

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