Environmental exposures, biomarkers, and population health

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Project Description:

Environmental exposures are major drivers of chronic disease risk across the life course, yet the biological and behavioral pathways linking environmental determinants to long-term health outcomes remain incompletely understood. This research investigates how exposures such as air pollution, heat, green space, noise, climatic factors, and emerging environmental contaminants shape population health by integrating environmental assessment with population knowledge, attitudes, and behaviors, as well as biomarkers of exposure and early biological response, including metabolomics, proteomics, and microbiome profiling. Using large cohort studies, machine learning, spatial epidemiology, and causal inference approaches, projects will examine how environmental exposures influence disease risk, how biomarkers refine exposure–disease modeling, and how environmental or policy changes translate into measurable health impacts. Findings will inform upstream prevention strategies and evidence-based environmental health policy.