with 82 AERD patients. Taste sensitivity to denatonium (DB), serving as a proxy for tuft cell T2R functionality, will be assessed using a validated 13-point scale, and correlations with clinical outcomes – SNOT-22, histopathologic, CT, and endoscopic scores – will be analyzed using linear regression. Aim 2: Sinonasal epithelial cells will be collected from AERD patients either hyper- or hyposensitive to DB and from healthy controls. We will establish ALI cultures and expose them to varying DB concentrations. Secretions will be analyzed for antimicrobial peptide release via bacterial kill assays and for IL-25 and β-defensin 2 via ELISA. Tuft cell frequency and baseline IL-25 mRNA expression will be assessed using immunofluorescence and quantitative real-time polymerase chain reaction, respectively. RESULTS/ANTICIPATED RESULTS: We expect that higher DB taste sensitivity in AERD patients will correlate with worse clinical outcomes, reflected by elevated 6-month postoperative SNOT-22 scores, indicating increased symptoms. Additionally, we anticipate that preoperative Lund-MacKay and Lund-Kennedy scores, along with histopathological metrics, will be worse in DB-hypersensitive patients, establishing a link between taste sensitivity and disease burden. In vitro, we predict that AERD patients with DB hypersensitivity will demonstrate significantly higher IL-25 and β-defensin 2 secretion and reduced bacterial colonies in kill assays. We also expect increased tuft-cell frequency and baseline IL-25 mRNA in AERD-derived cultures compared to healthy controls, highlighting T2R functionality's role in AERD pathogenesis. DISCUSSION/SIGNIFICANCE OF IMPACT: This project aims to investigate a putative new role for Tuft cells in AERD pathogenesis by correlating Tuft cell T2R functionality with outcomes in AERD patients and with inflammatory response in vitro. Findings could lead to predictive clinical taste tests and future genotyping studies to identify T2R polymorphisms correlated with AERD severity.

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The Effect of Pesticide Exposure on Immunological Responses in Children Against SARS-CoV-2

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OBJECTIVES/GOALS: To assess the effect on the immune response to COVID-19 in children exposed to pesticides. The hypothesis is that increased pesticide exposure results in different immunological response to COVID-19. The goal of the proposal is to improve scientific knowledge on factors affecting COVID-19 and identify a modifiable factor to reduce these disparities. METHODS/STUDY POPULATION: A cross-sectional analysis of children (aged 5–17 years) with asthma to assess pesticide exposure and immune markers of SARS-CoV-2. SARS-CoV-2 infection or vaccination was determined with blood exposome RNA analyses assessed from blood samples taken at baseline. Immunological response was measured using neutralizing, phagocytizing, and NK-activating antibody responses biomarkers using plasma antibody isotyping, effector functions, T-cell activation-induced marker (AIM), and recall cytokine secretion assays on lysed, whole blood. Pesticide exposure was assessed as concentration of four urinary metabolites in a spot urine sample adjusted for creatinine. Unadjusted regression models were created to assess the effect of 3-phenoxy benzoic acid, a common pyrethroid pesticide, on immune markers. RESULTS/ANTICIPATED RESULTS: Children's (N = 30) average age was 10 years (interquartile range: 8–11) A majority of children were male (63%) and Non-Hispanic Black (73%). The majority of children had markers of SARS-CoV-2 infection (77%). Of the 4 pesticide metabolites assessed, only 3-PBA was commonly found (77% of samples > LOQ). Higher urinary concentrations of 3-PBA are associated with a significant (p DISCUSSION/SIGNIFICANCE OF IMPACT: Significant associations in cytokine and inflammatory marker may indicate a Th2-skewed response, and dysregulated cytokine responses can lead to severe disease. A suggested increase in T-cell activation markers (e.g., CD4, CD8) may indicate potential exhaustion if excessively activated.

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Prevalence of heteroresistance in urinary *Escherichia coli* in Metropolitan Atlanta, Georgia

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OBJECTIVES/GOALS: Urinary tract infections (UTIs) cause significant morbidity, and many patients require multiple courses of antibiotics increasing the risk of antibiotic resistance. We determined the prevalence of urinary antibiotic heteroresistance (HR), which has been associated with treatment failures in vivo, to three first-line antibiotics for UTIs. METHODS/STUDY POPULATION: Clinical urine *Escherichia coli* isolates from patients in metropolitan Atlanta, Georgia in August 2023 were collected as part of public health surveillance performed by the CDC-funded, Georgia Emerging Infections Program (EIP). Only the first *E. coli* isolate collected for each patient was included in this study. Antibiotic susceptibility was determined through medical record review. HR to nitrofurantoin, trimethoprim-sulfamethoxazole, and fosfomycin was determined by population analysis profiling (PAP), where broth dilutions of *E. coli* were plated on increasing concentrations of the antibiotic. HR was defined as survival of >1 in 106 cfu but fewer than 50% survival at 1X antibiotic breakpoint (bp), resistant as > 50% survival at 1X bp and susceptible as survival of RESULTS/ANTICIPATED RESULTS: Among 355 patients, 21 (5.9%) were resistant or intermediate to nitrofurantoin and 92 (26%) were resistant to trimethoprim-sulfamethoxazole. Antibiotic susceptibility data were missing from 5(1.4%) and 11(3%) of isolates for nitrofurantoin and trimethoprim-sulfamethoxazole, respectively. Susceptibility testing was not routinely performed nor reported for fosfomycin, thus excluded. PAP revealed that of the total 355 isolates, 3(0.84%) were heteroresistant to nitrofurantoin, 17(4.8%) were heteroresistant to trimethoprim-sulfamethoxazole, and 27(7.6%) were

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