who had attended at least one monitoring visit by the end of 2022. The pilot survey, conducted with 277 participants as of March 2024, capturing additional health, lifestyle, and healthcare access information. **Results:** Between 2012 and 2022, the number of GRs in Florida grew from 1,211 to 5,122, with annual increases accelerating from 291.8 per year (2012-2017) to 490.4 per year (2017-2022). The cohort is predominantly male (85%), and 6.5% are current smokers, with 65.1% classified as category I obese (BMI 30.0-34.9 kg/m²). Among survey respondents, 58.9% rated their health as good or better, yet frequent healthcare needs and functional limitations were reported. Specifically, 67.6% had visited the emergency room in the past year, 80% experienced pain interfering with daily activities, and many reported functional limitations: 45.2% had difficulty getting in or out of bed, 46.8% had trouble walking a quarter mile, and 51.2% struggled with climbing stairs. There was also strong interest in research on sleep, physical activity, and chronic disease management, with a preference for individual, in-person support options, although app-based and remote options were viewed as potentially practical. **Conclusions:** To address these challenges, this study pilots the Clinician-Supported PTSD Coach mobile app, adapted for 9/11 responders in both English and Spanish, to provide accessible mental health support and improve sleep quality. If successful, this model could be scaled nationally for broader WTCHP use. Future research will investigate the role of chronic neuroinflammation as a potential pathway linking PTSD to Alzheimer's disease in 9/11 responders. This research aims to uncover specific biomarkers of neuroinflammation associated with chronic PTSD, which may accelerate cognitive decline and increase Alzheimer's risk. These findings could provide a scientific basis for incorporating neuroinflammatory markers into risk assessment models and regulatory guidelines in toxicology, enhancing protections and intervention strategies for populations with similar trauma exposure risks.

4588 Analysis of metabolic and inflammatory biomarkers and urinary tungsten concentrations in human serum samples from the San Luis Valley Diabetes Study

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Background and Purpose: Tungsten is classified as an emerging environmental toxicant due to increased human exposure and lack of knowledge of the health risks. Epidemiological and *in vivo* studies have shown that tungsten exposure is associated with increased incidence and/or severity of cardiometabolic diseases including cardiovascular disease (CVD), chronic kidney disease (CKD), and diabetes, as well as enhanced cancer progression, however there is not a clear understanding of the underlying molecular mechanisms. An epidemiological cohort exposed to increased levels of tungsten is the San Luis Valley Diabetes Study. The San Luis Valley houses the headwaters of the Rio Grande River and has been experiencing regional water insecurity. The water demands in this region are also starting to trend higher than the current supply, putting this population at increased risk of exposure to environmental metals. Previous publications have correlated urinary tungsten concentrations with increased/ more severe diabetes and CKD outcomes in this cohort. One factor that can drive metabolic diseases is adipocyte dysfunction leading to a pro-inflammatory state. *In vivo* studies conducted by our lab have also shown that tungsten enhances adipogenesis in the bone marrow niche of mice. By looking at pro-inflammatory adipokines/cytokines in the serum, we aim to draw further conclusions and provide some of the first evidence linking tungsten exposure to adipocyte dysfunction that could play a role in disease pathogenesis including diabetes, CKD, CVD, and cancer. **Methods:** Utilizing human serum samples from the San Luis Valley Diabetes Study, we conducted a multi-analyte enzyme-linked immunosorbent assays using the multi-plex Luminex platform. Human serum samples were analyzed for adipokine/pro-inflammatory cytokines as well as several disease biomarkers. The analytes analyzed included: FABP4, Insulin, Leptin, Chemerin, OPN, Adiponectin, Adipsin, Resistin, PAI-1, IL-6, IL-1β, TNFα, MCP-1, IL-8, IL-18, VCAM-1, ICAM-1, VEGF-A, TFF3, MMP-9, MMP-1, CRP, Cystatin C, β 2-Microglobulin, Calbindin D, and NGF. Simple linear regression and Pearson Correlation analyses were used to correlate urinary tungsten concentration with analyte concentrations in the serum. **Results:** N=160 serum samples were analyzed in this study, correlating urinary tungsten values to the values (in pg/mL) of each analyte in the serum. Interestingly, there was a significant positive correlation between increasing urinary tungsten concentrations with increasing levels of analytes MMP-1, p = 0.0004; OPN, p = 0.0448; and VCAM-1, p = 0.0644. And a slight negative correlation between increasing urinary tungsten concentrations with decreasing levels of analytes FABP4, p = 0.0565 and Chemerin, p = 0.0818. **Conclusions:** Overall, this is the first study to correlate tungsten exposure to levels of adipokines/pro-inflammatory cytokines within the serum of humans. This is promising early data to suggest that tungsten exposure could be leading to adipocyte dysfunction. Since epidemiological studies are limited, further studying vulnerable populations such as this one is highly important to be able to determine molecular drivers of tungsten-mediated disease. Further studies need to be completed to include other demographic information into the analysis including sex, age, disease state, etc. In addition, we plan to statistically evaluate the impact of these adipokines/cytokines on the associations between tungsten and cardiometabolic and kidney disease outcomes in this cohort. Funding P30ES032755, P20GM130422, and R21OH012552.

