of the clinical trial, and two others have expressed interest but were deemed ineligible. Barriers in recruitment resulted in the following modifications to protocol: we expanded our eligibility criteria by removing the upper age limit (now 50+ years old) and now are recruiting females with a personal or family history of breast cancer. We partnered with the Spencer Cancer Center of East Alabama Health to aid in recruitment. DISCUSSION/SIGNIFICANCE: Integrative approaches to improved patient outcomes are needed, however, recruitment remains a paramount barrier for clinical trials. Addressing our issues for recruitment has opened eligibility to more individuals and allows us to continue our investigations, answer our research questions, and advance translational science.

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Vascular Cognitive Impairment: Novel Endothelial Mechanisms and the Impact of Dietary PUFAs

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OBJECTIVES/GOALS: Vascular cognitive impairment (VCI) is the leading cause of dementia behind Alzheimers Disease (AD) and is often the result of brain hypoxia. Diets rich in polyunsaturated fatty acids (PUFAs) can lower cognitive decline and AD incidence in human patients. Therefore, our goal is to determine the mechanisms that PUFAs influence in a mouse model of VCI. METHODS/STUDY POPULATION: We hypothesize that hypoxia promotes endothelial P-tau accumulation and vasotrophic uncoupling, impairing endothelial integrity. Additionally, we believe that a preventative PUFA-enriched diet blocks this uncoupling and subsequently prevents/delays neurovascular dysfunction and cognitive decline. Male and female mice will be administered a control or novel PUFA-enriched dietary intervention 1 month prior to hypoxic injury using the bilateral carotid artery stenosis model. Mice will continue their diet and be assessed for cerebral blood flow, cognitive function, and motor function at 1- & 3-month time points. Following euthanasia, tissue samples from deep cortical regions and microvasculature will be examined for endothelial- & neuronal-specific P-tau accumulation, inflammation, and cell death. RESULTS/ ANTICIPATED RESULTS: Preliminary data in our lab indicates that hypoxia leads to a two-fold increase in endothelial P-tau accumulation and lowered mature BDNF (mBDNF) in brain microvascular endothelial cells (BMECs) compared to controls. Further, BMECs cultured in media with the PUFA docasahexaenoic acid (DHA) had lowered P-tau and increased mBDNF after hypoxia compared to controls. Based on this data and past research, we anticipate that mice on the PUFA-enriched diet will have enhanced cognitive and motor function alongside improved cerebral blood flow compared to controls. Also, we expect that mice on our PUFA-enriched diet will have lowered tau pathology, cell death, and neuroinflammation alongside increased blood brain barrier integrity and altered fatty acid composition in brain and vascular tissue samples. DISCUSSION/SIGNIFICANCE: An AHA Presidential Advisory identified cognitive function as modifiable through the management of cardiovascular risk factors, like diet. However, the mechanisms underlying the benefits of PUFA-enriched diets are unknown.

Successful completion of these studies will provide insight into the vaso-neuronal protective effects of PUFAs in VCI.

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Brain pathophysiology in SARS-CoV-2 disease

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OBJECTIVES/GOALS: The SARS-CoV-2 (Severe Acute Respiratory Syndrome CoronaVirus-2), which underlies the current COVID-19 pandemic, among other tissues, also targets the central nervous system (CNS). The goal of this study is to investigate mechanisms of neuroinflammation in Lipopolysaccharides (LPS)-treated mouse model and SARS-CoV-2-infected hamsters. METHODS/STUDY POPULATION: In this research I will assay vascular reactivity of cerebral vessels to assess vascular dysfunction within the microcirculation. I will determine expression of proinflammatory cytokines, coagulation factors and AT1 receptors (AT1R) in isolated microvessels from the circle of Willis to assess inflammation, thrombosis and RAS activity in the microvasculature. LPS and SARS-CoV-2, are both associated with coagulopathies and because of that I will measure concentration of PAI-1, von Willebrand Factor, thrombin and D-dimer to assess the thrombotic pathway in the circulation. Histology and immunohistochemistry will assess immune cell type infiltration into the brain parenchyma, microglia activation and severity of neuroinflammation and neural injury. RESULTS/ ANTICIPATED RESULTS: We hypothesize that under conditions of reduced ACE2 (e.g., SARS-CoV-2 infection), AT1R activity is upregulated in the microvasculature. In the presence of an inflammatory insult, these AT1Rs promote endothelialitis and immunothrombosis through pro-thrombotic pathways and pro-inflammatory cytokine production leading to endothelial dysfunction in the microvasculature, blood brain barrier (BBB) injury, deficits in cognition and increased anxiety. We will test this hypothesis through 2 aims: Aim 1: Determine the role of the pro-injury arm of the RAS in the pathophysiology of the brain in animal models of neuroinflammation and COVID-19. Aim 1: Determine the role of the protective arm of the RAS in the pathophysiology of the brain in animal models of neuroinflammation and COVID-19. DISCUSSION/ SIGNIFICANCE: This study will provide insights that will complement on-going clinical trials on angiotensin type 1 receptor (AT1R) blockers (ARBs) in COVID-19. This research is a necessary first step

in understanding mechanisms of brain pathogenesis that can set the groundwork for future studies of more complex models of disease.

