All known bacteria constantly release small vesicles to the environment. Their role is not well understood, but it is believed that they communicate the host and other microbes of their presence ("postcard" function). Vesicles can be a manner to get rid of substances unnecessary or even harmful for cells ("rubbish lorry" function). In addition, bacteria can pack into them so-called virulence factors (their "weapon system") - substances that help the bacteria fight with the host's defense system as well as survive and multiply therein. Vesicles filled with such agents can reach places where the bacteria enter with difficulty and can function as a "fighter-bomber aircraft". Vesicles contain all these structures that are located on the surface of the bacteria from which they originate. The host's organism recognizing them as foreign, begins to defend by production of specific antibodies. In contrast to bacteria, bubbles cannot multiply and therefore can be used as vaccines (safer than attenuated (weakened) microorganisms and better stimulating the host organism to produce antibodies than isolated or genetically engineered bacterial antigens). Bacteria produce vesicles continuously, but in stressful situations (e.g. under the action of antibiotics or elevated temperature) their secretion may be disturbed (intensified or inhibited). Changes can also be made to their composition. Harmless vesicles can turn probably into vesicles that stimulate the host's body to react vigorously. If this reaction gets out of control, it can lead to severe illness and even death.

The complement system is a set of cascade activated factors present in the blood, contributing to defending from infection (by destroying bacteria or facilitating their phagocytosis by specialized cells). **The aim of our project is to investigate whether complement takes part in rapid response of the organism to the bacterial vesicles.** The vesicles released by *Yersinia enterocolitica* will be studied. These microorganisms can grow both at very low (<4°C, for example in refrigerator) and high (>40°C) temperatures. The source of foodborne illness caused by the bacteria are often incorrectly stored food (animal and vegetable products) or water. Moreover, the bacteria can multiply within blood cell concentrates stored in low-temperature. Transfusion of such infected preparations can lead to fatal disease. The characteristic feature of *Yersinia enterocolitica* is that the activity of most of its virulence factors is modified by temperature. We are going to check whether after stepping into the host and activating the complement system, the temperature-stimulated change of the vesicles produced by *Yersinia* may cause dangerous health complications. The vesicles obtained from the growth medium after the bacteria cultivation will be observed in the electron microscope (their shape, size and surface structures). Modern immunochemical methods will enable the possibility of checking vesicles content and revealing the answer to a question about the elements the bacteria places inside them. Furthermore, the fluorescent-labeled vesicles dispersion in the host's organism, their impact on host immune response (by investigation of expression of immunity-associated gene panel) as well as their toxic properties will be studied.