4589 Examining Urinary Extracellular Vesicles in South Texas Population Exposed to Inorganic Arsenic through Drinking Water

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Background and Purpose: Exposure to arsenic (As) from drinking water is a worldwide public health concern. In the US, 5 million people drink water with As concentrations over the EPA standard limit of 10 µg/L. In the state of Texas, over a million residents rely on well water. Since private wells are not routinely tested, millions of people are potentially exposed, especially rural residents living in South Texas. As is a known carcinogen with the strongest association to bladder cancer. Moreover, bladder cancer is highly prevalent in South Texas. Extracellular vesicles (EVs) are cell-derived structures that represent potential biomarkers of exposure or effect to inform environmentally related diseases. As-induced inflammatory responses are modulated through EV signaling. Based on risks for As exposure and bladder cancer, there is a critical need for novel biomarkers to identify individuals at risk and to evaluate preventive interventions in South Texas. **Methods:** To address this, urine samples were collected from participants (N=74) consuming well water as their primary water source in five South Texas counties, including Bee, Goliad, Refugio, San Patricio, and Victoria Counties, with At the start of the study, each participant provided a urine sample (~200 ml). Urine samples were then processed and measured for urinary inorganic arsenic analysis. EVs were isolated from urine samples using Total Exosome Isolation Reagent. After EV isolation, nanoparticle tracking analysis (NTA), transmission electron microscopy (TEM), and western blots were performed to characterize the EVs. **Results:** From the NTA, human urine EVs yielded a concentration of $1.05x10^9$ particles/mL with a mean average size of 176 nm. TEM was then performed to further physically characterize EV's. TEM illustrated that the EV's isolated from human urine samples were within the exosome range of 50 to 200 nm in size. **Conclusions:** Initial findings support utility of urine exosomes as a potential marker when are exposed to inorganic As through drinking water. Studies on the role of miRNAs in EV signaling in driving pro-inflammatory responses are ongoing.

4590 Inorganic arsenic in private well water and diabetes prevalence in North Carolina: An ecologic study

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Background and Purpose: Chronic exposure to inorganic arsenic (iAs) has been linked to increased risk of diabetes. Private well users are at risk for exposure to groundwater contaminants, including iAs. Elevated levels of iAs in well water have been found in areas of North Carolina (NC) with measurements ranging up to 806 parts per billion (ppb). These levels in excess of the WHO recommended maximum value and the US EPA National Primary Drinking Water Regulations maximum contaminant level of 10 ppb make iAs contamination of private well water a major public health concern in NC. Furthermore, the state has a large population of private well users. Despite elevated levels of iAs and millions of private well water users (2.4 million residents), the relationship between iAs and diabetes in the state has not been assessed. To address this research gap, we carried out an ecologic study to examine the associations between iAs concentrations in private well water and diabetes prevalence. We hypothesized that a positive association exists between iAs concentrations in private well water and diabetes prevalence in NC at the census tract level. **Methods:** We performed linear regression analyses at the census tract level (n=1,576 tracts) in NC to compare mean iAs levels measured in the NCWELL database (with 110,383 arsenic tests from private wells from 1998-2019) and crude prevalence of diabetes assessed in the CDC PLACES study. Covariates included in one or more models were age (% of census tract residents over 64 years of age) and the Index of Concentrations at the Extremes (ICE), a measure of racialized economic segregation. Age data came from American Community Survey (ACS) 2015-2019 5-year estimates. ICE scores were calculated using ACS 2015-2019 5-year estimates. **Results:** Observed iAs means ranged from 0.71 to 28.72 ppb (average, 3.14 ppb) pre-log transformation. Diabetes prevalence ranged from 1.6 to 23.4% (average, 11.6%). Log-transformed, mean iAs concentrations were significantly associated with crude diabetes prevalence (β=1.14, p<0.0001) in models adjusted for age and ICE tertile. A positive, non-statistically significant association (β=0.29, p=0.554) between log-transformed iAs and diabetes, adjusting for age and ICE tertile, was retained in sensitivity models restricted to tracts with predicted private well water use by ≥35% of the population (n=576 tracts). **Conclusions:** Using an ecologic study design, this research highlights a positive association between iAs concentrations in private well water and diabetes prevalence in NC. Future studies assessing individual-level exposure and individual diagnosis of diabetes outcome are necessary to further support these results. These findings suggest a potential value in exposure-reducing interventions among private well users.

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