0.043), had higher number of STAT category 5 surgeries (34.8% vs 25.4%, p=0.033), lower preoperative serum creatinine (0.3 vs 0.48, p<0.001), had higher rate of delayed sternal closure (57.6% vs 28.4%, p<0.001), longer duration of mechanical ventilation (MV) (118.4 vs 73.7 hours, p=0.002), higher rates of cardiac arrest (18.6% vs 8%, p=0.002), required more postoperative extracorporeal life support (ELCS) (20.3% vs 8.2%, p<0.001), and higher rate of operative mortality (23.7% vs 6.7%, p<0.001). After adjusting for confounders, patients with delayed sternal closure (aOR 4.9, 95% CI 2.7, 8.9, p<0.001) and who developed postoperative cardiac arrest (aOR 2.5, 95% CI 1.1, 4.8, p=0.026) had higher odds of developing stage 2 or 3 AKI.

Conclusion: After cardiac surgeries, neonates who developed stage 2 or 3 AKI had a higher percentage of STAT category 5 surgeries, had higher rates of cardiac arrest, postoperative ELCS requirement, and had

higher operative mortality. After adjusting for confounders, patients who developed cardiac arrest had 2.5 times higher odds of development of stage 2 or 3 AKI. Future prospective, multicenter studies and randomized studies are required to further investigate these findings.

Higher Rates of Neurosurgical Interventions in Black Pediatric Patients following Traumatic Brain Injury

Presenting Author: Alvin Onyewuenyi, MPH, BA, BS; Children's Healthcare of Atlanta

Poster Number: 63

ONYEWUENYI, ALVIN; Blackwell, Laura; Reisner, Andrew; and Mulugeta, Makda

Background: Racial disparities in healthcare outcomes have been widely documented in the literature, with Black patients often experiencing worse outcomes compared to other races/ethnicities. Black pediatric patients continue to face disproportionate challenges related to traumatic brain injuries (TBI) based on their race, socioeconomic status, access to healthcare, and implicit biases within the healthcare system. It is imperative that more studies examine these racial disparities to improve access to care and current practice guidelines. This study aims to examine the association between race and neurosurgical interventions while considering severity of injury and age.

Methods: Prospective cohort of patients 0-20 years-old presenting to a tertiary pediatric hospital emergency department from May 2018 to January 2021 with TBI were analyzed in this study (n=354). Intracranial pressure (ICP) monitors, external ventricular drains (EVD), and/or craniotomies/craniectomies were considered as having neurosurgical interventions (n=55). Variables including race/ethnicity were obtained from parents and electronic medical records. TBI severity was assigned based on lowest Glasgow Coma Scale score. Chi-Square tests were utilized.

Results: Patients were primarily White (59.3%), Male (65.0%), and 0-9 years old (53.4%). There was a significant association between race and neurosurgical intervention ($\chi2(1)=10.075$, $p=0.002$), such that Black patients had higher rates of neurosurgical intervention (22.9%) compared to White (10.5%). Severity also correlated with neurosurgical intervention, such that 55.4% of severe TBI patients received neurosurgery compared to 5% of moderate/mild TBI patients ($p<0.001$). Race and severity correlated ($\chi2(1)=15.715$, $p<0.001$), such that 31.3% of Black patients had severe TBI compared to 13.8% of White patients. When assessed by age subset, Black patients in the 0-9 year old group had higher rates of neurosurgical intervention than White patients of the same age (24.7% vs. 10.6%, $p=0.010$). This association was not found in the 10-20 year old group ($p=0.077$).

Conclusions: Overall Black patients had more severe TBI and thus higher rates of neurosurgical intervention. In younger patients, race also associated with neurosurgical interventions, but in older patients this relationship was not found. Future studies should investigate why these rates are seen in Black patients, considering mechanisms of injury and the influence of social determinants of health on outcomes.

Pediatric Stroke Prevention: Innovations In Patient-Tailored Drug Delivery Systems For Enhanced Targeted Central Drug Delivery And Reduced Side Effects

Presenting Author: Dedeepya Pasupuleti, M.S.; Mercer University

Poster Number: 111

PASUPULETI, DEDEEPYA; D'Souza, Marissa; Adediran, Emmanuel; Ferguson, Amarae; Vijayanand, Sharon; D'Souza, Martin J.

Stroke is a significant cause of mortality and morbidity among adults worldwide. Although less common in pediatric patients, stroke still poses a substantial burden. In the United States, for example, over 795,000 individuals suffer from a stroke annually, with approximately 87% of cases being ischemic strokes and 25% representing recurrent events. The incidence of pediatric stroke is estimated to range from 1.2 to 13 cases per 100,000 children under the age of 18. However, these figures may underestimate the true prevalence due to possible misdiagnoses or insufficient clinical suspicion and evaluation. Low-dose Aspirin, either alone or in combination, is approved for secondary prevention in adults for transient ischemic attack (TIA). It effectively induces anti-inflammatory and antiplatelet aggregation effects, reducing the risk of stroke recurrence in high-risk patients. However, current delivery methods, including oral and intravenous routes, have limitations such as reduced ability to cross the blood-brain barrier (BBB) and systemic side effects like gastric bleeding, particularly in critically ill and comatose patients. To address these challenges, there is a need for a brain-targeted drug delivery system for Aspirin to enhance its penetration into brain tissue, increase local potency, and reduce systemic side effects. We also identified the need to explore nontraditional routes of administration for effective formulation delivery. We are developing a brain-targeting intranasal nanoparticle drug delivery system for Aspirin using an automated microfluidics system (Dolomite, Roystone, UK) with a 5-input 3D chip and employing the nanoprecipitation method. The resulting nanoparticles (NPs) are conjugated with brain-targeting Rabies Virus Glycoprotein (RVG29) ligands and further lyophilized. For quantitative characterization of the NPs in both in vitro and in vivo settings, we have developed a Dynamic Multiple Reaction Monitoring (dMRM) method using Liquid chromatography – triple quadrupole Mass spectrometry (LC-MS/MS). In this study, we explored the physio-chemical characteristics of the formulated nanoparticles for their size, morphology, polydispersity index and zeta potential, safety and release patterns. We also quantitatively established the drug deposition of Aspirin in the brain tissue in vivo. We hypothesize that this development will pave the path for exploring patient-tailored treatment strategies for stroke in both adult and pediatric patients.

Red Cell Rheology and Blood Viscosity in Pediatric Individuals Having Received Allogenic Hematopoietic Stem Cell Transplantation or Ex Vivo Autologous Gene Therapy for Sickle Cell Disease

Presenting Author: Ashwin Patel, MBBS, PhD, MPH; Emory University School of Medicine

Poster Number: 72

PATEL,ASHWIN; Kanne, Celeste; Stenger, Elizabeth; John, Tami; Sheehan, Vivien

Background: Allogenic hematopoietic stem cell transplantation (HCT) and ex vivo autologous gene therapies (GT) are potentially curative treatments for sickle cell disease (SCD). However, there is debate around how to define a cure. Red cell function post-HCT/GT may provide helpful information on the degree of red cell function correction and risk of SCD complications.

Methods: Elongation index maximum (EImax), elongation index minimum (EImin), and point of sickling (PoS) were measured on a Laser Optical Rotational Red Cell Analyzer (Lorrca, RR Mechatronics, The Netherlands). Chimerism was measured by short tandem repeat testing (STR) after cell density sorting. Dense red blood cell % (DRBC%) was measured on ADVIA cell counter (Siemens, Germany). Hematocrit-viscosity ratio at shear rates of 45 and 225 s-1(HVR45 & HVR225) were measured on a viscometer (Ametek Brookfield, USA). HCT and GT patients were compared with the donor's genotype-matched controls and HbAS controls, respectively (HCT: HbAA donor =8, HbAS donor=19, GT=2, HbAA controls=42, and HbAS controls=15).

