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 multi-disciplinary 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

educational preparation, hands-on observation of value of ACP in surgical patients and influences from attending and residents. DISCUSSION/SIGNIFICANCE: While current ACP research in surgery focuses on physician-led patient engagement in ACP discussions, there is a paucity of research focusing on how to develop a team-based approach to ACP discussions in surgery. This study will provide information necessary for the development of interventions that increase team-based ACP for surgical patients.

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Potential Drug Therapy for Fragile X Tremor/Ataxia Syndrome*,†

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OBJECTIVES/GOALS: Fragile X-associated tremor/ataxia syndrome (FXTAS) is a devastating rare neurological disorder that negatively impacts movement and cognition. To date, there are no effective pharmacological treatments for FXTAS. Our goal was to develop a cell culture model of FXTAS to investigate promising therapeutics. METHODS/STUDY POPULATION: To establish mitochondrial dysfunction, normal human cell lines and human-induced pluripotent cells were treated with multiple concentrations of glucose/ glucose oxidase (GluOx) at 2,12, and 24 hour time points to induce varying intensities of oxidative stress. The degrees of oxidative stress were measured by apoptosis and mitochondrial reactive oxygen species (ROS) production. Curcumin and MSKE compounds effective against oxidative damage in mitochondria were used to rescue glucose oxidase-induced oxidative damage in both cell lines. To test the ability of these drugs to restore mitochondrial health, cell viability and cellular superoxide production were assessed by propidium iodide and the MitoSox fluorescence assay, respectively. RESULTS/ANTICIPATED RESULTS: We anticipated that GluOx at varying concentrations and time points would proportionally increase levels of apoptosis and mitochondrial ROS, reflective of mitochondrial damage, with the most severe dysfunction occurring at a dose of 25 nM and the longest duration of 24-hr exposure. Administration of MSKE in concentrations ranging from 10-8 to 10-5 M in half log increments, did not reverse the oxidative defects induced in the cell lines. However, curcumin concentrations increased cell viability at the 2, 12, and 24 hour time period. Results indicate that the research design should be modified by increasing the concentration of both glucose and MSKE to provide a reliable test of the hypothesis. DISCUSSION/SIGNIFICANCE: These studies illustrate the usefulness of this in vitro model to test novel therapeutics in neuronal FXTAS models and expand the discovery of mitochondrial markers for the syndrome.

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Eliminating System xc- Signaling Between Astrocytes and Neurons Selectively Impairs Complex Cognition

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OBJECTIVES/GOALS: We aim to determine whether non-neuronal, non-synaptic glutamate signaling mechanisms can be targeted to produce highly specific, narrow changes in brain function that would benefit CNS disorders. To do this, we investigated cognitive changes produced through manipulating the activity of the astrocytic glutamate release mechanism system xc-. METHODS/STUDY POPULATION: System xc- (Sxc) activity was eliminated by mutating the gene Slc7a11 through pronuclear injection of zinc-finger nucleases into Sprague Dawley rat embryos to create a line of rats lacking Sxc (MSxc rats). To confirm a lack of Sxc activity, we verified that tissue from MSxc rats had a complete lack of xCT, which is the regulatory subunit of Sxc that is encoded by Slc7a11. We also verified that astrocyte cultures generated from MSxc tissue lacked cystine-evoked glutamate release. Next, we measured development (body weight), CNS regulation of metabolism, and other indicators of generalized, non-specific brain function as well as behaviors that are reliant on executive function, such as cognitive flexibility, impulse control, decision-making, and response inhibition. RESULTS/ANTICIPATED RESULTS: Eliminating Sxc was not lethal and did not impair development or produce widespread changes in brain function as is commonly observed when deleting other glutamate mechanisms. MSxc rats did not differ from wildtype in growth rate, central regulation of metabolism as reflected by absolute or diurnal changes in core body temperature, locomotor activity in a familiar or novel environment, or simple forms of cognition such as novel object recognition, or operant responding (food and cocaine-reinforced). In contrast, behaviors that rely on executive function were impaired. MSxc rats displayed deficits in cocaine reinstatement and attentional set-shifting. We anticipate MSxc rats to also show impairments in decision-making in the rat gambling task and response inhibition in the stop-signal reaction time task. DISCUSSION/SIGNIFICANCE: Eliminating Sxc activity in rats produced deficits in behaviors reliant on executive function without impacting development or simple brain function. These results highlight the potential of targeting Sxc to enhance cognition without generating therapeutically limiting adverse effects resulting from non-specific changes in brain function.

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Quantifying Heavy Metals in Interstitial Fluid for Remote Monitoring of Chronic Exposures

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OBJECTIVES/GOALS: Our hypothesis is that microneedle array (MA) extraction of interstitial fluid (ISF) will enable minimally invasive quantitation of heavy metal (HM) exposure. We aim to establish analytical parameters for ICP-MS analysis of HMs, quantify baseline HM content in ISF vs other fluids, and characterize a mixed HM exposure model. METHODS/STUDY POPULATION: Ten healthy human volunteers were recruited into the study, approved by the UNM Human Research and Resource Committee Each subject had blood and urine collected. ISF was also collected using 3D-printed MAs inserted into the forearm. Additionally, twelve Sprague Dawley rats were unexposed (n=6) or exposed (n=6) to ad libitum water containing a mixture of uranium (U), cadmium (Cd), vanadium (V), and arsenic (As), each at 5X the maximum contaminant level (MCL) for drinking water under a protocol approved by the UNM animal care and use program. Human and animal fluids were analyzed, using ICP-MS, to quantify the levels of U, Cd, V, and As. RESULTS/ANTICIPATED RESULTS: Recent advances in ISF extraction and analysis suggest a minimally invasive method that can be adapted to monitor HM exposure and biological loads