Rheumatoid arthritis (RA) is an autoimmune disease affecting the joints and various organs. In Poland and other European countries, rheumatic diseases, including RA, are one of the main causes of sick leave and work disability. Thus, the economic burden of RA is very high. Currently, there is still no cure for rheumatic diseases. The prognosis for patients to function normally can be much better when the RA is diagnosed early and is followed by a specific therapy. Therefore, it is crucial to seek new strategies that will allow faster diagnosis and improve the current treatment of patients before irreversible structural changes to the joints and other organs occur.

It has been demonstrated that epigenetic modification including DNA methylation is involved in many important biological processes, such as aging or cancer development. However DNA methylation in the pathogenesis of RA is not fully explored. Therefore, the long-term goal of my research is to use the obtained knowledge of DNA methylation to propose new diagnostic and therapeutic possibilities for patients with RA. In particular, we plan to find blood-based biomarkers of early joint destruction using methylated DNA. In addition, we plan to use drugs that change the DNA methylation pattern. Such drugs should inhibit chronic inflammation caused by autoagressive immune cells or synoviocytes isolated from RA patients. In conclusion, the proposed project using methylated DNA may be used as a diagnostic or therapeutic model for RA patients and also for people suffering from other autoimmune diseases, in the case of which previous methods of treatment did not bring the expected results.