

Effects of ionizing radiation in heart and brain

Epidemiological studies suggest that doses of ionizing radiation much lower than previously assumed may cause adverse effects on human health. The risk of cardiovascular disease and cognitive decline has been shown to be causally related to radiation exposure. However, the epidemiological approach to validating health hazards of ionizing radiation may not be sensitive enough to detect weak biological effects, nor will it give information about the biological mechanisms of these effects. There is a need for a new approach to study biological effects of radiation on cells, tissues and organisms at all dose ranges and at the low-dose range in particular.

High-throughput screening techniques have been developing in recent years with a breathtaking speed. Proteomics today is a mature technological tool that can provide us with novel information about the biochemical mechanisms that regulate physiology of the cell.

The main focus of my research is the evaluation of genetic and epigenetic modifiers of cellular and organ response to ionizing radiation. The biological responses are measured as changes in the protein expression using mass spectrometry-based label-free proteomics. The main goal is to evaluate late normal tissue damage, particularly in the heart and in brain areas responsible for learning and memory such as hippocampus and cortex.