Endometrial cancer (EC) – a cancer of the lining of the uterus – is becoming more common, especially in developed countries. Today, it is the most frequently diagnosed cancer of the female reproductive system. While early-stage EC is usually treatable, thousands of women still die of it every year. One of the biggest challenges is that we currently lack a non-invasive diagnostic test to detect it early. Current diagnostic methods can be uncomfortable, invasive, or not specific enough, and they often fail to accurately reflect the complex nature of the disease.

Our project aims to change that by exploring what EC looks like at the molecular level. Specifically, we are focusing on metabolites – small molecules found in blood, urine, and tissue that reflect the body's biochemical state. By using state-of-the-art laboratory techniques (like high-resolution mass spectrometry), we can track thousands of these molecules and look for patterns that are unique to EC.

But we won't stop at molecules alone. Our project adopts a "whole-person" approach, combining information from clinical data (such as hormone and inflammation levels), microscopic tumor features, and genetic markers to provide a comprehensive picture of each patient. This integrated view, combining clinical, metabolic, histological, and molecular data, is what makes our project both innovative and powerful.

We have already obtained early results showing that women with EC exhibit distinct changes in certain fats, sugars, and other molecules in their blood. Some of these changes are linked to inflammation or hormone imbalance, two processes known to play a role in the development of cancer. We also plan to measure molecules called eicosanoids, which are involved in both inflammation and hormone signaling, and may hold the key to understanding how EC begins and grows.

One major goal of the project is to develop an open-access online atlas of EC-related metabolites, which will serve as a valuable resource for researchers and doctors alike. Ultimately, our work could help doctors better identify individuals at risk of EC, diagnose it earlier, and even choose treatments that are more tailored to the patient's biology.

This research bridges biology, chemistry, and medicine, and puts patients at the center. By studying what makes EC unique at the molecular level, we aim to develop faster, gentler, and more accurate tools for combating this increasingly common cancer.