

Research project objectives

It is very well established that physical activity reduces risk of breast cancer in women. This knowledge is of great importance because most of other recognized breast cancer risk factors are not modifiable. Out of the few modifiable risk factors, physical activity has the greatest potential as risk reducing behavior. However, it is not clear how much physical activity in premenopausal women is needed for significant risk reduction. The most plausible mechanism by which activity lowers the risk involves reduction in lifetime exposure to reproductive steroid hormones, and additionally, an improvement in selected components of immune response, and maintenance of healthy body weight. Ovarian function, immune function and body composition indeed change under the influence of physical activity, however, the latest research suggests that they are also influenced by conditions experienced by a woman during her early (fetal and childhood) development.

This project aims to test how differences among reproductive age women in ovarian function, body composition, and in selected aspects of immune response can be explained by the combined effects of physical activity in adulthood and conditions experienced by those women during early development. We expect that physical activity will be related to changes in ovarian and immune function. More importantly, we predict that degree of suppression in levels of reproductive steroid hormones in response to increase in physical activity will depend on early developmental conditions. Women who developed in poorer conditions will have greater sensitivity of ovarian response to physical activity. Similar interactive effects of development and physical activity are expected on selected aspects of immune response and body composition.

Research project methodology

We will be investigating effects of recreational sport participation (N=200, urban, experimental study) and habitual physical activity (N=100, rural, observational cohort study) among healthy women aged 20-35, with regular menstrual cycles. For two entire menstrual cycles (physically non-active and physically active) women will collect daily saliva samples for hormonal analyses (estradiol and progesterone), have their 24-hour physical activity recorded by an accelerometer-based monitor, and give 2 blood samples for immunological analyses. Body size measurements will be conducted before and after physical activity regime. Fetal and childhood developmental conditions will be assessed by various biomarkers (e.g. size at birth, digit ratio, fingers dermal ridges, relative leg length and age at menarche) and questionnaires. Relative changes in ovarian hormones, immune markers and body composition will be compared between non-active and physically active cycles.

Reasons for choosing the research topic

This project will be highly novel and original. While impact of physical activity on ovarian and immune function is established, the between-women variation in physiological response is not well understood. The project will contribute to the relatively new theoretical area of research in “developmental origins of health and disease”. Results of this project will provide recommendations how much physical activity a woman with a particular developmental “experience” should do in order to reduce levels of sex hormones, improve immune response and achieve beneficial changes in body composition. Our results will provide important insights to development of effective breast cancer prevention strategies and contribute to improvement of women’s health and well-being.