dataset from a national multisite research program (Environmental Influences on Child Health Outcomes (ECHO)) will be used. Neighborhood factors will be measured using geocoded, census-level indices of neighborhood quality: the Child Opportunity Index 3.0. Adolescent outcomes include self and caregiver-reported measures of comorbid psychopathology, risk-taking behavior, and academic and social functioning. A series of regression analyses will be conducted to examine the relationship between these variables. An estimated 6000 children are expected to be included in the analyses. RESULTS/ANTICIPATED RESULTS: We expect that poorer neighborhood conditions, particularly low social and economic resources, will be associated with lower overall functioning in adolescence, and that this relationship will be stronger among adolescents with ADHD relative to those without ADHD. DISCUSSION/SIGNIFICANCE OF IMPACT: By identifying risk and protective factors, this project will help identify potential prevention and treatment targets for a substantial number of youth and may inform policy efforts to improve resource equity and reduce existing disparities.

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Prevalence of tinnitus in Puerto Rican adults: A pilot study

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OBJECTIVES/GOALS: (1) Conduct a pilot study documenting prevalence of tinnitus in a sample of Puerto Rican adults at the Audiology Clinic of the Medical Sciences Campus-University of Puerto Rico, (2) categorize patterns of tinnitus, (3) document intervention received for tinnitus, and (4) study sociodemographic characteristics of Puerto Rican adult participants with tinnitus. METHODS/STUDY POPULATION: A descriptive retrospective study was performed reviewing 121 clinical records of patients seen at the Audiology Intramural Clinic of the Medical Sciences Campus of the Universidad de Puerto Rico between 2022 and 2023. They were analyzed to determine the prevalence of tinnitus among this cohort. The study was submitted to the Office of Human Participants for revision and approval under the exempt category. The data were used to categorize the type of tinnitus, episodic versus constant, tonal versus non-tonal and the sociodemographic description of the sample. RESULTS/ANTICIPATED RESULTS: From these 121 records, 70.2% (n = 85) were females and 29% (n = 29.8) were males. Subject ages ranged between 21 and 65 years. About 30% reported being single 30.6% (n = 37), followed by 21.5% (n = 26) reporting being married. From the 62 revised clinical records of subjects that reported tinnitus, 24% (n = 29) classified their tinnitus, in terms of how long they experience its presence, as constant, while 14% (n = 17) classified their tinnitus as intermittent. From the 62 revised clinical records, 44 participants (36.4%) described their tinnitus as tonal and 64.6 % as a complex sound of those patients 38 (31.4%) reported the tinnitus as a high-frequency pitch sound. Of the 62 patient records, the majority (98.4%) informed that they never received the treatment for tinnitus. DISCUSSION/SIGNIFICANCE OF IMPACT: The results indicate that more than half of adults evaluated in the UPR Audiology Intramural Clinic (51%) had tinnitus. Age range was broad developing at any age but most prevalent in middle-aged females. Manifested permanent as a tonal or a complex sound. About 98.4% informed that they never received treatment, therefore, there is a need to ensure intervention.

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Feasibility and efficacy of a 12-week whole foods diet Intervention to reduce hemoglobin A1c in adults with prediabetes and improve diet quality in families: Trial design and methodology

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OBJECTIVES/GOALS: We will conduct a 12-week pilot randomized controlled trial (RCT) to test the feasibility, acceptability, and preliminary efficacy of a staged-intensity whole foods intervention on hemoglobin A1c (HbA1c) change in adults, diet quality change (via the 2020 healthy eating index [HEI-2020]) in adults and offspring, and diet adherence and social determinants of health (SDOH) considerations via focus groups. METHODS/STUDY POPULATION: In this two-arm, parallel RCT, 30 adults with prediabetes (25–59 years) and their offspring (6–18 years) will be randomized to receive the 1) 12-week whole foods intervention which includes a 2-week feeding period (all foods/recipies provided), a 6-week customizable feeding period (3 dinners/recipies weekly), and a 4-week maintenance period (no food/recipies). The control group will receive standard of care (i.e., single RD-led diet counseling session). Primary outcomes include feasibility (≥80% retention and completion of study outcome measures) and acceptability (≥75% adult self-reported diet satisfaction). Intervention effects include 1) HbA1c change at 12-weeks in adults and 2) adult/offspring HEI-2020 scores assessed via diet records. Focus groups will assess influences of SDOH on diet adherence. RESULTS/ANTICIPATED RESULTS: We have received Institutional Review Board approval, and recruitment is planned for January 2025. We will enroll 30 families from the greater Nashville, TN area. An intent-to-treat analysis will be conducted to test the preliminary effects of the whole foods diet intervention on the 12-week change in HbA1c (adults only) and 2020-HEI diet quality scores during the intervention period (adults and offspring). Focus groups will be conducted to understand how individual and family needs/preferences and SDOH may be perceived barriers or facilitators of diet adherence. Data generated from this study will be used to guide a fully powered RCT of our whole foods intervention to assess long-term effects on additional diabetes and metabolic outcomes and assessment of SDOH influences to support long-term adherence. DISCUSSION/SIGNIFICANCE OF IMPACT: A healthy diet pattern is an effective nonpharmacological solution to prevent T2D,

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but only if it can be maintained. A family-centered whole foods diet pattern that uses "food as medicine" and considers how individual and family needs/preferences, and SDOHs could be an effective and sustainable multigenerational solution to prevent T2D in families.

