Jeanne Cuny
Dr. med.

Development of Quantitative Screening Assays of Methylglyoxal Metabolism for Use in Clinical Diagnostics

Promotionsfach: Innere Medizin
Doktormutter: Prof. Dr. Angelika Bierhaus

Within my thesis I focused on the development of methods to assay the glycolysis metabolites triosephosphates, the dicarbonyls methylglyoxal, glyoxal and 3-deoxyglucosone, as well as D-lactate, the end-product of the glyoxalase pathway. All assays have been developed in a 96-well microplate format therefore allowing the analysis of a large number of patients in a short period of time. Furthermore the methods are adapted to be implemented in clinical laboratories.

The methods have been applied in the analysis of a patient collective which includes diabetic patients as well as non-diabetic controls. The aim was to see whether and to what extent the metabolites' concentrations change in diabetic patients against controls.

These data demonstrate that in diabetes an accumulation of triosephosphates leads to an increased metabolization of the latter to methylglyoxal, and that methylglyoxal accumulates in diabetic patients compared to non-diabetic controls although a higher D-lactate concentration in diabetic patients also implies a higher flux through the glyoxalase pathway.

In future, large prospective studies are needed that allow analysing both biochemical (metabolites from the glyoxalase pathway) and clinical variables and correlating them with later development of complications. This would allow to both verifying the results found in this and other small studies and to associate biochemical metabolites like those from the glyoxalase pathway to the later onset of diabetic complications and, possibly, establish the basis for a tool that reliably predicts the risk of developing late diabetic complications.