Annika Idahl: Longitudinal Investigation of Novel Biomarkers for Personalised Screening and Early Detection in Hereditary Ovarian Cancer in Sweden

For women with an inherited increased risk of ovarian cancer, the lack of an effective screening method presents a difficult choice. Today, women at high risk are often recommended to undergo preventive removal of the ovaries and fallopian tubes. While this surgery can greatly reduce the risk of ovarian cancer, it also causes an immediate menopause and can have significant long-term effects on health and quality of life. A reliable test that could detect the earliest signs of cancer could therefore make an important difference.

Annika Idahl is Professor of Obstetrics and Gynaecology at Umeå University and a Senior Consultant at the University Hospital of Northern Sweden. She also heads the Obstetrics and Gynaecology division within the Department of Clinical Sciences at Umeå University. Her research focuses on gynaecological cancer, particularly ovarian cancer, with an emphasis on risk factors, early diagnosis and prevention. By combining clinical experience with academic research, she works to improve the early detection and prevention of ovarian cancer.

One of her current research projects, LIONESS, aims to develop new ways to detect ovarian cancer at a very early stage in women at increased hereditary risk. The project brings together researchers from across Sweden, together with patient representatives, to investigate whether repeated self-sampling at home can be combined with advanced biomarker analysis to identify early cancer-related changes.

Participants in the study will collect small blood samples and vaginal samples themselves at home three times a year for up to four years, or until they undergo preventive surgery. Blood and cervical samples will also be collected by healthcare professionals when participants enter the study and before surgery. This repeated sampling creates an opportunity to follow changes in the body over time rather than relying on a single test.

> *“Women at high risk of ovarian cancer face difficult decisions about preventive surgery. Our hope is to develop a reliable test that can identify the earliest signs of cancer, giving women who have not yet undergone surgery a better chance of early detection and successful treatment.”*
> — **Annika Idahl**

The samples will be analysed using several new biomarkers linked to cancer development. These include changes in proteins, genetic alterations and DNA methylation. Advanced statistical methods and artificial intelligence will be used to assess how accurately individual biomarkers, and combinations of different markers, can identify early cancer-related changes.

An important part of the project is that the researchers will study how these biomarkers change over time. The aim is not simply to identify whether a woman has cancer, but to understand whether a pattern of changes in repeated samples can provide an early warning

signal. The researchers will compare the results with established markers such as CA125 and HE4 and with findings from surgery and follow-up.

The project will also explore the experience of the women taking part. Interviews will investigate how participants perceive self-sampling and repeated monitoring, and what would make such a screening approach practical and acceptable in everyday life.

The ultimate goal of LIONESS is to develop a reliable and user-friendly test that could be used repeatedly at home to detect very early cancer changes in women with an inherited increased risk of ovarian cancer. If successful, such a test could potentially help women and their doctors make more informed decisions about monitoring and preventive surgery.

In the longer term, the knowledge gained from the project could also contribute to improved early detection in women at average risk of ovarian cancer. By combining self-sampling with advanced biomarker analysis and artificial intelligence, Annika Idahl and her research colleagues hope to take an important step towards earlier diagnosis and more personalized care for women at risk of ovarian cancer.