

## MicroRNA as biomarker for Sepsis

MicroRNAs (miRNAs) are small non-coding RNAs that function as important biological regulators in viruses, plants, and animals. The single-stranded miRNAs regulate the expression of genes and the dysregulation of miRNAs is associated with a variety of human diseases, such as autoimmune diseases, cancer, cardiovascular diseases, inflammatory diseases, and neurodegenerative diseases. MicroRNAs are abundant not only in tissues but also in body fluids and retain a high stability in such fluids. Consequently, miRNAs show great potential as minimum-invasive biomarkers for the diagnosis and prognosis of diseases as they can be rapidly and reproducibly quantified in human serum samples.

A biomarker is defined as “a characteristic that is objectively measured as an indicator of normal biological processes, pathogenic processes, or pharmacological responses to a therapeutic intervention”. The value of biomarkers is derived from their capacity to discriminate between two or more biological conditions. A multitude of biomarkers, around 180 distinct molecules, have been assessed for potential use in sepsis. The majority of these biomarkers have been evaluated as prognostic markers, but only ten were identified as possible diagnostic markers. Recently, miRNAs have received attention for their potential as biomarker for sepsis, partly because of their stability and assay reproducibility in human serum samples, but also because it can sometimes be difficult to detect the bacteria causing the infection through the blood, due to for example a local infection. However, even in the case of a local infection giving rise to the sepsis syndrome, the response of the patient will be systemic, and could therefore be detected through the patient's change in miRNA expression through the blood.

The knowledge and development of miRNAs as biomarkers within the SMARTDIAGNOS project will certainly also be of importance for diagnosis of other human diseases in the future.