Results: There were 29 patients (median age: 6.6 years, range: 2.0-16.3) at HCT/GT with a median follow-up of 2.4 years (range: 0.1-7). A total of forty-three samples were analyzed. Median donor myeloid chimerism was 94% (33-100). Two HbAS HCT patients had low myeloid chimerism (33% and 50%) with a follow-up period of 3.3 and 1.9 years, respectively. At the first post-HCT/GT time-point (median: 1 year, range: 0.1-6.9), DRBC% were higher while EImax, and EImin were lower in HbAA donor HCT patients compared to HbAA controls (0.59 vs 0.60, p=0.008; 0.58 vs 0.60, <0.001; and 0.75 vs 0.20, p=0.02, respectively). TheRBC function improved with a longer follow-up (median 2.9 years, range 1.3-7) with EImax showing a trend of significance (p=0.07).

Seven patients (24%) had one or more red cell function test values outside the genotype-matched control range despite having myeloid donor chimerism of > 25-30% - a value commonly used to define cure.

Conclusion: Red cell function should be included in follow-up care of HCT/GT patients in view of abnormal red cell function tests in 24% of our patients and reports of higher odds of SCD-related complications with higher PoS and lower EImax/EImin.

Exploring Pain-free strategy for a Zika vaccine

Presenting Author: Parth Patel, MS in Pharmaceutical Science; Mercer University

Poster Number: 88

Parth Patel1, Sarthak Shah1, Uddin N. M1, D'Souza MJ1

Zika virus is a travel related infectious disease and currently, there is no approved treatment or vaccine available worldwide. This is a single stranded RNA virus that is associated with complications such as microcephaly in newborns, and Guillain-Barre syndrome in adults. We explored an intranasal and a buccal vaccine via thin film strategy or orally dissolving film (ODF). We formulated a polymeric microparticle vaccine combined with two FDA-approved adjuvants (Alhydrogel® and MPL-A®). In-vitro, the Zika microparticles were found to be spherical, Particle size (nm) 569.0± 12.25, Polydispersity index

(PDI) 0.354 ± 0.110, Zeta potential (mV) - 19.42 ± 0.66, Particle count (mg/mL) 1180. In-vivo, we tested this vaccine in 4-6 weeks-old Swiss Webster mice where a prime dose was given on week 0 and two booster doses on week 2 and week 4. Serum samples were collected biweekly. We examined how the immune response was affected via the intranasal vaccine and an orally dissolving film administration of the non-adjuvanted and adjuvanted inactivated Zika microparticulate vaccines. Both route The Zika MPs adjuvanted vaccine had significantly higher IgM, IgG, IgG2A, IgG1, and mucosal IgA than the no-treatment group. There was a balanced Th1/Th2 immune response. In the spleen and lymph nodes, significantly higher CD4+ helper T-cells and CD8+ cytotoxic T-cells were found indicating a robust cellular response. The adjuvanted vaccine and non-adjuvanted vaccine group displayed a robust memory response than the no treatment group. We developed pain-free alternatives for vaccinating people against the Zika Virus that can help curb the consequences of the infection.

Determining the function of the glycosyltransferase GALNT14 for osteosarcoma tumorigenesis

Presenting Author: Isabel Petrescu, BS in Genomics and Molecular Genetics, MS in Microbiology and Molecular Genetics; Emory University

Poster Number: 89

PETRESCU, ISABEL; and Yustein, Jason T.

Background: Osteosarcoma (OS) is the most common primary malignant bone tumor with bimodal inheritance by predominantly affecting adolescents and adults 60 years of age and older. OS treatment commonly involves surgical resection and adjuvant and neoadjuvant chemotherapy. However, refractory or relapsed OS significantly reduces patient survival even following treatment. OS presents a challenge for the discovery of novel therapeutic targets due to its genetic heterogeneity. Previous results demonstrated that altered protein glycosylation patterns due to increased a-GalNAc transferase (GALNT) activity decreases patient survival and chemotherapeutic efficiency. High expression of the GALNT family member GALNT14 in patient tumors significantly reduces survival likelihood and chemosensitivity compared to patient tumors with low expression of GALNT14.

Methods: To gain further insights into the role of GALNT14 in OS tumorigenesis and chemosensitivity, we are characterizing in vitro and in vivo OS models of GALNT14 high and low expression. Towards this goal, we have established GALNT14 knock-out (KO) models in high-expressing GALNT14 OS cell lines with CRISPR editing. Conversely, we have established GALNT14 overexpression (OE) models in low-expressing GALNT14 OS cell lines using lentiviral transfection. We are validating the models by genotyping, quantitative PCR, and western blotting. Following successful validation, we are performing in vitro and in vivo experiments to determine the effects on characteristic cell behaviors resulting from gain or loss of GALNT14. In vitro experiments include proliferation, chemosensitivity, and invasion and migration assays. To complement the in vitro experiments, GALNT14 KO and OE cell lines are injected into immunodeficient mice to assess differences in tumor growth and metastatic potential when compared to cell lines expressing basal levels of GALNT14.

Results: Characterization of these models confirmed decreased GALNT14 expression in KO models and increased GALNT14 expression in OE models, supporting the validity of these models. Furthermore, KO models demonstrated reduced cell proliferation with the opposite result seen for OE models. Immunodeficient mice injected with GALNT14 KO cell lines displayed decreased tumor growth and metastasis in preliminary studies.

Conclusions: These results indicate a role for GALNT14 in OS tumorigenesis dependent on high versus low expression.

Intensive Multidisciplinary Feeding Intervention for a Toddler with In-Utero Drug Exposure

Presenting Author: Leandra Prempeh, MS; Mercer University

Poster Number: 115

PREMPEH, LEANDRA; and Malugen, Emily

Background: Prenatal drug exposure can have a molecular impact on the hypothalamic and reward genes that regulate feeding behavior. This can impact feeding regulation, resulting in feeding difficulties and growth failure (Yen et al., 2019). This was potentially seen in "McKayla," a 19-month-old girl with a history of in-utero drug exposure, patent ductus arteriosus, and gastroesophageal reflux disease who presented for intensive day treatment feeding therapy. She was diagnosed with Avoidant Restrictive Food Intake Disorder, described as total food refusal and meeting 100% of her caloric needs from a gastrostomy tube. The primary goals during intensive feeding therapy were to increase her oral intake and decrease her reliance on supplementation with formula.

Methods: Several behavioral antecedent manipulations were implemented to establish consistent responding and make progress towards treatment goals. This included multiple modified bolus placements (using underloaded and Nuk brush), reinforcement contingencies, and variety fading before stability was finally achieved. Following, increasing retention of bites then increasing volume and variety were goals targeted.

Results: From treatment onset to the last 3 days of treatment, McKayla's rate of rapid acceptance of bite presentations increased significantly from 33.33% to 93.13%, rapid swallowing went from 0.00% to 92.32%, and her percentage of inappropriate mealtime behavior and expels decreased from 58.33% and 100% to 2.31% and 7.68%, respectively. Overall, the treatment team successfully introduced and increased the bite size of 7 pureed foods, generalize the treatment to caregivers with high integrity, and began facilitating tube weaning. She was receiving about 33.42% of her needs by mouth at the time of discharge. Other nutritional concerns addressed during treatment included drinking a nutritionally complete drink out of an open cup and age-appropriate growth. McKayla continued to have emesis almost daily, as was her baseline before starting treatment; however, the frequency during mealtime decreased.

Conclusion: Overall, McKayla responded well to treatment. She had a very slow response to treatment and required a lot of antecedent manipulations to establish consistent responding. As the literature

suggests, [drug]-exposed neonates, like McKayla, may be at increased risk for nutritional and growth challenges that may persist throughout development. This supports the need for long-term follow-up of infant growth.

Managing Pediatric Anti-NMDA Receptor Encephalitis: A Case Report

Presenting Author: Archana Venkatesan, BS; Medical College of Georgia

Poster Number: 52

Punukollu, Puja ; Jaknel, Brown

Objectives: This case report aims to highlight the complexity of diagnosing and treating pediatric anti-NMDA receptor encephalitis, underscore the importance of early intervention with multimodal therapy, and discuss the unique aspects of managing severe and novel presentations of this condition in a very young patient.

