bowel syndrome and Crohns Disease) were also reported (147 and 96 counts, respectively). Respondents also reported on the abuse potential and adverse effects of Kratom (122 counts). DISCUSSION/SIGNIFICANCE: This is the first study to delineate and classify motives for kratom use among Americans. Individuals reported using kratom for a wide spectrum of health-related reasons. Though these results may be influenced by the placebo effect, they suggest that kratom alkaloids may possess therapeutic activity for previously unknown applications.

Team Science

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Clinical characteristics and psychosocial factors associated with temporary neuromodulation success

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OBJECTIVES/GOALS: The present work aims to use baseline data to identify demographic, clinical, and psychosocial factors associated with patients who receive analgesic benefit from temporary neurostimulation. METHODS/STUDY POPULATION: This study presents baseline data from our descriptive, prospective, longitudinal study. Consecutive patients who present to the University of Arkansas for Medical Sciences Interventional Pain Management Clinic for implantation of a neurostimulation device, have met clinical criteria for implantation of a neuromodulation device, and are able to speak and understand English are invited to participate. Prior to the placement of the temporary stimulator, each patient completes demographic and symptom-related questionnaires. Clinical characteristics are obtained through medical record review. RESULTS/ANTICIPATED RESULTS: We anticipate enrolling 50 participants in order to have 30 patients that report analgesic benefit from temporary neurostimulation. Variability in demographics, clinical characteristics, and psychosocial factors will be reported between patients who receive and those who do not receive analgesia following temporary neurostimulation. Gender differences will also be reported. DISCUSSION/SIGNIFICANCE: Despite the use of varying outcome measures, studies to date have not incorporated validated patient reported outcomes or controlled for key demographic and clinical characteristics. Our analysis evaluates clinical and psychosocial variables associated with successful temporary neurostimulation.

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Adaptation and Evaluation of Guideline-Based Family-Based Behavioral Treatment for Overweight and Obesity in Childhood Survivors of Acute Lymphoblastic Leukemia (ALL)

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OBJECTIVES/GOALS: Childhood survivors of ALL are at considerable risk for late effects which are exacerbated by excess weight. The proposed study involves the adaption and evaluation of the first empirically supported intervention for childhood survivors of ALL that is consistent with all national recommendations for the treatment of childhood obesity. METHODS/STUDY POPULATION: The proposed intervention will be adapted from family-based behavioral weight loss treatment (FBT) a multicomponent intervention which targets diet, activity, behavioral skills, parenting, and social facilitation among children and their parents. The Framework for Reporting Adaptations and Modifications-Enhanced structure (FRAME), a dissemination and implementation framework, will guide the adaptation, allowing for the incorporation of feedback previously gathered from key stakeholders. A single-arm, non-randomized trial of the adapted intervention will then be conducted to evaluate its acceptability, feasibility, and preliminary indications of efficacy including measures of relative weight change and associated health-related behaviors among 40 childhood ALL survivors and their families. RESULTS/ANTICIPATED RESULTS: Self-reported feedback from families at the end of treatment (EoT) is anticipated to demonstrate that this intervention will be regarded as both acceptable and feasible. Other measures of feasibility will include attendance and retention rates, which are expected to reflect to those of previous FBT trials (92% and 85%, respectively). Preliminary indications of the efficacy of the adapted intervention will be investigated through the comparison of a series of measurements taken at both baseline and EoT. Changes in relative weight will be assessed and are expected to meet a previously established range of clinically meaningful reduction in child percent overweight of 9 units or more. Improvements in dietary intake, physical activity, and health related quality of life are also anticipated. DISCUSSION/SIGNIFICANCE: Knowledge gained from the implementation of the first evidence-based intervention adapted for childhood survivors of ALL will be critical to the justification of a larger-scale, randomized controlled trial and holds promise to effectively modify the risk for chronic disease among a vulnerable population.

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Adapting a randomized, placebo-controlled pilot study aimed to reduce anxiety symptoms to overcome recruitment barriers

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OBJECTIVES/GOALS: Minimal human investigations have assessed the effect of synbiotics (combination of pre- and probiotics) on anxiety symptoms, despite evidence from preclinical research. Our study aimed to determine the feasibility of a randomized, placebo-controlled trial utilizing synbiotics to reduce anxiety symptoms in older female breast cancer survivors. METHODS/STUDY POPULATION: We aimed to recruit older female breast cancer survivors experiencing anxiety symptoms to a 4-week randomized, placebo-controlled clinical trial. At commencement of the project, participants were eligible if they : 1) were 50-75 years old; 2) completed primary treatment for breast cancer; 3) were experiencing clinical anxiety symptoms 4) agreed to not change dietary supplements 5) were willing to comply with daily supplement regimen; and 6) were able to read and speak English. Use of anxiolytic or microbiome-altering medications, or changes to anxiety treatment within 4 weeks of enrollment were criteria for exclusion. Due to budgetary limitations, we were unable to recruit from state cancer registries, and instead recruited via newspaper advertisements and flyer distribution. RESULTS/ANTICIPATED RESULTS: One participant has successfully been recruited and completed the duration

https://doi.org/10.1017/cts.2022.222 Published online by Cambridge University Press

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

https://doi.org/10.1017/cts.2022.222 Published online by Cambridge University Press