

The Exposome

The HERCULES Exposome Research Center develops new tools and technologies to study the exposome.

The Exposome

The exposome is the concept that **environmental exposures** play a role in our **health** over a lifetime. These exposures include what we eat and drink, the air we breathe, our behaviors, and where we work, live and play.

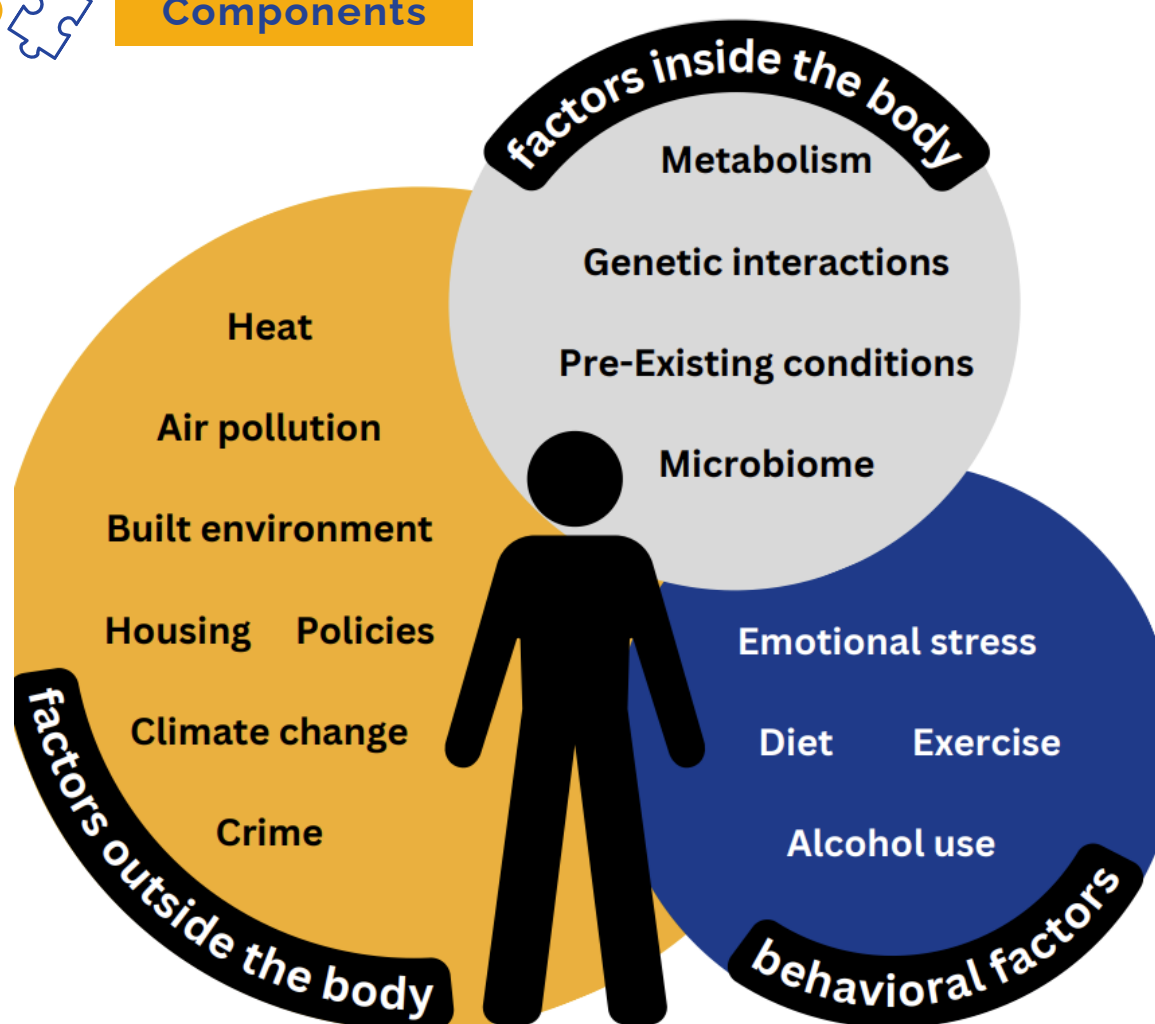


Why it Matters

The exposome is important to public health because it looks at how different exposures throughout life combine to affect health. Instead of focusing on just one factor, it takes a broader view to understand how the environment as a whole impacts well-being.



Components



Your Exposome is Unique

Everyone's exposome is unique because it involves how their unique body responds to the exposures they've experienced in their own life.



Everything Connects

The exposome is like a web of everything you experience. Factors like where you live, what you eat, the air you breathe, and even stress interact and build over time.



Lifetime Impact

Your exposome includes all exposures from birth (or even before) to the present.



How Does it Affect Health?

Depending on what is included in your exposome, you could be more likely to develop certain health conditions. For example:

Mental Health

Noise, urban stress, and social isolation can affect mental well-being and how the body reacts to environmental factors.



Chronic Disease

Long-term exposure to air pollution, poor diet, and stress can lead to heart disease, diabetes, and cancer.



Genetics

Some people are genetically more or less vulnerable to certain environmental exposures and related health risks.



Immune System

Infections, diet, and chemicals can affect immune responses, influencing susceptibility to illness and response to environmental exposures.



How Is it Measured?

There is no **one way** to measure the exposome, and new ways are being discovered all the time. These are just some of the many methods that can be used.



Targeted Analysis



Untargeted Analysis



Metabolomics



Personal



Geospatial



Social Science



Data Science



Transcriptomics



The Exposome in Action

HERCULES funded a Pilot Project where Benjamin Kopp, MD, and his team studied the impact of environmental pollutants on children with sickle cell disease. His study:

1

Investigated how exposure to air pollution affects inflammation, which could worsen the disease and increase pain.

2

Used blood and airway samples to track immune responses and integrated satellite data on pollution levels to develop personalized, predictive profiles of disease progression.

3

Aims to provide a preventive approach to treatment by linking environmental factors to immune system responses.



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HERCULES is funded by the National Institute of Environmental Health Sciences (P30ES019776)



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