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Dysregulated molecular networks in Cib2 knockout mice mimic human age-related macular degeneration*

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OBJECTIVES/GOALS: In mice, it has been shown that loss of Cib2 (calcium and integrin-binding protein 2) results in progressive retinal disease that recapitulates many characteristics of age-related macular degeneration (AMD). This study aims to characterize transcriptional changes in the retinal pigment epithelium (RPE) that underlie this disease process. METHODS/STUDY POPULATION: RPE tissue samples, pooled from 2–3 mice for each biological group, were collected from Cib2-KO and wildtype (WT) mice at two (young) and eight (aged) months of age. Bulk mRNA sequencing was performed using the Illumina HiSeq 4000. Reads were aligned to the UCSC mouse reference genome and quantified using HTSeq. Significant differentially expressed genes (DEGs) between mouse genotype and age groups were assessed using DESeq. CLICK unsupervised clustering followed by gene ontology analysis was performed to identify cellular processes and molecular pathways affected by loss of Cib2 as well as age. RESULTS/ANTICIPATED RESULTS: CLICK analysis revealed several functional pathways that are differentially expressed between sample groups. For example, in both young and aged mice, pathways upregulated in Cib2-KO samples included calcium signaling, RhoA signaling, and integrin signaling. Uniquely downregulated DEGs in young Cib2-KO animals were related to complement and coagulation cascades, LXR/RXR activation (related to lipid synthesis and transport), and phagosomes. Aged Cib2-KO mice displayed the most significant downregulation of genes in the phototransduction pathway, indicating temporal changes in functional pathways that correlate with disease progression. Next steps in analysis include investigating patterns in RPE- and AMD-signature gene sets that may identify molecular pathways more specific to human disease. DISCUSSION/SIGNIFICANCE OF IMPACT: Many current studies investigate the role of complement activation, vesicle trafficking, and ion transport as top contributors to AMD development. We identified DEGs paralleling many of these molecular pathways in Cib2-KO mice, highlighting their potential as a model to study age-related RPE pathologies and evaluate therapeutic interventions.

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Best practices for data management and metadata creation for collaborative biostatistics teams

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OBJECTIVES/GOALS: Our goal is to enhance communication and documentation in collaborative biostatistics by refining data management and metadata processes. We aim to capture critical data collection and generation information, improve transparency and reproducibility, and foster stronger researcher partnerships for more effective collaborations. METHODS/STUDY POPULATION: Traditional statistical analysis plans (SAP) often miss essential contextual knowledge from collaborators, leading to gaps that hinder reproducibility and limit future data use. Biostatistics teams at the University of Kentucky have updated their strategies to better capture important details about data origins and collection processes. By focusing on clear, comprehensive documentation early in the research process, we aim to preserve foundational data insights and improve collaboration efficiency. Our Biostatistics, Epidemiology, and Research Design (BERD) team has established best practices for addressing data management structures with collaborators across medical and healthcare fields – covering all project stages, from initial data collection to metadata creation and dataset finalization. RESULTS/ANTICIPATED RESULTS: We will detail the processes used to improve data management structures and the observed results of these processes. For example, initiating deeper discussions about data origins and collection processes as early as possible in the collaboration has resulted in a more comprehensive project narrative that lays the foundation for effective collaboration. By engaging with project leaders early in the process, we can confirm that critical details about how data were collected and processed are documented, improving both the transparency and reproducibility of research findings. Streamlining the processes of capturing this information makes it more accessible and useful for those with limited statistical backgrounds, which is particularly relevant for faculty and staff in BERD communities and Clinical and Translational Science Awards Programs. DISCUSSION/SIGNIFICANCE OF IMPACT: Nuanced data documentation structures are crucial for transforming raw data into meaningful, reusable datasets. Our initiatives promote clear communication, enhanced efficiency, and streamlined workflows. Translational science researchers can benefit from improving data management and metadata to boost long-term collaborative success.

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Wildfire smoke-driven PM2.5 and its association with persistent respiratory symptoms and repeated asthma exacerbations among adults with asthma

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OBJECTIVES/GOALS: 1) Determine the association between wildfire smoke-driven PM2.5 and risk of persistent respiratory symptoms and repeated asthma exacerbations after the acute wildfire period among adults with asthma. 2) Examine how measures to reduce personal exposure to wildfire smoke, including avoiding outdoor activities, modify this association. METHODS/STUDY POPULATION: This is a retrospective study of adults with asthma in WHAT-NOW, a cohort study of people living in Northern California during the 2018 Camp Fire. Daily smoke-driven PM2.5 was estimated for each participant based on their home address or evacuation location. We examined the association between mean PM2.5 exposure and the presence of respiratory symptoms at both the time of the survey (6–16 months post-wildfire) and at least one other post-wildfire time-period, as well as whether they had a medically attended respiratory

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