effective radiomitigator in vivo when administered after exposure to lethal doses of total body irradiation. METHODS/STUDY POPULATION: Tocoflexol was designed using computational techniques to improve binding to ATTP, the key transporter that reduces the rate of elimination of tocols. In vitro studies compared the antioxidant and cell uptake properties to conventional tocotrienols. Next, we used a mouse model of lethal total body irradiation to evaluate its radioprotection efficacy (treating before radiation). To determine the optimal administration route for radiomitigation (treating after radiation), we will test oral and subcutaneous dosing. Mouse survival will be monitored for 30 days after irradiation. Sample tissues will be taken to evaluate the ability of tocoflexol to protect key organs from acute radiation syndrome. The bioavailability of tocoflexol will be evaluated in a rodent model. RESULTS/ANTICIPATED RESULTS: Known Results: Results show that tocoflexol has potent antioxidant properties and high cell uptake. When tocoflexol was administered 24 hours before exposure to lethal doses of radiation, tocoflexol-treated mice showed 100% survival. Anticipated Results: Because of its improved bioavailability and pharmacokinetic properties, we expect that tocoflexol will show radiomitigation efficacy when administered 24 hours after radiation, improving survival and protecting key organ systems from acute radiation syndrome. DISCUSSION/SIGNIFICANCE: There is an unmet need for safe and effective radiomitigators that can offer multi-organ protection and be rapidly administered in the event of nuclear emergencies. Demonstration of radiomitigation efficacy will position tocoflexol as a prime candidate to be developed into a nuclear medical countermeasure and stockpiled for emergencies.

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Electroencephalographic Correlate of Sensory Over-Responsivity in Adults with Chronic Tic Disorders

David A. Isaacs[1], Alexander C. Conley[1], Alexandra P. Key[1], Carissa J. Cascio[1], Harrison C. Walker[2], Mark T. Wallace[3], Daniel O. Claassen[1]
[1]Vanderbilt University Medical Center [2]University of Alabama-Birmingham Medical Center [3]Vanderbilt University

OBJECTIVES/GOALS: To identify an electroencephalographic (EEG) signature of SOR in adults with TS METHODS/STUDY POPULATION: We will recruit 60 adults with CTD and 60 sex- and age-matched healthy controls to complete scales assessing severity of SOR (Sensory Gating Inventory, SGI), tics, and psychiatric symptoms. Subjects will then be monitored on dense-array scalp EEG during sequential auditory and tactile sensory gating paradigms, as such paradigms have been shown to correlate with self-report measures of SOR in other populations. Single-trial EEG data will be segmented into 100-ms epochs and spectrally deconvoluted into standard frequency bands (delta, theta, alpha, beta, gamma) for pre-defined regions of interest. We will conduct between-group contrasts (Wilcoxon rank-sum) of band-specific sensory gating indices and within-group correlations (Spearman rank correlations) between sensory gating indices and SGI scores. RESULTS/ANTICIPATED RESULTS: We hypothesize that, relative to controls, adults with CTD exhibit impaired sensory gating and that extent of impairment correlates with severity of SOR. 14 adults with CTD (9 men, 5 women) and 16 controls (10 men, 6 women) have completed the protocol to date. Within this sample, adults with CTD showed significantly reduced sensory gating compared to controls in frontal (CTD median 0.12 dB (interquartile range -0.15–0.70 dB); control -0.37 dB (-0.80–-0.13 dB); p = 0.01) and parietal (CTD 0.17 dB (-0.08–0.50 dB); control -0.20 dB (-0.43–0.10 dB); p = 0.01) gamma band during the 100-200 ms epoch in the tactile paradigm. No significant between-group differences were evident for the auditory paradigm. Among adults with CTD, multiple sensory gating indices significantly correlated with SGI scores. Enrollment continues. DISCUSSION/SIGNIFICANCE: Results aim to clarify the extent of sensory gating impairment in TS and identify a clinical correlate of neurophysiologic dysfunction in the disorder. Such knowledge has direct implications for identification of candidate neurophysiologic biomarkers, an express goal of the National Institutes of Health.

