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### Perceived Stress and Access to Care in Parents of Children Living a Diagnostic Odyssey in Puerto Rico

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**OBJECTIVES/GOALS:** Diagnostic odyssey is the time it can take to a patient for receiving a diagnosis. Diagnostic process in rare diseases can be complex due to the heterogeneity of symptoms and lack of access to care. We aim to evaluate the association between diagnostic odyssey, perceived stress, and access to care, in parents of Puerto Rican patients with a rare disease. **METHODS/STUDY POPULATION:** We propose a cross-sectional study in parents of 100 children who received an uninformative whole exome sequencing (WES) report during a scheduled appointment with their geneticist. Discussion of WES results during clinical session, followed by a Perceived Stress Scale (PSS-10) and semi-structured interview to explore the experience of access to care during the diagnostic process will be arranged. Observation and interviews will be recorded. Data analysis and descriptive statistics will be calculated using STATA. Statistical associations (OR) will be estimated using generalized linear models at a 5% significance level. **RESULTS/ANTICIPATED RESULTS:** We expect to find high perceived stress in parents of Puerto Rican pediatric individuals having rare diseases, especially among single mothers. We will be able to identify limited access to care in Puerto Rico, especially in the testing pre-authorization process and long waits for geneticist appointments. Demand for advanced diagnostics is above the number of medical geneticists available in Puerto Rico, which triggers delayed diagnosis, management, and counseling. Therefore, these could affect the health disparities in our population with rare diseases. **DISCUSSION/SIGNIFICANCE:** This descriptive study will evaluate perceived stress in parents of pediatric patients living a diagnostic odyssey in Puerto Rico. No study has described perceived stress and access to care in this Hispanic population with undiagnosed conditions. Findings will contribute to a deep understanding of diagnostic process and limited access to care.

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### Predictors of Substance Use Initiation by Late Childhood: Findings from the Adolescent Brain Cognitive Development (ABCD) Study

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**OBJECTIVES/GOALS:** Adolescence represents a critical period for substance use initiation. Various factors may contribute to

trying a sip or single puff of a substance, that could lead to more frequent use. However, less is known about how predictors from multiple domains converge to impact risk for general substance use initiation. **METHODS/STUDY POPULATION:** The Adolescent Brain Cognitive Development (ABCD) study is a multi-site longitudinal study following youth into early adulthood. The present study included 7,644 ABCD children who reported no lifetime substance use (including any experimentation) at baseline (ages 9–10). Our primary aim was to use a random forest classification model to predict binary substance use initiation, defined as trying any non-prescribed substance (e.g., alcohol, tobacco, cannabis, non-prescribed medications), during a 2-year follow-up after baseline. A total of 402 variables from the following categories were examined as predictors: demographics, peer substance use and availability, mental and physical health, culture and environment, biospecimens, neurocognitive functioning, and structural neuroimaging variables. **RESULTS/ANTICIPATED RESULTS:** Over a two-year follow-up, 751 (9.8%) of substance-naïve children reported trying a substance by age 11. The most common substance was alcohol, followed by cannabis and tobacco. Mean Decrease Accuracy (MDA) values were used to assess the relative importance of each predictor. The overall accuracy of the model in accurately predicting group membership (no substance use initiation vs. substance use initiation) was 57.66%. Of the top 5 predictors, the most important predictor was intent to use alcohol (MDA = .002). The following top predictors were structural neuroimaging variables: volume and surface area of right lateral occipital lobe (MDA = .0009 and .0008, respectively), surface area of right inferior temporal lobe (MDA = .0007), and surface area of left superior frontal lobe (MDA = .0007). **DISCUSSION/SIGNIFICANCE:** A combination of intent to use alcohol and structural neuroimaging indices were among the top predictors of substance use initiation. Understanding predictors of early substance use experimentation is important for identifying at-risk youth that may require targeted intervention approaches.

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### Radiopathomics: Integration of Advanced Neuroimaging and Molecular Pathology Features in Meningiomas

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**OBJECTIVES/GOALS:** Our overall objective is to investigate the relationship between radiologic features of meningioma with recently identified histopathological and molecular biomarkers, and to apply a machine learning (ML) approach to further demonstrate their utility in predicting clinical outcomes. **METHODS/STUDY POPULATION:** We have enrolled a cohort of 84 patients with meningioma diagnosed on the basis of conventional gadolinium-enhanced MRI imaging features since September 2019. Each patient has demographic and clinical data, Ga-68-DOTATATE MRI/PET SUV and dynamic metrics, DCE-MRI perfusion parameters, and histopathologic data. Various tumor subregions will be segmented semi-automatically and later confirmed by experienced neuroradiologist. Histopathologic data will include histologic grade, mitotic rate, Ki67 proliferative index, and presence of WHO established atypical histologic features, immunohistochemical

