White blood cells are the cells of immune system that protect the body against infectious disease. Among white blood cells neutrophils are the most abundant population and they are the first line of defense against invading pathogens. During last years immense progress has been made in our knowledge on mechanisms employed by these cells to fight microorganisms. It was discovered, that neutrophils are able to not only engulf pathogens and to release soluble antimicrobials (which are normally found in granules of neutrophils) but also to release web-like extracellular structures composed of DNA and intracellular proteins. These unique structures called neutrophil extracellular traps (NETs) immobilize pathogens, prevent them from spreading and create conditions, which favors clearance of pathogens. Interestingly, abnormal NETs formation has been shown to be implicated in several diseases, e.g. cystic fibrosis and autoimmune conditions such as systemic lupus erythematosus and rheumatoid arthritis.

NETs were described later than other strategies employed by neutrophils to fight infections and even though it has been a field for extensive studies, our understanding of the mechanisms involved in the regulation of NETs release is still very limited. It has been elucidated so far, that NETs formation is regulated by interplay between several different mechanisms, including synthesis of reactive oxygen species (ROS). Synthesis of ROS is tightly connected with the formation of related family of compounds - reactive nitrogen species (RNS). Both ROS and RNS are very important for proper function of immune system cells. They comprise highly reactive molecules, responsible for killing microorganisms and the regulation of immune response. Previously scientists have been focusing on the function of ROS in NETs formation, but the role of RNS remains largely undefined.

In view of the very limited number of studies on the link between RNS in NETs formation, we aim to assess, what is the role of RNS during this process. Our task is to explore the mechanism underlying the release of NETs stimulated by RNS and to elucidate, whether the involvement of RNS is a mandatory factor for NETs formation.

The results of our study will contribute to better understanding of mechanisms employed by white blood cells to fight infections and they will broaden our knowledge on the function of immune system in humans. Extensive studies on these phenomena are very innovative, shedding a light on the fragile mechanisms regulating the balance between health and disease. An in-depth understanding of this newly-recognized mechanism would be valuable not only from the scientific point of view, but could also impact on new therapies for patients suffering from NETs-related diseases.