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Exploring gastrointestinal bacterial colonization in rosacea as a biomarker for systemic abnormalities in innate immunity

Jessie M Nelson, Mio Nakamura
University of Michigan

OBJECTIVES/GOALS: To investigate the relationship between abnormal bacterial colonization of the gastrointestinal (GI) tract and systemic abnormalities in innate immunity as it contributes to the pathogenesis of rosacea. METHODS/STUDY POPULATION: This is a prospective observational study of patients with erythematotelangiectatic or papulopustular rosacea. The study participants will undergo urea breath testing for Helicobacter pylori (Hp) and hydrogen-methane breath testing for small intestinal bacterial overgrowth (SIBO). Colonic microbiome analysis will be performed using 16S rRNA sequencing of fecal samples. Further, key pro-inflammatory cytokines will be quantified from serum samples. Markers for rosacea subjects and subgroups will be compared by standard analysis of variance methods where appropriate, and Tukey studentized range tests will be done for specific comparisons. Chi-square tests will be used to assess group differences in categorical data. At least 42 subjects will be studied to provide 80% power atÎ±-0.05. RESULTS/ANTICIPATED RESULTS: We hypothesize that the results of this study will support an observed relationship between abnormal GI bacterial colonization and systemic innate immunity abnormalities in rosacea as determined by three primary endpoints: a significantly greater prevalence of Hp and SIBO in rosacea participants, presence of pro-inflammatory cytokines linked to rosacea pathogenesis including interleukin (IL)-1β, IL-6, IL-8, tumor necrosis factor (TNF)-Î±, and Granulocyte-macrophage colony-stimulating factor (GM-CSF), and observation of distinct, metabolically active colonic bacterial communities specific to rosacea participants. DISCUSSION/SIGNIFICANCE: By identifying rosacea as a cutaneous manifestation of a more systemic inflammatory disease, the results of this study will have implications for the development of important pharmacological interventions targeting key inflammatory pathways in rosacea pathogenesis.

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Exploring the Genetic Contribution to Oxidative Stress in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

Nicholas Henry Hampilos[1], Arnaud Germain[2], Xiangling Mao[1], Maureen R. Hanson[2], Dikoma C. Shungu[1]
[1]Weill Cornell Medicine [2]Cornell University

OBJECTIVES/GOALS: Strong evidence has implicated oxidative stress (OS) as a disease mechanism in myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). The study aim was to assess whether a C>T single nucleotide polymorphism (SNP) (rs1800668), which

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reduces the activity of glutathione peroxidase 1 (GPX1), is associated with brain OS in patients with ME/CFS. METHODS/STUDY POPULATION: Study population: The study enrolled 20 patients with ME/CFS diagnosed according to Canadian Consensus Criteria, and 11 healthy control (HC) subjects. Genotyping: DNA was extracted from whole blood samples, amplified by PCR, and purified. Sanger sequencing was used for genotyping. 1H MRS: Proton magnetic resonance spectroscopy (1H MRS) was used to measure levels of glutathione (GSH)â€" a primary tissue antioxidant and OS markerâ€" in a 3x3x2 cm3 occipital cortex (OCC) voxel. GSH spectra were recorded in 15 minutes with the standard J-editing technique. The resulting GSH peak area was normalized to tissue water level in the voxel. Statistical Analysis: T-tests were used to compare OCC GSH levels between ME/CFS and HC groups, and between the study's genotype groups (group 1: CC, group 2: combined TC and TT). RESULTS/ANTICIPATED RESULTS: Clinical characteristics: ME/CFS and HC groups were comparable on age and BMI but not on sex ($p = 0.038$). Genotype frequencies: Genotype frequencies in the ME/CFS group were 0.55 (CC), 0.25 (TC) and 0.2 (TT); and 0.636 (CC), 0.364 (TC), and 0 (TT) in the HC group. GSH levels: There was a trend-level lower mean OCC GSH in ME/CFS than in HC (0.0015 vs 0.0017; $p = 0.076$). GSH levels by genotype group interaction: Within the ME/CFS group but not in the combined ME/CFS and HC group or HC group alone, GSH levels were lower in the TC and TT genotypes than in CC genotypes (0.00143 vs 0.00164; $p = 0.018$). DISCUSSION/SIGNIFICANCE: This study found that the presence of a C>T SNP in GPX1 is associated with lower mean GSH levels and, hence, brain oxidative stress, in ME/CFS patients. If validated in a larger cohort, this finding may support targeted antioxidant therapy based on their genotype as a potentially effective treatment for patients with ME/CFS.