parameters, and established high-grade molecular features. We will use supervised learning techniques to develop algorithms for predicting molecular features from imaging phenotypes. RESULTS/ANTICIPATED RESULTS: Anticipated results - advancements in understanding the molecular biomarkers of meningiomas has uncovered genetic alterations and epigenetic changes that more accurately determine tumor behavior. Currently, the imaging correlates of these molecular biomarkers are unknown, and utilizing radiographic data to predict prognosis and imaging-based classifications of meningiomas have not yet been investigated. Validated imaging correlates of molecular biomarkers not only provide an in-vivo assessment of tumor biology, but can also be integrated with histopathologic features (radiopathomics models) for more accurate disease prognostication. We anticipate that our results will identify surrogate imaging features for some of the recently emerged molecular biomarkers of meningioma. DISCUSSION/SIGNIFICANCE: There is a paucity of data on the importance of imaging phenotypes in determining tumor biology. This work has the potential of significant clinical impact by enabling a priori molecular characterization of meningiomas at the time of new diagnosis or recurrence, thereby allowing a personalized medicine approach to treatment planning.

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### **Rapid Screening Tool for Identifying Acute Myocardial Injury: An Exploratory Study Evaluating the Ability of a Novel, Noninvasive Device to Detect Cardiac Troponin**

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OBJECTIVES/GOALS: Tropsensor, a noninvasive portable device using infrared spectroscopy, delivers a troponin result within five minutes, significantly quicker than standard of care (SOC) assays. This pilot study assesses the correlation of the Tropsensor and high sensitivity cardiac troponin (hs-cTnI) assay results. METHODS/STUDY POPULATION: Patients undergoing cTnI testing with the Abbott Architect STAT (Abbott Laboratories) hs-cTnI assay were recruited at a quaternary-care emergency department (ED). The Tropsensor was applied to the underside of the patients' wrist within 5 minutes of the SOC blood draw for 5 minutes. The results of the hs-cTnI assays were compared with the raw output of the Tropsensor device to assess the relationship using both Spearman's and nonlinear logarithmic measures of correlation. Patient demographic data was extracted from the EHR to supplement the data collected for this study. RESULTS/ANTICIPATED RESULTS: 58 patients were recruited with a mean age of 60 years (60% male, 40% female). Due to connection error, 8 patients' data did not get captured by the device. Additionally, due to noise related to suboptimal device contact with the wrist, 24 patients' data (41%) were rejected. Of the 26 patients with usable data, 9 patients had a troponin above the 99th percentile threshold. A nonlinear correlation of 0.64 and Spearman's rho of 0.59 were observed between the SOC hs-cTnI assay and Tropsensor optical data. DISCUSSION/SIGNIFICANCE: The Tropsensor exhibits 64.4% correlation to the SOC hs-cTnI assay. While further evaluation is needed, this exploratory study provides insight into the potential of a transdermal optical device to be used as a screening tool for AMI in an ED triage situation.

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### **Remote Monitoring of Pediatric Heart Failure: A Systematic Review**

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OBJECTIVES/GOALS: Pediatric heart failure is a complex disease presenting as an end-stage condition due to various etiologies and symptoms, causing 14,000 hospitalizations per year in the United States. Currently, there is a lack of objective metrics that are monitored non-invasively. This study explores tools to adapt remote monitoring technologies for pediatrics. METHODS/STUDY POPULATION: The task was determining commercially available and upcoming technologies for remote heart failure monitoring in the pediatric population. Literature and patent reviews were done in various databases with defined eligibility and key terms. Our inclusion criteria were: English peer-reviewed research or review articles, patents filed by cardiac monitoring companies, and independent groups focusing on non-invasive monitoring solutions. Key terms used for the literature search and patent review included pediatric heart failure', at-home monitoring', cardiac monitoring', and non-invasive'. Based on a strong correlation between increased filling pressures and pediatric heart failure, the term filling pressures' was also included in the search. RESULTS/ANTICIPATED RESULTS: Preliminary searches demonstrate an abundance of adult-use commercially available devices and patents for monitoring heart failure. Yet, there are no FDA-approved devices for use in the pediatric population. Current devices include monitoring metrics such as lung congestion and multi-parametric monitoring to capture heart rate, thoracic impedance, and oxygen saturation levels. In monitoring filling pressures, Abbott CardioMEMs is a leader in measuring pulmonary arterial pressure invasively in adults. Thus, there is a gap for non-invasive monitoring of filling pressures in both pediatric and adult populations. For further review, a larger focus will be placed on non-invasive methods for direct monitoring or extrapolation of cardiac filling pressures. DISCUSSION/SIGNIFICANCE: Current methods of heart failure monitoring are ineffective in serving the pediatric population. Thus, an identified gap exists in non-invasive filling pressure monitoring for pediatric heart failure. This review informs that innovation within this area would address inefficacies within the current paradigm of heart failure monitoring.

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### **Reusing EHR Phenotyping Algorithms in Practice: Developing the Colorado Diabetes EHR Research Repository (CODER)**

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OBJECTIVES/GOALS: The rates of computational phenotyping algorithm reuse across health systems are low, leading to a