Background: Anti-NMDA receptor encephalitis presents a formidable challenge in pediatric neurology, characterized by diverse neuropsychiatric manifestations and a critical need for prompt, aggressive treatment. This case report is distinguished by its focus on a very young patient with severe disease presentation, detailing an innovative treatment regimen that underscores the necessity of early and aggressive intervention. It adds significantly to the limited pediatric literature, showcasing a successful outcome despite formidable odds.

Methods: A 2-year-old African American female with a history of seizures since July 19, 2021, presented with generalized tonic-clonic seizures, altered mental status, choreoathetoid movements, tachycardia, hyperthermia, and leukocytosis. The diagnostic process revealed high titers of NMDA receptor antibodies in the cerebrospinal fluid, leading to a diagnosis of anti-NMDA receptor encephalitis.

Results: Initial treatment strategies included plasmapheresis and IVIG, followed by discontinuation of medications potentially contributing to neuroleptic malignant syndrome. Despite these measures, the patient's condition necessitated further intervention, leading to the administration of rituximab and a repeated course of IVIG. Notably, subsequent testing revealed a negative result for serum NMDA receptor antibodies, indicating a possible cessation of antibody production. The patient demonstrated mild clinical improvements, suggesting a positive response to the aggressive treatment regimen. The extensive diagnostic workup excluded other potential etiologies, such as metabolic diseases and infectious causes, thereby reinforcing the diagnosis of anti-NMDA receptor encephalitis.

Conclusion: Pediatric anti-NMDA receptor encephalitis poses significant diagnostic and treatment challenges, emphasizing the need for early recognition and a multifaceted treatment strategy. This narrative enriches the pediatric neurology field, advocating for proactive therapeutic escalation to improve outcomes in this vulnerable population.

Factors Contributing to Burnout in Advanced Practice Providers Differ by Work Demographic.

Presenting Author: Zahidee Rodriguez, MD; Emory Univ SOM

Poster Number: 112

Swerdlin, Rachel; Newman, Christopher; Miltz, Danielle; Meissen, Heather; Seitter, Brooke; Jergel, Andrew; Calamaro, Christina and RODRIGUEZ, ZAHIDEE

Background: To date there are few comprehensive studies looking at burnout and wellbeing among advanced practice providers (APPs). Most of the studies focus on physicians and nurses. The prevalence of burnout in APPs is not well defined and limited largely to single center studies or single type of APP specialty therefore associated factors to burnout are not well understood. In a multicenter randomized control trial studying the feasibility and impact of coaching on APPs, we analyzed our baseline data to identify if factors contributing to burnout differ between APP demographics.

Methods: APPs from Emory, Children's Healthcare of Atlanta, University of Colorado, and Children's Hospital Colorado who were enrolled in an APP Coaching study completed a baseline demographic survey along with Turnover Scale, Neff's Self Compassion Scale, Moral Injury Symptom Scale for Health Professions, Self Reflection and Insight Scale, Young's Imposter Syndrome Symptom Scale, UCLA Loneliness Scale, and Maslach Burnout Inventory Human Services Survey for Medical Personnel (MBI). We used adjusted univariate linear regression, adjusted univariate logistic regression, and adjusted univariate ordinal regression where appropriate.

Results: Of 319 APPs, 305 had complete survey data. Physician Assistants (PAs), surgical and adult specialties, and atypical shifts all experienced statistically significant higher burnout on their MBI profile compared to Nurse Practitioners (NPs), medical and pediatric specialties and typical shifts. Surgical subspecialities and PAs scored significantly lower on the Self-Reflection and Insight Scale than medical subspecialties and NPs. PAs had significantly more moral injury than NPs. Those with 11+ years experience had significantly lower moral injury compared to those with 0-10 year experience. Interestingly, none of these groups scored statistically significantly higher regarding loneliness, turnover, or Imposter syndrome, or self-compassion.

Conclusion: The differences in factors contributing to APP burnout by work demographic identified in this study suggest that a "one size fits all" approach to APP burnout may not be effective. Further study is needed to determine if customized interventions for PAs, surgical and adult specialty APPs, and those within the first 10 years of career can reduce these disparities.

Flu Fiasco: Influenza's Unwelcome Partners

Presenting Author: Sara Sadiq, MBBS, M.D.; University of Texas Medical Branch

Poster Number: 73

SADIQ, SARA; and Gonzalez, Amy

Background: While cases of influenza infection with secondary pneumococcal infection have been documented, there is a paucity of clinically severe reports of influenza infection and secondary Group A

streptococcal (GAS) infection in the medical literature. We present a previously healthy 6-year-old patient who presented with paranasal sinus disease, unilateral otomastoiditis, epidural abscess, and pneumocephalus, in the setting of influenza B and secondary group A Streptococcus infection (GAS).

Methods: A 6-year-old immunocompetent female presented to the ED with a 1-week history of cough, rhinorrhea, and nasal congestion. On illness day 5, she developed a headache, fever (102.2 F), left eyelid swelling, emesis, and fatigue. On illness day 6, she was taken to the clinic and discharged home with antipyretics. The next day she was brought to the ED, where she had a focal seizure lasting 6 seconds. Immunizations were complete except for seasonal influenza.

Results: Labs revealed elevated white blood cell count, inflammatory markers, and a positive Influenza B PCR. CT scan head showed pneumocephalus, extensive paranasal sinus disease, left orbital cellulitis, and right mastoid air cells opacities. CSF testing contained elevated protein and WBCs. Broad-spectrum antibiotics were initiated. The patient underwent left supraorbital craniotomy and functional endoscopic sinus surgery. Grossly purulent pus was evacuated, which grew GAS on culture.

Conclusion: Our patient presented with paranasal sinus disease, orbital cellulitis, epidural abscess, and pneumocephalus, in the setting of influenza B and GAS infection. The presence of both organisms in our patient suggests a synergistic role in pneumocephalus formation. The AAP recommends oseltamivir treatment for children with influenza, which decreases the duration of symptoms when started <48 hours from symptom onset and is associated with fewer influenza complications. Being vaccinated for influenza and being diagnosed with it earlier in the clinic and started on Oseltamivir, might have prevented a prolonged ICU stay and surgery in our patient. It is also important to be vigilant for neurological symptoms, which signal CNS involvement. Even in immunocompetent patients, the rapid dissemination of pathogens into the sinuses, mastoid air cells, and brain parenchyma underscores the need for awareness and prompt management of upper respiratory symptoms.

Flexible thermoelectric cooling to Improvising the thermoregulation in infants: an implication for sudden infant death syndrome (SIDs)

Presenting Author: Maria Sattar, Ph.D. in Progress; Georgia Institute of Technology

Poster Number: 120

Maria Sattar and Prof. Woon Hong Yeo

Personalized thermoregulation improves the blood circulation and maintains the body temperature of infant to the world health organization's (WHO) recommended body temperature of 36.5°C-37.5°C. It is evident that overheating and disordered thermoregulation in infants is responsible somehow to sudden infant death syndrome (SIDs). The world health organization recommends keeping the body temperature of newly born between 36.5°C-37.5°C to reduce the thermal stresses which can harm the brain development of the infant The infant head produces 40% of body heat and of up to 85% of body heat loss through the head. It is because metabolic rate rises during first three months of life which causes the body temperature of the infants to rise. Abrupt increase in body temperature causes the thermal

imbalances and exerts thermal stresses in the infant body which may cause the sudden death. A few studies conducted to offer the personalized thermoregulation for infants. Indeed, infants personalized thermoregulation is necessary to manage the excessive heat production and to reduce the thermal stresses. In our study, we proposed personalized thermoregulation based on flexible thermoelectric coolers with the possibility of offering better thermal stability to reduce the risk of SIDs. The flexible thermoelectric cooler successfully reduces the body temperature to 2°C-3°C and regains the body temperature to 36.5°C-37.5°C when a heating load is applied. Considering the results of our study, we believe that the proposed thermal care will help to overcome the disordered thermoregulation in infants and reduce the chances of SIDs by improvising the infant's thermoregulation.

