Non-alcoholic fatty liver disease (NAFLD) is the hepatic complication of obesity and metabolic syndrome and now the most common chronic liver disease in the world. As many as 116 million people in the EU alone may suffer from some form of NAFLD. It ranges from simple steatosis, then NASH to cirrhosis. Pathologists assess NASH severity using semiquantitative scoring methods, such as NAS or SAF score, which are linked to an inherent high variability. Histological scoring assessment provides discrete and not continuous values thus small variations may not translate into a different score.

To perform a numerical quantification of NASH features, fully automatic, which is of particular interest for accurately monitoring evolution or regression upon therapy in pre-clinical studies.

We followed high fat diet-fed foz/foz mice (FOZ HF), known to develop progressive NASH over 34 weeks, which were compared to high fat diet-fed wild type mice (WT HF) and normal diet-fed wild type mice. Automated software image analysis of steatosis, inflammation and fibrosis was performed on digital images from entire liver sections stained for the respective purposes: H&E for steatosis, immunostaining of F4/80 for inflammation and picrosirius red for fibrosis. Data obtained from numerical analysis were compared with NAS score, biochemical quantification and gene expression. Therefore, we can precisely and easily quantify key NASH features such as steatosis, inflammation and fibrosis, although ballooning remains a big challenge. Software-based fully-automated NASH method represents a promising accurate and reliable quantitative analysis to rapidly monitor disease activity with high-throughput in large pre-clinical studies.