

Every day our organism encounters billions of bacteria, viruses and fungi. The immune system protects us from the dangerous microbes as well as pathological processes occurring in our body, for instance malignancies. One of the most powerful elements of the immunity are **antibodies**, which circulate in blood and are able to recognize and eliminate the threats. Although antibodies were discovered many years ago, they are still extensively studied because of their important functions and therapeutic potential. The human antibodies belong to the best characterized molecules. However, **my research concerns mouse antibodies**.

Why mouse antibodies are worth studying?

Mouse is one of the most commonly used model organisms to study human diseases and evaluate efficacy and safety of experimental therapies. **Although the physiology of mouse closely resembles human, the immune systems of the two species, including structures and functions of antibodies, are remarkably different.** The understanding of these dissimilarities is absolutely essential for reliable conclusions from experiments performed on mice.

What makes mouse antibodies unique?

There are several types of antibodies both in human and mouse. One of the mouse antibodies, called IgG3, have an **exceptional ability to interact with each other** and to form oligomers. Moreover, we have discovered that only mouse IgG3, but not any other similar molecules, can aggregate red blood cells.

The objective of the project is to explain at molecular level the exceptional features of mouse IgG3. Neither molecular cause nor physiological importance of this IgG3 hallmarks are yet elucidated.

Mouse IgG3 differ from other antibodies especially in a fragment called a hinge region. While carrying out the project, I will answer the question whether the hinge region is responsible for the unique properties of mouse IgG3.

The knowledge acquired through the project could help in the future to generate innovative diagnostic reagents for blood typing, as well as to improve antibody-based drugs used in cancer therapy. Both blood typing and many novel therapies are based on antibodies. According to current state of knowledge, even a small modification in the structure of antibody can lead to tremendous change of its function.