Development of a Conceptual Model and Applied Framework to Support Clinician Engagement with Adolescents about Online Health Information

Presenting Author: Cambray Smith, BS; University of North Carolina at Chapel Hill

Poster Number: 101

SMITH, CAMBRAY; Comello, Maria Leonora; and Allison, Bianca

Background: Adolescents often access health information online, including on social media. While increased accessibility of health information has benefits, there are also concerns about misinformation or dangerous content, which can be especially harmful for adolescents whose critical reasoning skills are still in development. Misinformation can create misunderstandings about risk susceptibility, promote harmful behaviors, and/or result in negative health outcomes. Determining how clinicians can support adolescents' interactions with and interpretations of health information online should be seen as an emerging clinical competency. To promote this skillset, models and frameworks are needed to structure future interventions.

Methods: We conducted a narrative literature review focused on identifying and adapting 1) a conceptual model and 2) an applied framework that will contribute to future interventions aimed at helping clinicians proactively engage with adolescents who use social media to access health information. The conceptual model was adapted to incorporate the role of clinicians and new relationships between variables, and the applied framework infused additional recommendations from the health communication literature. While we incorporated brief guidance for clinicians who engage on social media to promote accurate health information, the overall focus was on supporting clinicians during their clinical interactions. Grounding principles included promotion of patient-centered care and shared decision-making.

Results: First, we created the Clinician-Engaged Social Media Wellness Model, adapted from work by Claydon et al. (2021), which aims to show where and how clinicians can intervene to promote social media wellness with adolescents. Second, we generated a Framework for Discussing Online Health Information, which was adapted from Fridman et al.'s 2023 guidance related to discussing potentially harmful health information often found online. We used the example of information about

contraception found on social media as an example topic that may be discussed between adolescents and clinicians.

Conclusions: The Clinician-Engaged Social Media Wellness Model and the Framework for Discussing Online Health Information are two tools that can be used to structure interventions that help clinicians connect with adolescents and promote patient-centered care amidst a complex information environment. Future studies can use these conceptual contributions to increase clinician competency and comfort with these conversations.

RSV Pneumonia Among Adults Hospitalized with Acute Respiratory Infections, CHF, or COPD Exacerbations

Presenting Author: Janelle Spencer-Ramirez, Bachelors; Emory University

Poster Number: 74

Spencer-Ramirez, Janelle; Tippett, Ashley; Begier, Elizabeth; Gibson, Theda; Salazar, Luis; Sun, He-Ying; Hsiao, Hui-Mien; Li, Wensheng; Stephens, Kathleen; Hubler, Robin; Liu, Qing; Uppal, Sonal; Gessner, Bradford D.; Swerdlow, David; Kalina, Warren; Kam

Background: Respiratory syncytial virus (RSV) is a common respiratory virus that can lead to severe disease in older adults and those with underlying comorbidities. The objective of this study was to describe RSV pneumonia (PNA) in hospitalized adults.

Methods: Adults ≥50 years of age hospitalized for acute respiratory illness and adults of any age hospitalized for CHF or COPD exacerbations were enrolled at two hospitals in Atlanta, GA during the 2018-2019 and 2019-2020 respiratory seasons. Nasopharyngeal and oropharyngeal swabs were collected and tested with BioFire FilmArray respiratory panels and standard-of-care results were recorded. Acute and convalescent sera were collected when possible and analyzed for seroconversion (≥four-fold increase in RSV-A/B binding antibodies). Demographic and clinical data were collected through patient questionnaire and electronic medical record abstraction. PNA was categorized as definite or probable based on chest imaging reports. Baseline characteristics were summarized using descriptive statistics, and study groups were compared using t-test, chi-square, or Fisher's exact in SAS v9.4.

Results: Of 3,142 eligible patients, 1,584 were enrolled, and 1,538 had chest imaging performed and NP/OP specimens available for analysis. Overall, 83 (5.4%) were RSV-positive, of whom 80 (96.4%) were ≥50 years of age and 25 (30.1%) had radiographic PNA. Among participants with RSV, those who had PNA had similar sociodemographic characteristics as those who did not develop PNA. In terms of comorbidities, participants with RSV PNA less commonly had baseline CHF (20.0% vs. 55.2%, p=0.004) or COPD (20.0% vs. 43.1%, p=0.05), but tended to be immunocompromised (44.0% vs. 24.1%, p=0.07) compared to RSV-positive participants without

PNA. Clinical features did not differ significantly between RSV-positive participants with and without PNA, with the exception of myalgias. The most common clinical features in both groups were cough,

dyspnea, and fatigue. Clinical outcomes were similar between RSV-positive participants with and without pneumonia in terms of ICU admission (20.0% vs. 17.2%, p=0.76), requirement for mechanical ventilation (8.0% vs. 15.2%, p=0.49), and death (8.0% vs. 0.0%, p=0.09).

Conclusion: Approximately one-third of adults hospitalized with RSV in our cohort developed radiographic PNA, and severe clinical outcomes were observed.

Pioneering an Early Language Intervention to Promote Neurocognitive Development of Vulnerable Low Birth Weight Infants in Ethiopia

Presenting Author: Jennifer Stapel-Wax, PsyD; Emory University

Poster Number: 79

STAPEL-WAX, JENNIFER; Brasher, Susan; Tebeje, Hiwott; Hailu, Selambizu; Cranmer, John; Gobezayehu, Abebe; Becklenberg, Amy; Hall-Clifford, Rachel; Biza, Heran; Shiferew, Meseret; and Darcy-Mahoney, Ashley

Background: Early language interactions between babies and caregivers enhances newborn neurodevelopment. Talk With Me Baby (TWMB) trains clinicians on the 1) scientific importance of early language interactions, 2) integration of language 'nutrition' into care and 3) transferring TWMB skills to caregivers. Early childhood neurodevelopmental delays and disabilities (NDD) are common in Ethiopia. We leveraged multiple partnerships to reverse these developmental delays. These included TWMB scientists (US), the national Saving Little Lives (SLL) consortium (Ethiopia), Emory-Ethiopia and Ethiopia's leading health institution—Addis Ababa University (AAU).

Methods: We used a sequential, iterative method to collaboratively co-design the TWMB interventions for Ethiopia (TWMB-E). In Phase 1, 15 NICU nurses from Tikur Anbessa Hospital were trained (1.5 days) and provided focus group feedback on the curriculum; their feedback was incorporated. Second, 6 subject matter experts (SME) from newborn care and the Ethiopian Ministry of Health (MOH) provided feedback on the improved version; their feedback was incorporated. Third, we trained 10 NICU nurses from referral hospitals in Addis Ababa (Gandhi, Zewditu) using the improved TWMB-E over one day. They returned after 30 days to provide focus group feedback on TWMB-E feasibility in real-world NICU practice and receive brief skill practice sessions.

Results: Trainings followed by focus groups with NICU nurses and SMEs yielded data on the acceptability, adoptability, accessibility, and feasibility of the adapted and iteratively refined TWMB-E curriculum and training for Ethiopia. Systematic iteration enabled the original TWMB curriculum to be customized and align with culture, language and NICU clinical context at hospitals in Ethiopia. Focus groups with NICU nurses provided insights on integrating TWMB into clinical practice while SME insights focused on integration with national early childhood development policies.

Conclusions: Pilot implementation of a TWMB-E was the important next step to assuring that this neurocognitive intervention was customized, tested, improved and optimized using collaborative co-design. TWMB-E was customized to routine NICU practice at referral hospitals in Ethiopia. Four factors

predict sustainable scale-up and success: links to Ethiopia's national SLL consortium, co-design with faculty from the nation's leading health science institution (AAU), guidance from the MOH and real-world testing at leading referral hospitals.