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Factors needing attention to implement effective drug treatment in community correctional in Puerto Rico

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OBJECTIVES/GOALS: The complex health profile of those supervised by community corrections places them at a greater risk of morbidity and mortality from social disruption, infection, and of substance misuse, relapse, and overdose. This study aims to explore individual and social determinants of SUD and treatment utilization for this population. METHODS/STUDY POPULATION: A secondary data analysis was conducted using an administrative database from the Department of Corrections of Puerto Rico (DoC-PR) that included individuals under community supervision between 2015 and 2018 (N=13,163). Two logistic regression analysis were performed to predict SUD and SUD treatment utilization. The predictors included in the models were: a) age, b) gender, c) civil status, d) education level, e) employment status, f) income, g) number of dependents, h) housing zone, I) type of crime, j) offender classification k) community sentence classification, and k) sentence duration. RESULTS/ANTICIPATED RESULTS: A total of 4,531 cases (34.4%) were identified with an SUD and of these 79.2% were enrolled in treatment. Significant predictors of SUD included a parole sentence (vs probation), commission of felony, decreasing sentence duration and recidivism. Significant demographic variables include, male, single, younger age, unemployed, residing in an urban zone and decreasing income. Significant predictors for SUD treatment utilization were a probation sentence, older age and residing in a rural zone. Mandated treatment may explain a higher likelihood of treatment utilization, yet prevalent modalities consist of residential abstinence based, non-professionalized services known to have poor treatment outcomes. The current data set does not include follow up data to assess changes in treatment utilization. DISCUSSION/ SIGNIFICANCE: We should aim to prevent health and social disparities and risk of sentence revocation associated with interventions that lack evidence to support their effectiveness. Next steps should address challenges and opportunities for the adoption of EBPPs for individuals with an SUD under community corrections supervision.

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The Feasibility of Designing and Using a 3-D Printed Dynamic Upper Extremity Orthosis (DUEO) with Children with Cerebral Palsy and Severe Upper Extremity Involvement

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OBJECTIVES/GOALS: To evaluate whether a low cost, functional dynamic 3-D printed upper extremity (UE) orthosis could be designed, fabricated and used by children with cerebral palsy (CP) with severe unilateral UE involvement and the ability of common standardized instruments to assess its effectiveness. METHODS/ STUDY POPULATION: Five patients, ages 13-17 years, with CP and unilateral UE involvement, MACS levels III-IV, were enrolled.

Custom forearm thumb opponens orthosis and dynamic upper extremity orthosis (DUEO) were designed and fabricated by a multidisciplinary team for use during 8 one-hour occupational therapy sessions targeting bimanual UE training. Pre- and post-assessments included Assisting Hand Assessment(AHA), Melbourne-2(MA-2), Pediatric Motor Activity Log-Revised(PMAL-R), and PedsQL Measurement Model for the Pediatric Quality of Life Inventory: CP Module(Peds-QL). RESULTS/ANTICIPATED RESULTS: The 3D printed orthotic device is custom fit to the patient based on scans of their arm and is designed with a tensioning system that allows for functional usage of the arm. It incorporates a rigid polymer to provide support and flexible material for comfort where appropriate. Overall, higher post-treatment scores were found for the majority of participants using the custom orthotic. Four made minimal clinically important differences (MCID) in the AHA. Three met MCID scores in subtests of MA-2 (two positive and one negative). Patient-reported outcome improvements were found for PMAL-R for four, but only one met MCID and at least three reported improvements in more than one domain of PedsQL. DISCUSSION/SIGNIFICANCE: Children with CP may often present with UE impairment, yet current therapeutic orthoses only target the progression of contractures and are still limited by cost and discomfort. Our team designed and fabricated a functional, low cost, 3D printed orthosis that showed significant gains in UE function.

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Advanced Practice Provider Perspectives on Advanced Care Planning

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OBJECTIVES/GOALS: Perioperative surgical care is team-based with close partnership between surgeons, residents, advanced practice professionals (APPs), and others. The objective is to develop an understanding of the current state and implementation needs required for APPs to engage surgical patients in advanced care planning (ACP) to promote goal concordant care. METHODS/STUDY POPULATION: We will conduct a mixed methods evaluation of ACP knowledge, attitudes, and beliefs amongst surgical APPs to identify barriers and facilitators of APPs engaging in a team-based approach to engaging surgical patients in ACP. We will conduct an online survey and qualitative interviews in the following 4 domains: 1) knowledge, skills, and attitudes about engaging in ACP with a patient or their surrogate decision maker during their perioperative care; 2) prior ACP-specific education; 3) experiences conducting ACP discussions with patients; and 4) perceived training needs to increase ACP uptake and documentation. The findings will provide the foundations to design team-based interventions focused on addressing the barriers and inform training and coaching needs to develop expertise and comfort in the ACP process. RESULTS/ ANTICIPATED RESULTS: We expect variability in the knowledge, skills, attitudes, and experiences with the ACP process. We anticipate gaining a better understanding of the educational materials best suited to support APPs as they begin engaging patients in ACP. Possible barriers to APP-led ACP discussions include inconsistent role delineation, uncertainty about the value of pre-operative vs. post-operative ACP discussions, lack of experience engaging in ACP discussion, and lack of familiarity with electronic health records ACP tools. Possible facilitators of APP-led ACP discussions may be related to past work experience settings, exposure to ACP in