

ABSTRACT

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Hepatocellular carcinoma (HCC) is one of the highly prevalent cancers globally. A number of new cases of HCC and deaths rises every year. Molecular mechanisms of HCC are being intensively studied, yet they are not still fully understood. In addition to genetic alterations, epigenetics also plays an important role in HCC pathogenesis. Long non-coding RNAs (lncRNAs) are RNA molecules that are not capable of coding proteins, and their length is 200 nucleotides or more. Various studies have already revealed lncRNAs involved in tumorigenesis through binding to DNA, RNA and proteins. New studies also demonstrate significant changes in the expression of biotransformation enzymes in HCC, and interactions with microRNAs (miRNAs) and lncRNAs.

This diploma thesis deals with the issue of long non-coding RNAs in relation to HCC. It summarizes the epidemiological situation, risk factors, and current possibilities of diagnosis and therapy of this disease. It also summarizes recently described genetic and epigenetic mechanisms contributing to the development of HCC, focusing on miRNAs and lncRNAs. A related aspect is the connection between tumor-damaged liver tissue and alterations in the expression of cytochrome P450 (CYP) enzymes and the interactions between CYPs and non-coding transcripts. In addition to the above, all these findings bring closer the possibility of identifying new biomarkers for early or more precise (molecular) diagnosis and finding or individualization of the treatments for effective HCC therapy. Last chapters describe basic methods for lncRNAs identification and analysis, and databases that gather information about this growing group of RNAs.