Utilizing Galectin-9 Blockade To Improve CAR T-cell Efficacy In AML

Presenting Author: Emily Sullivan, BS; Emory University

Poster Number: 46

Sullivan, Emily; Hashmi, Areeba; Branella, Gianna; Jhita, Navdeep; Henry, Curtis; Raikar, Sunil

Background: Acute myeloid leukemia (AML) claims thousands of deaths every year. Treatment for AML is limited, yet emerging clinical trials for novel therapeutics offer a glimmer of hope. CAR-T therapy is an FDA-approved last line of defense against B-cell malignancies, but its success rate in AML is suboptimal due to numerous limitations such as CAR T cell exhaustion. Galectin-9 (Gal-9) is a soluble protein that has recently emerged as a modulator of T-cell exhaustion and thus targeting it in tandem with CAR-T treatment proposes a potential solution to CAR-T failure in AML due to exhaustion. Interestingly, Gal-9 binding to the surface of AML cells results in increased AML cell survival. Therefore, we hypothesized that Gal-9 blockade will improve the overall efficacy of CAR T-cell therapy in AML through complementary T-cell and tumor-associated mechanisms.

Methods: Human AML cell lines were treated for 72 hours with increasing doses of αGal-9 antibody. Growth inhibition and cell death were analyzed via MTT assay and flow cytometry, respectively. Human primary T cells were treated with high dose αGal-9 antibody, and growth and viability were assessed over the course of 72 hours using trypan blue exclusion assay. Three AML-directed CAR T cells were designed and subsequently cloned into a γ-retroviral vector. Surface expression of the AML antigens targeted by each CAR T cell product was analyzed before and after αGal-9 antibody treatment via flow cytometry.

Results: We have found that Gal-9 antibody blockade directly impedes AML cell growth and kills AML cells in vitro. However, Gal-9 antibody treatment improves growth and has no negative impact on viability of primary human T cells. Proper cloning of three AML-directed CAR T cells was confirmed via nucleic acid sequencing and we have found that surface expression of antigens targeted by our AML-directed CAR T cells remained unchanged after Gal-9 antibody blockade.

Conclusions: These data show that Gal-9 inhibition alone is selectively cytotoxic towards AML cells but not T cells. We plan to test the efficacy of combinatorial Gal-9 antibody blockade/AML-directed CAR T-cell therapy in AML both in vitro and in vivo.

Utilization of Long-Term Video EEG Monitoring in Pediatric Patients: Experience of a Large Pediatric Tertiary Care Center

Presenting Author: Phillip Sumardi, BS; Emory University School of Medicine

Poster Number: 80

SUMARDI, PHILLIP; Sanghi, Avni; Philbrook, Bryan; Bhalla, Sonam; Al-Ramadhani, Ruba; and Lin, Jenny

Background: Long-term video EEG monitoring (LTVM) is a vital neuromonitoring tool that aids in recording nonconvulsive subclinical seizures and status epilepticus, especially in inpatient settings. In large clinical hospitals, maintaining LTVM continuously requires extensive resources, personnel, and clinicians. An ongoing struggle occurs on institutional levels of how to balance limited resources and staff with patient care demand. This balance is vital at Children's Healthcare of Atlanta, consisting of 586 inpatient beds between two large pediatric tertiary care centers. This study aims to retrospectively describe our experience of inpatient clinical utilization of LTVM.

Methods: Conducted a retrospective review on LTVM studies of patients ages 0–21 years between August 1, 2021–January 31, 2022. Excluded EEG's done in outpatient or in the Epilepsy Monitoring Unit. Demographic, clinical, and EEG seizure data were reviewed.

Results: The six-month period included 879 LTVM studies and 28,935 hours 53 minutes of cumulative EEG data. The mean LTVM's started per day were 4.8 studies. The mean daily total LTVM EEG data was 157 hours 16 minutes. The median patient age was 5.1 years with 35% (n=304) infants, 33% (n=292) children 1-10 years, 23% (n=199) over 10 years, and 9% (n=83) neonates. There were 47% (n=412) female and 53% (n=466) male patients. The median study duration was 23 hours 18 minutes. Most common indications included seizure-like activity (49%, n=427), breakthrough seizures (11%, n=99), altered mental status (AMS) (9%, n=81), and status epilepticus (9%, n=80). EEG detected seizures in 23% (n=196) of cases. 41% of seizures (n=78) were subclinical, 33% (n=63) clinical, 24% (n=46) both, and 2% (n=3) on the ictal-interictal continuum. When analyzing patients with electrographic seizures only, 33/62 (53%) patients had seizures within 1 hour of LTVM initiation, 60/62 (97%) within 24 hours, and 61/62 (98%) within 72 hours.

Conclusion: LTVM utilization in the inpatient setting is rapidly increasing. Infants and children were most frequently evaluated by LTVM. Most common indications for LTVM were seizure-like activity, breakthrough seizures, AMS, and status epilepticus. Seizures were recorded in 196 patients (23%), of which 78 (41%) were electroclinical. Of electrographic seizures, 97% were detected within 24 hours.

Race and Ethnicity Do Not Affect the Impact of Genomic Profiling in Pediatric T-Cell Acute Lymphoblastic Leukemia/Lymphoma, High Grade Glioma, and Medulloblastoma

Presenting Author: Ryan Summers, MD; Emory University School of Medicine

Poster Number: 58

SUMMERS, RYAN J; Castellino, Sharon M; Porter, Christopher C; MacDonald, Tobey J; Bhasin, Manoj K; Cash, Thomas; Carter, Alexis B; Castellino, Robert Craig; Fangusaro, Jason R; Lawrence, Taylor; Mitchell, Sarah G; Pauly, Melinda G; Sabnis, Himalee; Penche

Background: Profiling of pediatric cancers through deep sequencing has been adopted in many clinical settings. However, the true impact of genomic sequencing on the clinical care of patients remains to be defined.

Methods: The Aflac Precision Medicine Program conducted a prospective trial employing whole-exome sequencing (WES) of tumor and germline tissue and whole-transcriptome sequencing (RNA Seq) of tumor tissue to characterize the mutational landscape of tumors from children with high-risk brain tumors (BT), leukemias and lymphomas (LL), and extracranial solid tumors (ST). Somatic therapeutically targetable alterations (TTAs), somatic additional significant alterations (ASAs), and impactful findings were defined as previously reported (Summers RJ, JCO Precis Onco 2022). We present updated findings from all patients enrolled.

Results: From 5/2018 to 2/2024 we enrolled 382 patients (122 BT, 124 LL, 162 ST) and sequenced 405 samples. The cohort reflects the racial and ethnic diversity of our center: 205/382 (54%) White, 131/382 (34%) Black, 316/382 (83%) Non-Hispanic, and 64/382 (17%) Hispanic. Utilizing our published impact score we identified ≥1 impactful findings in 312/405 (77%) samples sequenced. A recommendation to consider a targeted agent was made in 248/405 (61%) cases. The most common tumors sequenced were T-lymphoblastic leukemia/lymphoma (T-ALL/LLy; n=48), high grade glioma including diffuse midline glioma (HGG; n=43), and medulloblastoma (MBL; n=42); within these tumor types there was no difference in median impact score across racial and ethnic groups. No other tumor types were sequenced frequently enough to allow for statistical comparison. Most patients with T-ALL/LLy (46/48, 96%) and HGG (42/43, 98%) had ≥1 identified TTA/ASA regardless of racial or ethnic group. Black patients with MBL were more likely to have ≥1 identified TTA or ASA as compared to white patients, though this finding did not reach statistical significance (p=0.0591).

Conclusions: Our data revealed that paired tumor/normal WES and tumor RNA Seq was clinically impactful in 77% of high-risk pediatric cancer patients. In T-ALL/LLy, HGG, and MBL there were no differences in impact between different racial and ethnic groups. Black patients with MBL may be more likely to have an identified TTA or ASA; this finding should be evaluated in a larger cohort.

Association of Pulmonary Hemodynamics at Fontan with Long-term Outcomes after Fontan palliation

Presenting Author: Divya Suthar, MD, MHA; Children's Healthcare of Atlanta

Poster Number: 90

Suthar, Divya; Yang, Yanxu; Knight, Jessica; Behshish, Asaad; Oster, Matt and Kochilas, Lazaros

BACKGROUND AND AIM: To determine the association of pulmonary hemodynamics at time of Fontan with in-hospital and long-term outcomes after Fontan operation.

