



## Hepatocellular Cancer, the Killer Disease, It's Etiology, Pathological Orientation, Genomic Pathway, A Concern to the 21st Century's Field of Medicine BY E.E. GODSWILL (B.SC, ASN,)

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### Introduction

Hepatocellular carcinoma (HCC) is a malignant tumor of the liver that poses a significant global health burden in the 21<sup>st</sup> century. It is characterized by high mortality rates and increasing incidence worldwide, reflecting the challenges and opportunities for the medical field. This introduction reviews the current discoveries of Hepatocellular Carcinoma, to cover the broader aspect of the etiology, pathology, genomics, and implications HCC for the 21<sup>st</sup> century medicine.

### Etiology

The etiology of HCC is complex and intricate, because it involves various environmental and genetic factors that contribute to the formation and growth of hepatocarcinoma. Most HCC cases occur in the presence of chronic liver disease, which indicates a great risk factor for HCC. Chronic viral hepatitis, especially hepatitis B virus (HBV) and hepatitis C virus (HCV), is responsible for a large proportion of HCC cases worldwide. These viral infections cause chronic inflammation and liver injury, resulting in cirrhosis and subsequent HCC development.

Other risk factors for HCC include excessive alcohol consumption, non-alcoholic fatty liver disease (NAFLD), aflatoxin exposure, genetic predisposition, and metabolic disorders. Excess alcohol consumption will lead to chronic liver disease and cirrhosis, which increase the risk of HCC. Non-alcoholic fatty liver disease, linked to obesity, insulin resistance, and metabolic syndrome, is an emerging risk factor for HCC. Aflatoxin exposure, due to improper food storage practices, is prevalent in some regions and leads to higher incidence of HCC. Genetic factors and metabolic disorders, such as diabetes, also modulate the susceptibility to HCC.

### Pathology

The pathology of HCC encompasses the histological examination and staging of tumor specimens, which provide valuable information for prognosis and treatment planning. HCC displays a variety of histological patterns, ranging from well-differentiated to poorly differentiated forms. These patterns are influenced by several factors, such as tumor grade, size, vascular invasion, and satellite nodules.

The tumor microenvironment of HCC is a key determinant of disease progression. Angiogenesis, the formation of new blood vessels, is a characteristic feature of HCC and supports tumor growth and metastasis. Immune cell infiltration, especially lymphocytes, is evident in HCC and reflects the interaction between the tumor and the immune system. When there are visible changes in the extracellular matrix composition it will also affect how HCC behaves, hence leading to the expedition of invasion and metastasis.

### Genomics

The genomics of HCC reveals the complex molecular mechanisms underlying hepatocarcinogenesis. Genetic alterations play a pivotal role in the development and progression of HCC. Mutations in tumor suppressor genes, such as TP53 and AXIN1, impair the regulatory pathways that control cell growth and division. Subsequently, the onset of oncogenes, such as CTNNB1 and TERT, will lead to cell proliferation and survival. Furthermore, epigenetic modifications, such as DNA methylation and histone modifications, contribute to the dysregulation of key genes involved in HCC development [1-10].

Genomic profiling studies have also identified molecular subclasses within HCC, demonstrating the heterogeneity of the disease. These subclasses exhibit distinct molecular signatures and clinical features, suggesting the need for personalized therapeutic strategies. The identification of specific molecular alterations and the development of targeted therapies offer greater percentages for improving patient outcomes and increasing survival rates.

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