

Physical activity is associated with an increased risk of injury, especially in the musculoskeletal system. Injuries most frequently affect the knee and ankle joint. It is therefore necessary to identify the causes of injuries and the factors that increase the risk of their occurrence. Risk factors include environmental and genetic factors. Hypotheses about the relationship between genetics and the occurrence of injuries appeared even before the era of genetic research. It has been observed that patients with an ACL injury are twice as likely to have a relative with such an injury than patients without this type of injury. One of the first genes analyzed in the context of soft tissue injuries were genes encoding collagen proteins. Many researchers have been able to prove the association between rare alleles and specific genotypes of polymorphisms of collagen genes and significantly higher risk of ACL injury or tear. A new direction in the genetic research on damage of soft tissues of the musculoskeletal system is the study of genes encoding interleukins. These cytokines are the mediators of immune and inflammatory reactions, they also play a key role in the process of healing and regeneration. Research indicates a relationship between genes encoding interleukins and trauma, as well as muscle and other tissue damage. It was observed that in girls, the T allele of the rs1800587 polymorphism of the *IL1A* gene was associated with lumbar disc degeneration and its development. It was also noted that patients with cartilage damage associated with ACL rupture have been found to have higher levels of **IL6** in the synovial fluid.

The goal of this project is to determine the relationship between the genes of pro- and anti-inflammatory cytokines - *IL1*, *TNF*, *IL18*, *IL15*, *IL6*, *IL10*, *TGF-β* and their receptors, and the risk of injury of the internal and external ligaments of the knee joint in physically active people. Real-Time PCR is a widely accepted and recognized genotyping method and will be used for determining polymorphisms. The study and control groups will consist of women and men practicing handball with and without injuries of the knee ligaments. The selected study group is as homogeneous as possible - it consists of players with similar sports experience, training plan and level of physical fitness. Genetic material collected from participants - DNA, will be the basis for further analysis. It will be possible to correlate the occurrence of rare alleles of selected genes with the risk of injury. Results of this study might allow for the creation of an appropriate injury prevention program in the future.