METHOD: This is a cohort study of patients undergoing Fontan in the Pediatric Cardiac Care Consortium, a US-based registry of congenital heart surgeries. Post-discharge deaths were captured through 2022 by linkage with the National Death Index. Regression analysis and Cox proportional hazard models were used to assess association between pulmonary hemodynamics [mPAP=meanpulmonary arterial

pressure, PVR=pulmonary vascular resistance, TPG=transpulmonary gradient] and in-hospital Fontan failure (death or takedown) and post-discharge risk of death respectively.

RESULTS: Between 1986 and 2011, 1461 patients were enrolled in the PCCC who underwent pre-Fontan cardiac catheterization. A total of 95 patients had in-hospital Fontan failure (death: 78, Fontan take-down: 17) and 1366 patients were discharged alive with Fontan physiology. Over 21.2 years of median follow-up (IQR: 18.4-24.5) 184 deaths occurred. On multivariable analysis for in-hospitalFontan failure, mPAP was found to have borderline significance (aOR 1.09 for each mmHg increase in mPAP; 95%CI: 0.99-1.20, p=0.08); no other variable reached statistical significance. The risk for post-discharge death increased by 10% at any time during the follow-up period for each mmHg increase in the mPAP (aHR 1.10, 95%CI 1.0-1.21, p<0.01). mPAP had an almost linear relationship with the risk of post-discharge death along the range of values obtained at time of pre-Fontan evaluation. mPAP also had strong interaction with presence of systemic left ventricle (aHR0.95, 95%CI:0.49-1.84, p<0.02). TPG and PVR did not reach a significant association either with in-hospital or with post-discharge risk of death. Systemic RV and age >4 years at Fontan were both independently associated with a higher risk of post-discharge mortality. Presence of heterotaxy as a co-morbidity was statistically significant with worse long term outcomes(aHR 1.94, 95% CI 1.15-3.27, p 0.01.

CONCLUSIONS: Our data demonstrate that low mPAP and age of 2-4 years at the time of Fontan are strong predictors of long-term success in the Fontan pathway. The findings,also, suggest that maintaining low mPAP may prolong the longevity of Fontan physiology for many years after the procedure, especially for patients with systemic left ventricle.

Seasonal Variation in Pediatric Hemoglobin and Ferritin Levels

Presenting Author: McKinley Tran, BS; PPC

Poster Number: 105

TRAN, MCKINLEY; AND ADAMKIEWICZ, THOMAS

BACKGROUND: Hemoglobin and ferritin levels are markers of iron status. Understanding seasonal variations in these markers may inform further need for supplementation. This study aims investigates seasonal fluctuations in hemoglobin among children less than 2 years old.

METHODS: This retrospective study on patients at Perimeter Pediatrics examined hemoglobin (07/10/07 – 12/29/23) and ferritin levels (04/21/09 – 02/28/24). Hemoglobin levels were assessed in clinic using the Hemocue Hb 801 analyzer, or at LabCorp. Ferritin levels were conducted at LabCorp. Stratified analyses were performed by age groups (<1 year and 1-2 years). In patients with first time measurements, frequencies of hemoglobin levels below <11 g/dL or ferritin levels <20 ng/mL were examined. The month with the lowest frequency falling below these thresholds was compared to the remaining months. Statistical analysis was conducted using Excel (part of the flu and vaccine utilization study; CHOA IRB).

RESULTS: A total of 6,400 hemoglobin levels and 482 ferritin levels were assessed. Differences in mean hemoglobin levels were observed. For hemoglobin, the most notable difference was between May (n=451, mean: 12.7 g/dL, standard deviation [std]: 1.67) and November (n=526, mean: 13.1 g/dL, std: 1.76; p<0.001). For patients under <1 year of age (n=1327), the greatest difference was between January (n=114, mean: 11.94 g/dL, [std]: 1.17) and March (n=110, mean: 12.36 g/dL, [std]: 1.15; p<0.01). For patients between the ages of 1 and 2 years (n=686), the greatest difference was between March (n=73, mean: 12.11 g/dL, [std]: 1.26) and April (n=65, mean: 11.68 g/dL, [std]: 1.3; p<0.05). February had the lowest frequency of hemoglobin <11 g/dL (11/277 = 4%), compared to the rest of the months (268/3034 = 9%; p=0.006), For ferritin, February had also the lowest frequency of <20 ng/mL (11/44 = 25%) compared to the rest of the months (97/291 = 33%; p=0.27).

CONCLUSION: Within the population examined, notable monthly differences were noted in hemoglobin amongst children, this may have implications on thresholds for iron supplementation. Reasons for variability need to be further understood.

Safety of Peanut Oral Immunotherapy in Preschoolers at a Pediatric Academic Food Allergy Center

Presenting Author: Brian Vickery, MD; Emory University

Poster Number: 43

VICKERY, BRIAN; Horton, Codi; Leef, Chelsea; Bai, Shasha; Ezhuthachan, Idil; Lee, Tricia; Lee, Gerald; and Rathkopf, Melinda

Background: Following publication of the IMPACT study, we launched an early peanut oral immunotherapy (e-POIT) program for peanut-allergic children 6 months to 4 years of age. We aimed to capture adverse events (AEs) related to dosing for all e-POIT patients.

Methods: We developed and implemented an online data capture system within REDCap (Vanderbilt University Medical Center, Nashville, TN) and an external patient-facing module, MyCAP, to capture AEs for in-office and home e-POIT dosing, respectively. E-POIT providers completed data entries into REDCap at the time of office visits, while caregivers entered dosing outcomes in real-time or retrospectively.

Results: From April of 2022 through July of 2023, we captured 3,160 home (N=25 patients) and 261 in-clinic e-POIT doses (N=35 total). Twenty-eight percent reported reactions during home e-POIT dosing (per-dose reaction rate 0.8%), whereas 72% reported no reactions. During in-clinic dosing, we observed reactions in 14% of patients (per-dose rate 1.9%), while 86% did not react. No patient had > 1 reaction and none required epinephrine; all were treated with antihistamine only. There were no cases of eosinophilic esophagitis or hospitalization. A preliminary comparison of MyCAP dosing data from POIT patients older than 4 years suggested the rate of home dosing reactions was significantly lower in e-POIT (0.8% vs. 4.1%, p<0.001).

Conclusions: Open-source patient-facing software that integrates into the electronic health record is used by most e-POIT caregivers. Data from this clinical quality system demonstrated a favorable safety

profile of e-POIT, with a rate of infrequent, mild dosing reactions perhaps superior to POIT in older patients.

Congenital Heart Disease and Prematurity: Similarities and Differences in Outcomes and Access

Presenting Author: Molly Winston, PhD; Children's Healthcare of Atlanta, Emory School of Medicine

Poster Number: 95

Winston, Molly; Lee, Susan McManus; Ilardi, Dawn

Background: Premature birth (<37 weeks gestation) and congenital heart disease (CHD) encompass two of the leading causes for perinatal complications with significant neurodevelopmental (ND) implications. Although scientific and medical communities have guidelines for monitoring ND outcomes across both populations, follow-up programs are very different, and may affect access to services and overall outcomes. This study aims to characterize similarities and differences in service access and ND outcomes for children with CHD only, prematurity only (PREM), and CHD with prematurity (CHDPREM). It is hypothesized that the CHDPREM group will have poorer ND outcomes, but PREM groups will have better access to services.

Methods: Retrospective data were collected from patients referred for a neuropsychological evaluation at Children's Healthcare of Atlanta (IRB approved). The initial sample (ages 4-20) includes 164 participants (CHDPREM=34, CHD=71, PREM=59). ND measures include comprehensive neuropsychological data. Sociodemographic, medical, and service access data was also collected. Initial analyses are descriptive and explore group differences in service access and select ND outcomes. Upcoming analyses will explore the impact of the risk and protective factors on comprehensive ND outcomes across age-matched groups.

