

Identifying angiogenic and metabolic biomarkers in endometriosis-associated ovarian cancer using photoacoustic imaging and data mining (ENDOVO).

The state of play in endometriosis research

Endometriosis is a disease characterized by the growth of uterus-lining tissue outside the uterine cavity. It affects the quality of life in **one out of every ten** reproductive-age women and may cause menstruation problems, chronic pain and even infertility. Recently scientists found a link between endometriosis and ovarian cancer and called this type of tumour endometriosis-associated ovarian cancer. The co-existence and co-development of these two conditions presents a very complex picture; there is an urgent need for more knowledge and research in this area. We do not really know **how both conditions develop**, how they can be prevented and what the risk factors are.

Aim:

The goal of my research is to find **biomarkers** that will enable early detection of endometriosis.

Methodology:

Firstly, I will identify how endometriotic and ovarian cancer **cells interact** with each other. To this end, I will grow them separately and together in the special incubator fitted with a camera to enable 24 hours observations of living cells in real time. I will also look for the differences in the feeding patterns of those cells.

Secondly, I will use the recent **advances in imaging**, called photoacoustics, to see how tumours growing in vivo develop their vasculature. To achieve this, I will use animal models as they better represent the complex processes within a woman's body.

Followingly, I will examine samples of the animal's tumour tissue for the presence of certain vasculature-related proteins to validate my imaging results. I will also analyse the changes in metabolism of those tissues using the process known as immunohistochemistry.

Lastly, I will search the literature for **endometriosis-related datasets** and will put the data together to create a comprehensive database. To this resource I will add information held by the hospitals I will be working at and collaborating with. Finally, I will use this database to confirm the results obtained from previous experiments and look for the biomarkers for the early diagnosis of both conditions.

How the results of this research will be used:

This **multi-disciplinary** approach will provide us with fundamental insight into endometriosis and its impact on ovarian tumour evolution. The results of those experiments will help us to understand how aberrant metabolism and newly formed blood vessels enable those tumours to invade tissues outside the uterine cavity. The new endometriosis database will be a great springboard for opening a discussion on how to enable **early detection** of this and related diseases. The outcome from this project will advance our knowledge on women's health.