The exposome is all the environmental factors that affect a person's health across the lifespan. It includes things that are outside our bodies, like the air we breathe, the food we eat, our social support systems, and neighborhood characteristics. The exposome also includes factors inside our bodies like our metabolism and biological response to stress. Exposomics is the study of the totality of our environmental exposures and how they affect health and disease.

The exposome is made up of millions of pieces of data. No two people have the same exposome.

**Why exposomics?**

Complex diseases such as autism, certain cancers, and neurological disorders are on the rise and cannot be explained by genetics alone. The environment is the missing puzzle piece. Each person is exposed to a unique mixture of many factors across time. Exposomics uses new methods to link the complex interaction of external and internal factors to disease risk.

*We can go back in time.*

Exposomics also includes the study of **when** an exposure occurs. This is because at life stages when cells and tissues are developing or changing, some exposures can cause more harm. Examples of these “windows of susceptibility” include pregnancy, early childhood, menopause, and old age.

**How?**

Traditional methods measure only one exposure at a time. The Mount Sinai Institute for Exposomic Research is pioneering innovative methods to collect and analyze a large number of external and internal factors across the lifespan, reducing the amount of time it takes to understand how the environment affects health. This approach increases the speed of scientific discovery and allows us to understand how multiple exposures interact to contribute to health and disease.
Scientific breakthroughs at the Mount Sinai Institute for Exposomic Research:

**Novel biomarkers**
Breakthrough technologies utilize unconventional sample types, such as teeth, hair, nails, and newborn blood spots to look back in time to measure past exposures and connect them to health outcomes.

**NASA satellite imaging and big data**
NASA satellite imagery is used to reconstruct air pollution, weather data, and temperature from years ago in an effort to understand and address the adverse health effects of climate change.

**Wearables**
Non-invasive, low-cost silicone wristbands and skin patches capture tens of thousands of internal and external exposures, creating a real-time personal exposure profile.

The future is now.

We are developing groundbreaking strategies for the prevention, early detection, and treatment of disease. Through the integration of the study of genes and the environment, we are uncovering the complex multifactorial interactions that contribute to the risk of autism, obesity, cancer, neurological disorders, and other conditions of unknown origin. Some of our research highlights include:

**Birth outcomes**
A mother’s traumatic life experiences and stress during pregnancy may increase the risk of her baby being born with low birth weight.

**Childhood leukemia**
Blood spots collected shortly after birth show how internal metabolic factors combined with early life nutrition may alter risk of childhood leukemia.

**Autism**
Children with autism had lower levels of zinc and manganese present in their shed baby teeth, suggesting opportunities for early prevention during pregnancy.

**Asthma**
Children of mothers who experience both stress and air pollution exposure during pregnancy are at greater risk of developing asthma.

**Lou Gehrig’s disease**
Tooth biomarker studies show that exposure to metals during childhood may be linked to increased risk of Lou Gehrig’s disease (ALS) later in life.

**Health disparities**
Together with community partners, we apply our research findings to support programs and policies that benefit populations that have a greater burden of harmful environmental exposures.

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