Results: Preliminary analyses show the PREM group was younger at evaluation, had lower gestational age, and lower birthweight compared to CHD and CHDPREM groups ($p<.001$). PREM had the highest rate of neuroimaging [head ultrasounds (HUS), MRI, or CT] ($p<.001$) and the highest participation in early intervention ($p<.001$). Regarding ND outcomes, CHDPREM had higher parent-reported behavioral symptoms ($p=.092$) and executive functioning difficulties ($p=.070$). Parent-reported adaptive functioning and academic achievement did not significantly differ between groups ($ps>.11$); although the means for all groups fell below the normative sample. Future analyses will include data from additional neurocognitive domains.

Conclusions: Preliminary results for the present sample of individuals with CHD, CHDPREM, and PREM, highlight disparate practices for early neuroimaging and unequal service access across the populations, with PREM having the highest rate of both compared to the CHD groups. Initial analyses of ND outcomes show higher parent-reported behavioral and cognitive difficulties in CHDPREM. Results will be used to inform clinical recommendations for initial assessment and long-term follow up in these comparable high-risk groups.

Inducible Costimulatory Molecule (ICOS) is Important for CD4 Th17 Adoptive Cellular Therapy

Presenting Author: Megen Wittling, B.S. - Current MD/PhD Student; Emory University

Poster Number: 53

Wittling, Megen; Knochelmann, Hannah; Wyatt, Megan; Kumarasan, Soundharya; Cole, Anna; Lesinski, Gregory; and Paulos, Chrystal

Background: T cell therapies are efficacious forms of treatment for cancer, particularly for hematologic malignancies but have room for optimization for use in solid tumors – a primary focus of our lab. We have found that antigen-specific CD4 Th17 cells are able to effectively clear melanoma tumors in mice more effectively than other CD4 subtypes. Additionally, these unique cells have multiple properties such as stemness and pleiotropic cytokine production that make them a promising approach for the treatment of a variety of cancers. As these unique cells express high levels of inducible costimulatory molecule, ICOS, I herein investigate the role of this molecule on the success of this therapy.

Methods: C57BL/6J mice were given B16F10 melanoma tumors and one week later were preconditioned with 5Gy radiation followed by treatment with antigen specific Th17 cells. ICOS blockade was then given or an isotype control, and tumor growth and survival monitored over time. Cytokine profiles as well as the phenotype of both infused and host lymphocytes was assessed. Additionally, RNA-Seq was performed on lungs, skin, tumors, and spleen from mice blocked of ICOS or from the isotype control group. ICOS-Ligand expression was also assessed on antigen-presenting cells using flow cytometry.

Results: ICOS was found to be important for Th17 therapy efficacy as when blocked, anti-tumor activity of Th17 cells and survival was diminished. Those given the isotype antibody, however, survived long-term. Additionally, engraftment and survival of the transferred cells was decreased when ICOS was blocked. This interaction between ICOS and its binding partner ICOS-Ligand additionally appears to be important early on as early but not late blockade decreased therapy efficacy. Additionally, ICOS-Ligand appears to be expressed primarily by macrophages and B cells with some expression seen on dendritic cells. This expression was highest in the blood and spleen compared to the tumor and lymph node.

Conclusions: Co-stimulation with ICOS is important for Th17 therapy success, and this interaction between ICOS and ICOS-Ligand increases the ability of transferred cells to persist. Future directions will investigate how ICOS changes the phenotype of adoptively transferred cells to further characterize how it mediates increased long-term protection.

Wireless Soft Multifunctional Biopatch for Preventing Heat-Related Illnesses

Presenting Author: Hoon Yi, Doctoral degree; Georgia Institute of Technology

Poster Number: 106

Yi, Hoon; Kim, Hodam; Kang, Minki; Kim, Ka Ram; Kim, Eugene; Yeo Woon-Hong

Outdoor workers, such as construction workers, are exposed to the risk of heat-related illnesses (HRIs) due to prolonged heat stress and heavy labor. Heat-related illnesses include heat stroke, heat exhaustion, heavy dehydration, and the like, which can lead to highly dangerous accidents on work sites. Thus, the prevention of HRIs is crucial. To address this, we developed wireless biopatches that can measure various physiological signals in real time, ensuring the worker's convenience. The biopatch directly monitors electrocardiogram (ECG), 3-axis acceleration, skin impedance, photoplethysmography (PPG) signals, and skin temperature. It is designed as a rigid-flex system to ensure mechanical reliability and maintain conformal contact with the skin. The biopatch does not impede the workers' tasks with its small form factor. The developed biopatch was attached to the subject's chest, allowing continuous physiological signal collection in real-time over a full working period (over 12 hours), displayed on a mobile phone via Bluetooth. These physiological signals can serve as biomarkers for diagnosing HRIs. With this approach, the biopatch shows a high potential for preventing HRIs in outdoor workers.

Examining Sociodemographic Differences in Adaptation of Parent-Mediated Intervention in Early Intervention Clinic

Presenting Author: Millena Yohannes, BA; Emory University School of Medicine

Poster Number: 108

Yohannes, Millena; Adebogun, Rola; Guerra, Karen; Hendrix, Nicole; Pickard, Katherine

Background: Parent-mediated interventions (PMIs) are an effective approach to early intervention (EI) for autistic children (Nevill et al., 2018). Parents' engaged participation is crucial for the success of PMIs (Pellecchia et al., 2018). However, limited research has examined whether the goals of manualized PMIs align with the needs of families typically underrepresented in research (Pickard et al, 2016). This misalignment may lead to clinician-directed adaptation of intervention delivery. This study aims to assess whether parent engagement and sociodemographic factors such as race and socioeconomic status impact the frequency and type of adaptations made to PMI delivery.

Methods: Participants included 325 toddlers who received an evidence-based PMI, Project ImPACT (Ingersoll & Dvorcsak, 2019), in an outpatient, university-affiliated EI clinic in a major metropolitan area. Most participants identified as white (n=109) or African American (n=166). 77% of participants utilized public insurance versus 23% with private insurance. Prior to receiving Project ImPACT, caregivers completed questionnaires regarding sociodemographic information and perceived barriers to treatment participation. After each session, clinicians reported adaptations made to program delivery based on the Framework for Reporting Adaptation and Modifications-Expanded (FRAME) within the electronic medical record. Independent t-tests were used to assess whether race or insurance were predictive of frequency or type of adaptation.

Results: There were no significant differences in reported total adaptations via race or insurance. However, clinicians reported covering other therapeutic content more often for white than Black families ($p=0.006$). Further, clinicians reported shortening session length significantly more often for Black families ($p=0.05$), and families who utilized public insurance ($p=0.002$). Clinicians also reported providing

more autism psychoeducation to families utilizing public insurance (p=0.01). Further, families that reported greater barriers to treatment participation experienced a higher frequency of total adaptations made over the course of Project ImPACT (p=0.01).

Conclusion: These findings suggest that caregivers from diverse racial and socioeconomic backgrounds may benefit from intentional and specific adaptation of PMI. Altogether, these findings may indicate the need for adaptation to manualized PMI to support the engagement of families within outpatient early intervention services. Next steps are to understand the impact of adaptation on caregivers' experiences, engagement, and outcomes.

The Development of Personal Choice in Autistic and Non-Autistic Adolescents

Presenting Author: Rachel Young, Bachelor of Science, Brain and Cognitive Science; Bachelor of Arts, Psychology; Marcus Autism Center

Poster Number: 64

YOUNG, RACHEL; Layton, Christina; Smetana, Judith; and Bennetto, Loisa

Background: As adolescents grow older and social reasoning develops, they push boundaries with their parents and request increasingly more control. Because this development of personal autonomy relies on social experiences (Smetana et al., 2014), it may progress differently in autism. Additionally, while parents typically resist adolescents claiming more autonomy, this may be amplified in autistic families because of heightened safety concerns and misconceptions about the capacity for autonomy in autism (Wray-Lake et al., 2010). Parent-teen negotiations about personal choice provides a critical context for adolescents to practice making their own decisions when stakes are low. Understanding the nature and timing of this negotiation in ASD is critical for supporting adolescents' autonomy as they enter adulthood.

