

Reactive oxygen species (ROS) are a group of small molecules formed in different reactions with oxygen that occur within living organisms. It is a heavily studied research subject that tries to answer questions regarding function of ROS molecules in energy metabolism. ROS production remains controversial since it is unclear whether it is a strictly beneficial or harmful process. It might also be a combination of both. It is important to elucidate mechanisms behind this phenomenon in order to broaden our understanding of the aging process and other related biochemical events that are happening within our cells. Current findings show that mitochondria are one of the main producers of ROS, specifically within mitochondrial electron transport chain (ETC), known to be the main source of energy. ETC is comprised of several proteins that are believed to be the main culprits behind production of radicals, especially Complex III (CIII).

The aim of the proposed study is to elucidate mechanisms of ROS generation within CIII and its role in the regulation of cellular signaling within mitochondria. This study aims to highlight the important factors behind production of radicals including redox potentials of heme cofactors that are present within subunits of CIII and are the driving force behind the electron transport reactions occurring within this protein. The proposed study involves evaluation of ROS-generating properties of CIII in conditions resembling native mitochondrial environment and bacterial membranes.

We believe that studying different variants of CIII will lead to discovery of important factors that influence ROS production in CIII and ETC. It will also help in the description of other reactions that can occur during superoxide formation. We are convinced that this research will help us understand the biological aspects of ROS formation in mitochondria and contribute to future experiments related to respiratory complexes and the way they operate.