Rheumatic diseases are a diverse group of musculoskeletal system disorders, affecting 30-40% of the European population. It is estimated that in Poland about 400 000 people suffer from inflammatory rheumatic diseases. In the pathogenesis of rheumatic diseases associated with the presence of changes in the peripheral and axial joints (of medium and small joints, sacroiliac joints, spine etc.), a special role is played by dysregulation of immune response leading to the development of inflammatory process. The chronic nature of the inflammation that is observed in the joints suggests that the regulation of the immune system as well as control mechanisms of the inflammatory process are impaired. The aim of the project will be determine the panel of soluble, cellular and genetic biomarkers of inflammation associated with susceptibility to rheumatoid diseases, that allow to analyze and predict the risk of disease development, to prevent disease progression by selection of personalized treatment. For this purpose patients with rheumatoid arthritis (RA), patients suffering from ankylosing spondylitis (AS) and psoriatic arthritis (PsA) and healthy controls will be investigated. The goal of our study will be achieved by performing a panel of complex analyzes including (i) flow cytometry based study of the IL-23/Th17 cells phenotyping profile and intracellular profile of proinflammatory cytokines, (ii) analysis of genetic variability of the IL-23/Th17 signaling pathway genes, (iii) gene expression studies, (iv) determination of the metabolic profile and the amount of secreted protein in serum, (v) assessment of miRNA repertoire and its expression value. This comprehensive comparative study will be performed for patients with RA, PsA and AS before and after three months of the treatment. The results of our study allow to discover new relationships in the regulation of inflammation at the functional and molecular level. It is estimated that the effects of genetic variability on the risk of RA is about 50-60%. In Europe, in 50% of patients with RA the HLA-DRB1 and PTPN2 genes are risk factors associated with the disease. Genetic markers constitute also important factors predisposing to the development of spondyloarthropathies (RA and AS). HLA-B27 is detected in 80-90% of patients with AS while HLA-B17, -Cw6, -DR4 and -DR7 are much more common in patients with psoriasis or psoriastic arthritis compared to healthy volunteers. The presence of HLA-Cw*06:02 is often associated with the early onset of PsA. Therefore analysis of the polymorphic variations at single nucleotide level also in non-HLA system genes will extend a panel of genetic biomarkers of selected rheumatic diseases. The genotype frequencies and allelic distribution will be compared between groups of patients and healthy controls, the risk of disease will be assessed, gene-gene interactions and haplotype association will be studied. For analysis of the genetic data special software available on the platform MultiGenBank will be used. Disease-associated changes in the immune system of patients with RA, AS, PsA are not limited to sites of inflammation but also may characterized wit systemic nature. Severe damage of the musculoskeletal system and other organs are associated with progressive disability of the patient and may be a direct cause of death. The key factor that affects the future prospects of the patient is the time that elapses from the first symptoms to implementation of appropriate treatment. If the time from diagnosis is extended, it comes to irreversible lesions and the patient's disability. Therefore rapid implementation of therapy significantly increases the chances of inhibition of progression of the disease and achieving remission state. Thus identification of new biomarkers and subsequent implementation of an early diagnosis system in the field of rheumatology may further improve the access to specialized diagnostic system for patients with inflammatory diseases, a group of patients that need them the most. Our comprehensive analysis of soluble, cellular and genetic biomarkers of inflammation, may extend the panel of diagnostic parameters of rheumatic diseases. This will improve the quality of life of people with inflammatory disorders of the joints, and also contribute to savings in health care and social systems by more effective and therefore less expensive treatment, and by reduction of absences due to illness and expenses on disability pensions. Furthermore, identification of new and/or common disease biomarkers for RA, AS, RA may be important in the selection of personalized therapy.