Methods: Participants included 204 dyads of parents and their adolescents (ASD=116), aged 12 to 17 years and without intellectual disability. The ASD sample was recruited from Simons Powering Autism Research (SPARK). Parents and teens independently completed online surveys assessing their opinions on the legitimacy of parental authority for hypothetical scenarios across multiple domains.

Results: A repeated measures ANOVA yielded significant effects of respondent (p<.001), group (p=.02), and domain (p<.001), as well as a significant three-way interaction (p=.02). Consistent with prior research, non-autistic teens viewed all domains as less under legitimate parental authority compared to their parents' views (p<.001). The same pattern was seen in the ASD group, except for the personal domain. Autistic adolescents and their parents agreed that personal issues were up to adolescents to decide, and parents of autistic adolescents granted more autonomy regarding personal issues compared to other parents (p<.001). This domain was also the only area where autistic and non-autistic teens did not differ in their opinions.

Conclusions: Parents of autistic adolescents were more likely than other parents to view adolescents as having legitimate authority over personal issues. Increased autonomy support seemed successful, as

autistic teens' judgements of their own authority on personal matters did not differ from peers. In contrast, autistic adolescents viewed other domains as significantly more under parents' legitimate authority. Our results highlight the importance of recognizing autistic individuals' ability to have control over personal choices and preferences.

Role of Palliative Care in Patients with Leukodystrophy

Presenting Author: Deborah Yu, MD; Emory University School of Medicine

Poster Number: 65

Nguyen, Vanessa; YU, DEBORAH; D'souza, Tabitha; Keller, Stephanie; and Bishop, Cia

Objective: The aim of our study is to better understand the role of pediatric palliative care involvement within the pediatric leukodystrophy population.

Background: Children with leukodystrophy experience progressive physical and cognitive decline, which can cause considerable suffering. Literature on the role of palliative care for children with severe neurological impairment emphasizes that palliative care helps with multimodal symptom management, building trust with medical teams, and managing advanced care planning and care coordination (1, 2). However, there is limited research specifically evaluating the involvement and the impact of palliative care within the pediatric leukodystrophy population.

Design: A single-center retrospective chart review was conducted on patients 0-18 years with leukodystrophy, followed at Children's Healthcare of Atlanta's leukodystrophy clinic from 2016-2023.

Results: 206 patient charts were reviewed, of which 26% (53/206) received a palliative care referral. Hospitalist team (37%) or ICU team (27%) placed majority of palliative referrals, as these were only offered inpatient. Progression of disease (96%) was the most common referral reason. Diagnosis to palliative care consult took an average of 2.4 years. All palliative consultations involved goals of care/advanced care planning, and 42% also included symptom management.

20% (41/206) of the patients in this cohort had died. Of these, 66% (28/41) had a palliative care consult, and 54% (22/41) were enrolled in hospice. Average time from palliative consult to death was 2 years, and average age at death was 5.9 years. 27% of deceased children had a full code status, 39% had a DNR/DNI, and 27% had a DNR. 49% died at a hospital, and 29% died at home/a hospice house.

Conclusions: Palliative care is an underutilized layer of support for children with leukodystrophy and their caregivers. There are many opportunities to improve neuro-palliative integration earlier in the illness course.

Development of a High-Throughput Drug Screening System Based on Human Peripheral Blood Derived Microglia-Like Cells from Sickle Cell Patients with Chronic Pain

Presenting Author: Yankai Zhang, PhD; Department of Pediatrics, Emory University School of Medicine; Aflac Cancer and Blood Disorders Center at Children's Healthcare of Atlanta

Poster Number: 47

ZHANG, YANKAI; Goldsborough, Kennedy; Shen, Huifeng; Hernandez, Britney; Kanne, Celeste; Kostamo, Zachary; Yoo, Justin; Patel, Ashwin and SHEEHAN, VIVIEN

Background: Children with sickle cell disease (SCD) experience acute pain, which can transition to chronic pain. Reducing abnormal microglia activation is a promising strategy to treat chronic pain. However, microglia-targeted drug discovery has been stymied by species related differences (e.g., rodent models) and lack of healthy human CNS microglia. Moreover, the current human microglia model systems have limitations for high-throughput drug screening (HTS), such as loss of pathological characteristics of disease processes, technical challenges for HTS miniaturization and high culture cost. To address these shortcomings, we have established an efficient suspension culture system to generate human peripheral blood derived microglia-like cells (HPB-MLC) and combined the culture system with AlphaScreen technology to develop a cost-effective, highly robust HTS platform to screen compounds to treat chronic pain.

Methods: Human peripheral blood mononuclear cells (PBMC) obtained from patients with SCD were cultured in a suspension culture system to generate human microglia-like cells (HPB-MLC) with human GM-CSF, IL-34, TGF-β2. The culture was validated with transcriptomic analysis. The microglial phagocytic function of HPB-MLC was determined using imaging flow cytometry analysis. TNFα levels were detected using a commercial homogeneous cell-based assay kit based on AlphaScreen technology.

Results: The transcriptomic analysis demonstrated that the cultured HPB-MLC strongly expressed microglia markers, while losing their expression of PBMC markers and upregulated microglia functional pathways compared with PBMC from the same donor before culture. The PB-MLC showed typical microglia morphology and functions exhibiting microglial phagocytic activity and robust response to LPS. To evaluate the possibility of using the HPB-MLC model system to screen compounds to inhibit microglia activation, we tested HPB-MLC with the microglial inhibitor: minocycline. The drug significantly suppressed the release of TNF-alpha from LPS-induced activated PB-MLC in a dose-dependent manner. The suspension culture system enabled fast and uniform seeding of cells to 384 well microplate for HTS applications.

Conclusions: We developed an efficient suspension culture system to generate HTS assay-ready microglia-like cells. As a novel, cost-effective, efficient, and patient-specific microglia model, the system can be applied to screen for compounds that reduce microglia hyperactivity, thereby identifying promising pharmacologic agents to be developed to treat chronic pain.

Association Between Health Insurance Continuity and Stage at Diagnosis Among Children, Adolescents, and Young Adults Newly Diagnosed with Lymphoma

Presenting Author: Elyse Xinyue Zhang, MPA; Emory University

Poster Number: 59

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Background: Lymphoma is the third leading cause of cancer among children and adolescents/young adults (AYAs) in the United States. Continuous health insurance coverage is vital for early diagnosis and improved survival among this young population. We examined the association of the timing of Medicaid gains and coverage continuity with lymphoma stage at diagnosis among children and AYAs.

Methods: Using the linked Surveillance, Epidemiology, and End Results (SEER) registry and Medicaid enrollment data, we identified 15,366 children and AYAs (aged 0-39 years) newly diagnosed with lymphoma between 2007-2013. For patients linked to Medicaid data, we categorized enrollment patterns into 1) continuous Medicaid (enrolled ≥12 months preceding and through diagnosis), 2) newly gained Medicaid (gained Medicaid only in the month before, during the month of, or ≤2 months following diagnosis), 3) other Medicaid enrollment patterns. For patients not linked to Medicaid data, insurance type recorded at diagnosis from SEER was used. We defined late-stage as stage IV (vs. stage I-III) using the Ann-Arbor staging classification. Multiple logistic regressions were estimated, and marginal effects (MEs) were reported.

Results: Of our sample, 52.0% had private insurance and 22.9% had Medicaid insurance. Of those insured by Medicaid, 35.2% did not gain Medicaid until the point of diagnosis, and 27% experienced periods of non-continuous coverage. These groups were 18%-54% more likely to present with stage IV lymphoma, compared with peers with continuous Medicaid coverage.

Conclusions: Lacking continuous Medicaid coverage was significantly associated with late-stage lymphoma diagnoses. However, only three in eight Medicaid-insured children and AYAs with lymphoma had continuous coverage preceding and through cancer diagnosis. These findings highlight the importance of multilevel strategies to improve insurance coverage continuity for vulnerable children and AYAs populations, as millions of them have lost coverage under the recent unwinding of the Medicaid continuous enrollment protections instituted as part of the response to the COVID-19 pandemic.

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