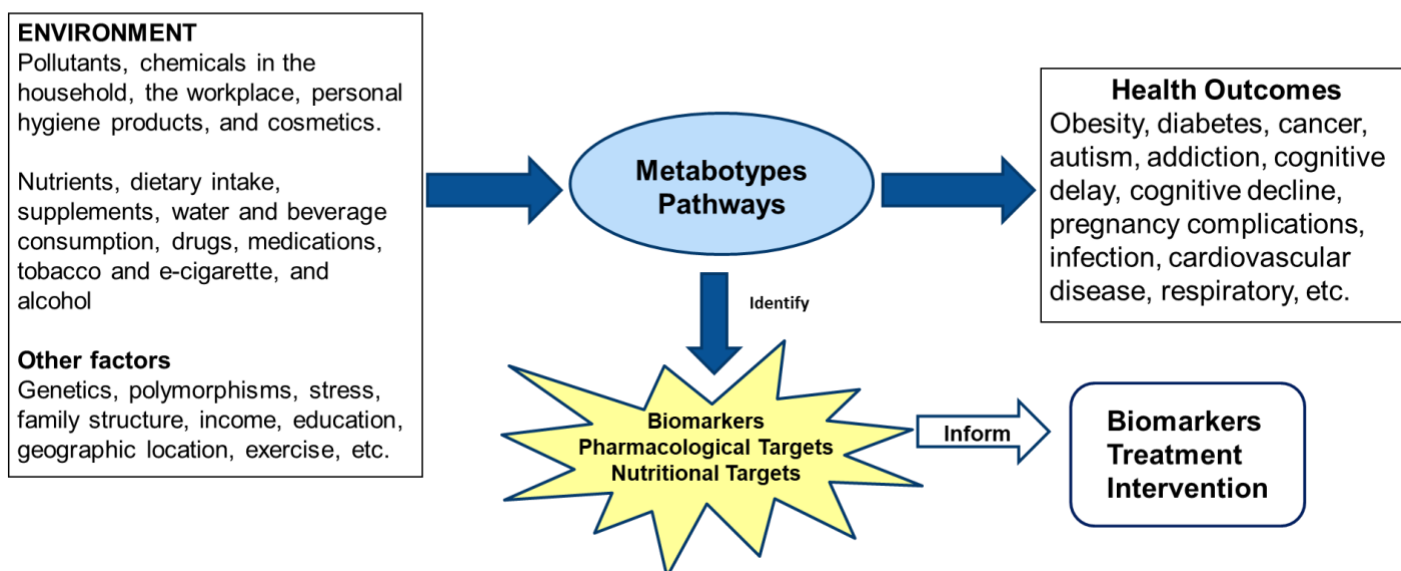## The North Carolina Human Health Exposure Analysis Resource Hub (NC HHEAR Hub)

The North Carolina HHEAR Hub is conducting research to understand how exposures are related to states of health and wellness. Individuals have complex interactions with the environment throughout their lifespan, and these exposures influence a person's state of health and wellness and how they respond to treatments or interventions. Individuals have different exposures depending on their dietary intake, or use of supplements or natural products, medications, drugs of abuse, tobacco products or e-cigarettes. In addition, each of us have different exposures to chemicals that have been added to our foods and beverages for taste or preservation, in cosmetics and personal hygiene products, and from cleaning and agricultural products used in the workplace, home and garden, as well as to environmental pollutants. Individual's exposures leave behind chemical fingerprints of their interactions at the cellular and molecular level.

The Concept of the Exposome in Precision Health

Exposome research is key to informing precision health through understanding how exposures, and perturbations in endogenous and microbial metabolism, are linked to our genetics, and to our states of health and wellness.

ENVIRONMENT
Pollutants, chemicals in the household, the workplace, personal hygiene products, and cosmetics.

Nutrients, dietary intake, supplements, water and beverage consumption, drugs, medications, tobacco and e-cigarette, and alcohol

Other factors
Genetics, polymorphisms, stress, family structure, income, education, geographic location, exercise, etc.

Metabotypes Pathways

Identify

Health Outcomes
Obesity, diabetes, cancer, autism, addiction, cognitive delay, cognitive decline, pregnancy complications, infection, cardiovascular disease, respiratory, etc.

Biomarkers Pharmacological Targets Nutritional Targets

Inform

Biomarkers Treatment Intervention

The NC HHEAR Hub is using targeted and untargeted metabolomics/exposome approaches to determine how molecules present in our tissues and biological fluids associate with states of health and wellness. Through determining how exposures are related to perturbations in the endogenous metabolism of the host system, and how these perturbations are associated with the on-set and progression of disease, exposome research can establish biomarkers, reveal mechanisms, and lead to the development of intervention strategies.

Learn more about the NIEHS HHEAR Program at https://hhearprogram.org/
Submit an Application for Biospecimen Analysis at: https://hhearprogram.org/how-apply

Exposome research is key to informing personalized medicine and precision health. The NC HHEAR Hub brings together 3 UNC System research groups located on the North Carolina Research Campus (NCRC), and RTI International, a nonprofit research organization located in the Research Triangle Park. Our team uses metabolomics to detect tens of thousands of signals for molecules that are present in relatively non-invasive human biospecimens (e.g., urine, serum, plasma, stool, tissue) to define an individual's internal exposome. Our untargeted methods capture signals for endogenous and exogenous metabolites that are derived from the metabolic processes of the host system, microbial metabolism, lifestyle exposures (e.g., tobacco products, e-cigarettes, illicit drugs), medications, and dietary exposures (e.g., components of foods, food stabilizers, polyphenols), as well as environmental, household, or occupational exposures. Computational tools and big data analytics are used to determine signals that define study phenotypes, and to reveal biological significance through pathway mapping.

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