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Glycomics based biomarkers: A sweet alternative for biomarker development in liver transplantation

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The study of “clinical glycomics” has led to the discovery of a multitude of glycomics-based biomarkers in a variety of disease conditions. Using DNA-sequencer assisted fluorophore assisted carbohydrate electrophoresis (DSA-FACE), our research group was able to define specific alterations of the N-glycome on the whole serum protein content. These specific glycomic signatures can be used to diagnose liver fibrosis, liver cirrhosis and non-alcoholic steatohepatitis with a high sensitivity and specificity. Recently, we also showed that the glycomic profile diagnostic for cirrhosis, is also predictive of the development of hepatocellular carcinoma in cirrhotic patients. Based on our large experience in glycomics-based biomarkers for liver disease, we explored the potential of glycomics-based biomarkers in liver transplantation. Two projects are potentially relevant for clinical practice. First, we analysed serum samples of patients after liver transplantation. In a single center cohort of 127 liver transplant patients, a specific glycomic signature in serum, seven days after liver transplantation was independently related to graft loss during the first year after liver transplantation with a hazard ratio of 7:22 ($p < 0.001$; 95% CI 2.35–22.12) for graft loss at three months after liver transplantation. In a second project, the N-glycomic profile of perfusate, the fluid in which the donor liver is transported to the acceptor, was analysed and a profile predictive of primary non-function (PNF) of the liver after transplantation was discovered. PNF is an acute liver failure in the first hours after liver transplantation which requires prompt retransplantation in order to avoid patient death. This novel biomarker answers a huge medical need. Both biomarkers illustrate the validity of glycomics based biomarkers in liver disease and liver transplantation. Furthermore, the DSA-FACE technology allows easy implementation on routine laboratory equipment.

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