ABSTRACT

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Title of diploma thesis: Viral hepatitis: novel insights and novel therapeutic interventions.

Viral hepatitis is a well-known worldwide problem. Hepatitis B virus (HBV) and hepatitis C virus (HCV) are characterized by the development of serious complications, especially with regard to the transition to the chronic stage of the disease, associated with the development of fibrosis, cirrhosis and hepatocellular carcinoma (HCC). Interactions between viruses and host cells are quite complicated and not always fully understood. In general, the infection cycle of viruses is a multi-step process. A closer understanding of the entire life cycle of the virus is a major prerequisite for the invention of effective drugs. Viral hepatitis B and C have long been treated mainly with interferon alfa. Ribavirin was later added to HCV treatment and nucleoside / nucleotide analogs (NA) were introduced for HBV. Interferon was later pegylated to improve its properties. However, these drugs did not provide sufficient efficacy and were additionally associated with a number of side effects. It is precisely because of these disadvantages of the current treatment that an effort has been made to find new and more effective therapies. However, the invention of new treatments has been hampered to a large extent by the lack of model systems, which are necessary not only to understand the life cycle of the virus, but also to develop drugs. Importantly, NTCP has been discovered as a major input receptor for HBV (also HDV) using model systems, and the HCV replication cycle could also be further investigated. This, as well as a number of other findings, caused a major breakthrough in treatment options. Modern direct-acting antivirals (DAAs) and host-targeting antivirals (HTAs) have become very promising treatment options.

The presented diploma thesis analyzes the life cycle of viruses, mechanisms and factors that participate in the process of infection and are also the main goal for the development of new treatments. Subsequently, the latest treatment options for HBV and HCV will be mentioned, and the last part will focus on the most commonly used model systems in connection with these hepatitis.