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Financial Toxicity in Dementia Caregiving

Danielle M. Hart, Brandon Leggins, Clara Sanches, Winston Chiong
University of California, San Francisco

OBJECTIVES/GOALS: Financial toxicity describes the adverse effects of medical expenses on financial security and health related quality of life. Though dementia caregiving carries serious costs, financial toxicity has not been studied in this context. Here we assess the prevalence of financial toxicity in dementia caregiving and its sociodemographic correlates. METHODS/STUDY POPULATION: We utilized the COmprehensive Score for financial Toxicity (COST)â€" 12-item questionnaire validated to quantify financial toxicity in patients and their caregiversâ€" to conduct a nationally representative survey of 317 US dementia caregivers, oversampling non-Hispanic Black (n = 75) and Hispanic (n = 61) caregivers. Participants were required to be currently providing unpaid care to someone 50 years or older with dementia. Financial toxicity was defined as COST 0 & RESULTS/ANTICIPATED RESULTS: COST scores ranged between 0 and 44, with a survey-weighted mean of 24.57 and standard deviation of 9.8. Weighted analysis revealed 52.7% of American dementia caregivers experience some degree of financial toxicity. Of those who experience financial toxicity, 73.1% are classified as mild, 25.7% as moderate, and 1.2% as severe. Financial toxicity was identified in 69.5% of non-Hispanic Black, 54.1% of Hispanic, and 42.3% of non-Hispanic White caregivers, with non-Hispanic Black caregivers significantly more likely to experience financial toxicity compared to their non-Hispanic White counterparts ($p = 0.017$). DISCUSSION/SIGNIFICANCE: Most US dementia caregivers experience financial toxicity, though prevalence varies significantly by caregiver race. Discerning the pervasiveness of financial toxicity in this population and significant correlates will inform the development and expedient delivery of resources for patients and families.

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Impact of COVID-19 Pandemic on Oral Cleft Services in Puerto Rico

Dr. Yinayra Victoria, Dr. Carmen Buxo, Dr. Augusto Elias, Dr. Natalio Debs
University of Puerto Rico

OBJECTIVES/GOALS: Evaluate the impact of COVID-19 on oral clefts services including surgical and dental treatments in Puerto Rico. METHODS/STUDY POPULATION: This Observational retrospective cohort study will consider patients 0-21 y/o with CL/P that visited the UPR school of Dental Medicine, Pediatric University Hospital Dr. Antonio Ortiz and ongoing case-control research project Face-Genes. Records to be used are classified as follow: Pandemic (March 15, 2020 to March 15 2022) Pre-pandemic (March 15, 2015 to March 15, 2017) Power analysis (power=0.80 alpha=0.05) will be calculated. Unavailable and incomplete medical records and those that did not attended study clinic during study period will be excluded. Data extraction instrument will be based on previous published study. Descriptive statistics, Chi-square, Odds Ratios at 95% confidence intervals and multiple logistic regression will be estimated. RESULTS/ANTICIPATED RESULTS: We hypothesize that surgical and dental services in Puerto Rico will be adversely impacted because of COVID-19 pandemic. DISCUSSION/SIGNIFICANCE: CL/P are common congenital diseases that require early interdisciplinary attention. Lack of timely care as well as surgery and treatment delays, could be associated with poorer prognosis, increased morbidity and mortality. If there is high risk of dh services during emergency situations, our findings will help to allocate the available resources

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Incidence and Risk Factors for Comorbidities Following COVID-19 Disease in People Living with HIV

Cecilia Castellano, Caitlin Moran, Minh Nguyen, Cecile Lahiri, Emory University

OBJECTIVES/GOALS: COVID-19 disproportionately affects patients with prior health conditions and those living at a lower socioeconomic status. Persons living with HIV (PLWH) are infected with SARS-CoV-2 at a higher rate than seronegative patients. Risk factors and incidence of post-COVID-19 comorbidities in PLWH, specifically, are still unknown METHODS/STUDY POPULATION: We will study PLWH enrolled in the Emory Centers for AIDS Research (CFAR) Registry who receive care at the Grady Ponce de Leon Center in Atlanta, Georgia to 1) investigate the incidence of, and 2) identify risk factors that predispose PLWH to post-COVID-19 comorbidities. All PLWH with documented COVID-19 (by positive SARS-CoV-2 PCR or antigen test) between March 1, 2020, and September 30, 2021, with a clinic visit within 12 months will be included. We will identify comorbidities using problem list diagnoses and ICD9/10 codes. With a predicted sample size of 395, we will use a Cox proportional hazards model for time-to-detection of comorbidity, and bivariate and

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