Type 1 diabetes (T1D) onset involves acute inflammation of the pancreas resulting in islet cell destruction and dramatic long-term consequences for the individual. Intravital microscopy (IVM) – in contrast to histological or immunohistochemical methods - can be employed to study early, dynamic stages of inflammation (such as leukocyte rolling and adhesion) and functional consequences, for instance, impact on microvascular blood flow of the pancreas. Our goal was to establish an IVM-based method to study early pancreatic inflammation in non-obese diabetic (NOD) mice, which can be used to screen novel medications to prevent or delay T1D in future studies. This included evaluation of leukocyte-endothelial interactions as well as disturbances of capillary perfusion in the pancreatic microcirculation.

In our pilot study, we observed significantly increased rolling behavior as well as firm adhesion of leukocytes to the endothelium in early T1D and a reduction of the functional capillary density in the pancreatic microvasculature of diabetic NOD mice. Experimental preventive treatment with cannabidiol (CBD), a natural cannabinoid, attenuated pancreatic inflammation and resulted in lower blood glucose levels indicating a delay in the onset of T1D in our model.

Employing pancreatic IVM further studies are facilitated to evaluate changes within the pancreatic microcirculation in early T1D and to screen for novel drugs to control or delay the onset of T1D.