Project goal

Is it possible that tiny microbes living in our gut play a role in fertility, breast cancer, and other important aspects of health? This research project aims to understand how certain gut bacteria influence estrogen levels in the human body and how our lifestyles, environments, and early childhood exposures affect the abundances and types of these bacteria living in our digestive tracts.

What the research is about

Estrogen is a key hormone that affects human health, including reproductive function, heart and bone health, mood, and the risk of some cancers. Although we know that genes, body size, and lifestyle habits influence hormone levels, these factors explain only part of the differences seen between people. Recent research points to a new piece of the puzzle: the ***estrobolome***. The estrobolome is a group of microbes that can recycle estrogens in the gut back into the bloodstream–estrogens that would otherwise be excreted from the body. This means that gut bacteria are a hidden factor influencing hormone levels and lifelong hormone exposures. We still know very little about the extent to which gut microbes affect estrogen levels or why people have higher or lower numbers of these microbes.

In this study, saliva and stool samples will be collected from premenopausal and postmenopausal women, and men over two seasons. These samples will be used to measure hormone levels and to study the gut bacteria that recycle estrogens. Participants will also provide detailed information about their diet, physical activity, and early life experiences, including whether they were born by cesarean section or vaginal delivery, and whether they spent their early years in a rural or urban environment. Physical activity will be tracked using wristband devices.

Why this research is important

Understanding how the gut microbiome influences estrogen levels could lead to major advances in medicine and public health. This project may uncover why some people are more vulnerable to hormone-related conditions, and whether simple lifestyle changes, such as diet or exercise, could help regulate hormones naturally by influencing the estrobolome. It may also reveal how early life events affect long-term health by shaping the microbes in our gut.

Expected results and impact

This project will help us better understand how gut bacteria contribute to hormone concentrations in both women and men. It will show whether these microbes influence hormone levels differently depending on age, sex, or menstrual cycle phase. Just as important, this is the first comprehensive study to identify which factors shape the makeup and activity of estrobolome bacteria. The study will examine whether modifiable aspects of daily life affect how the estrobolome functions. Ultimately, these findings could support more personalized and preventive strategies for improving fertility, promoting healthy aging, and reducing the risk of estrogen-related diseases.