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Prof. Mathias Heikenwälder is a trained molecular biologist, with expertise in immunology and a strong link to translational research evoked by 10 years of work and expertise in a Pathology Institution (Clinical Pathology, University Hospital Zurich). Since October 2015 he is Department head at the German Cancer Research Center (DKFZ) in Heidelberg focusing on the link between chronic inflammation and cancer.

The Heikenwälder laboratory aims at understanding the different immune signatures of chronic inflammatory human diseases using relevant mouse models - with the final aim to generate models of chronic inflammation potentially used for pre-clinical research. Thus, the Heikenwälder laboratory focuses on comparative studies of human and animal tissues, recapitulating human disease on a histo-pathological and pathophysiological level. The laboratory engages in classical molecular biology techniques complemented with sophisticated ways to receive as much information from tissue samples through histology (e.g. light microscopy/ immune fluorescence/ FISH/ in situ hybridization), other in vivo imaging techniques (e.g. MRI) as well as through FACS analyses for tissue homogenates. At the same time, the Heikenwälder laboratory is also interested in the systemic functional effects of pathologies and the interplay between several affected non-lymphoid tissues and the immune system.

Finally, testing several therapeutic compounds in a single use but also combinatorial fashion is one of the goals employing established and stratified pre-clinical mouse models.

Prof. Heikenwälder publishes his work in high-ranking journals and has established himself as an international leader in the field of liver cancer. Mathias Heikenwälder is the third most frequently cited German-speaking researcher in the field of cell biology in the last 5 years and was one of the Highly Cited Researchers (Cross Fields) (Web of Science Group) in 2019, 2020 and 2021. Not only have his publications been widely cited by the research community, but they have also shifted fatty liver and liver cancer research in new directions - relevant to the day-to-day management of patients with fatty liver or liver cancer. The current H-Factor of Mathias Heikenwälder is 75 (Web of Science), with 281 publications listed in Pubmed.

Immune mechanisms driving NASH and liver cancer

In association with the pandemic spreading of obesity and metabolic syndrome, the prevalence of NAFLD-related HCC is increasing almost exponentially. In recent years, many of the underlining multifactorial causes of NAFLD have been identified, and the cellular mechanisms sustaining disease development have been dissected up to the single-cell level. Still, there is still an urgent need to provide clinicians with more therapeutic targets, with particular attention on NAFLD-induced HCC, where immune checkpoint inhibitors do not work as efficiently. Whereas much effort has been invested in elucidating the role of innate immune response in the hepatic NAFLD microenvironment, only in the past decade have novel critical roles been unraveled for T cells in driving chronic inflammation toward HCC. The metabolic and immune microenvironment interact to recreate a tumor-promoting and immune-suppressive terrain, responsible for resistance to anticancer therapy. Here, I will illustrate the cellular crosstalk with other immune cells, regulatory networks or stimulatory effects of these interactions, and role of the metabolic microenvironment in influencing immune cell functionality in the context of fatty liver disease and subsequent liver cancer.