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# **Long non-coding RNA (lncRNA) as a new biomarker for hepatocellular carcinoma (HCC) progression and drug resistance**

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## **Abstract**

Hepatocellular carcinoma (HCC) is a primary malignant liver tumor that commonly occurs as a progression of chronic liver inflammation due to long-standing viral hepatitis infection, toxins, metabolic conditions, and congenital disorders. In 2018, HCC was the 4<sup>th</sup> leading cause of cancer-related deaths worldwide, accounting for approximately 780,000 deaths in total.

HCC's prognosis is directly correlated with early detection. Unfortunately, HCC has an asymptomatic pattern of growth in the early stages of the disease which makes early detection challenging. When HCC progresses to advanced stages, it leaves clinicians with limited therapeutic and curative options, leading to high rates of morbidity and mortality. In general, one major hurdle in treating advanced cancer is that cancer cells develop drug resistance.

Research studies have elucidated the role of long non-coding RNAs (lncRNAs) in progression and drug resistance in various cancers such as bladder cancer, prostate cancer, and non-small cell lung cancer. Long non-coding RNAs (lncRNAs) are non-coding RNA segments that are >200 nucleotides long that play various roles in biological processes regarding DNA, RNA and protein regulation. In carcinogenesis, lncRNAs can promote growth and differentiation of cancer stem cell populations, promoting chemoresistance and tumor recurrence. The role of lncRNAs in chemoresistance of HCC has not been well-studied. There is a need to uncover novel lncRNA biomarkers for both the early detection of HCC and to create drug strategies for clinicians when predicting chemoresistance.

The goal of our review is three-fold. Firstly, we aim to describe HCC risk factors, the pathologic progression of HCC from benign pathologies such as viral hepatitis and non-alcoholic fatty liver disease (NAFLD), current diagnostic standards and challenges, and approved treatment options for HCC. Secondly, we aim to explain the molecular role of lncRNAs in cancer progression and drug resistance. Lastly, we aim to compile a comprehensive list of studied lncRNAs involved in HCC progression and drug resistance, their mechanisms of action, their binding partners, and the impact these lncRNAs had on metastatic potential and tumor proliferation. Additionally, we aim to include a list of proteins involved in HCC and their interactions with lncRNAs.