

Exploring the molecular mechanisms behind the effects of physical exercise on breast cancer prevention

Principal Investigator: Aija Linē
Project Promoter: Latvian Biomedical Research and Study Centre
Project Partners: Oslo University Hospital, Norway, Latvian Academy of Sport Education, National Institute of Chemical Physics and Biophysics, Estonia
National Cancer Institute, Lithuania



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It is well known that physical activity can prevent cancer development, but the molecular mechanisms behind these effects are poorly understood. During exercise, extracellular vesicles (EVs) are released into the circulation and mediate tissue crosstalk with potential effects on tumour cells and the immune tumour microenvironment. The overall goal of the project is to characterise the molecular cargo of exercise-induced EVs and explore their effects on breast cancer (BC) progression in vitro and in vivo.

The project has the following objectives:

- To elucidate the effects of exercise on the molecular profile of tumour, quality of life, side effects and efficacy of neoadjuvant chemotherapy in BC patients (clinical study);
- To characterise the molecular cargo (RNA, proteins) of exercise-induced EVs in healthy long distance runners and BC patients;
- To elucidate the effects of exercise-induced EVs on BC cells;
- To elucidate the effects of exercise-induced EVs on the growth of cancer in a mouse model of BC.

The expected outcome is to provide biologically and clinically meaningful insights into the ways how regular physical exercise affects the progression of cancer and the immune tumour microenvironment. This knowledge in turn may help to define optimal dose, intensity and type of exercise for the prevention of BC. Moreover, these studies may open a new avenue for therapeutic manipulation of exercise-related health effects and contribute to the generation of an "exercise pill".