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The aim of the project is to study the impact of mutations in complement C2 protein on autoimmune diseases. The complement system is a part if our innate immunity, which protects us from variety of invading pathogens. Among many benefits of the complement system for our health and welfare one has to mention the risk of complement-driven autoimmune diseases. Such diseases take place when immune system attacks own cells and tissues and one of the permisive condition is when individual components of the complement system (consisting from more than 30 proteins) get mutated and upregulates certain path of the complement cascade. The best characterized (up to date) autoimmune diseases are caused by improper regulation of so-called alternative complement pathway. This group contain among others glomerulopathies resulting in loss of kidney function, systemic lupus erythematosus or age macular degeneration causing loss of vision in eldery.

Due to complicated methodology studies on the complement system are problemtic. Very ofter scientists have to analyze transient states of complement proteins, which forms short-living enzymatic complexes. However, such complexes determine a degree of activation of whole complement cascade and recognition of their function is crucial for understanding etiology of many diseases. Aforementioned C2 protein forms one of such complexes and its role in autoimmune processes is poorly understood. That is why the present project aims at analysis of mutations in C2 protein in population of patients suffering from various autoimmune diseases. Initial functional analysis will enable to select patients, in whose serum C2 complex reaches very high activity. Afterwards, sequecing of their genetic material will allow production of such recombinant, mutated C2 protein for further, detailed analysis.

Another idea is to assess, whether hyperactive version of C2 protein can be used as supporter in treatment of certain tumors, e.g. leukemias. Leukemia therapy consists from antibodies recognizing specific antigens on the surface of tumor cells. Such antibodies after being bound the cell surface activate the complement system, which finally kills target cells. Importantly, one of defence mechanisms of tumor cells is production of complement inhibitors, which destabilize C2 complexes. If we are lucky to find out a mutated variant of C2 protein, which is resistant to the activity of complement inhibitors and add such protein together with antileukemic antibodies, there is a chance for marked improvement of actual therapy.