Wilson's disease (WD) is an autosomal recessive disorder of copper metabolism. The excess of this microelement absorbed from the digestive tract is not eliminated by the liver properly and accumulates in tissues. Toxicity of copper leads to chronic damage of the liver, kidneys, and central nervous system. The most commonly observed symptoms are non-specific liver function disorders and neurological and psychiatric disorders such as tremors, muscle rigidity, speech impairment, and manic-depressive or schizophrenic-like disorders. Moreover, deposition of copper in the corner of the eye is also observed and may cause visual disturbances. Diagnosis of WD may be problematic for clinicians since the disease is relatively rare, and initial symptoms resemble many other conditions. Late diagnosis results in irreversible complications that significantly impair everyday life and are associated with a poor prognosis.

Our understanding of genetic and molecular mechanisms, neuroimaging abnormalities, and other biomarkers for neurological involvement in WD has advanced in recent years. However, the fundamental question of why only some patients primarily manifest with liver and/or neurological disease remains unanswered. Novel approaches to exploring the genetic, epigenetic, and wider metabolic influences that determine the initial presentation may be required. We anticipate that novel non-genetic and genetic biomarkers, including extracellular vesicles (EVs) and non-coding RNAs (ncRNAs) for hepatic and neurological involvement, will be increasingly used in the future.

Available data suggest that circulating RNAs (including microRNAs and long non-coding RNAs), as well as microvesicles secreted by cells, may be promising in this regard. Therefore, our study planned to analyze the platelet reactivity and circulating platelet-derived microparticles in blood samples collected from WD patients. Next, using the next-generation sequencing (NGS) - we will assess the expression of selected RNA types related to platelet reactivity. We expect that our project will i) develop the knowledge of the pathophysiological processes underlying WD; ii) allow to assess the importance of platelet reactivity, as well as platelet-associated microvesicles and selected RNA molecules in this disease; iii) allow to define diagnostic and prognostic biomarkers available in peripheral blood. We believe that our strategy may significantly contribute to the knowledge of this rare and still poorly understood disease and, in the future, accelerate the diagnostic procedure and starting treatment which improve the prognosis of patients.