

# Research

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## **Human Cancer Genomics and Therapeutics**

Primary liver cancer is the fifth most common cancer worldwide and hepatocellular carcinoma (HCC) accounts for over 85% of all primary liver cancers and hence, HCC is a worldwide health threat. The clinical management of advanced and metastatic HCC is challenging on many counts. Besides largely occurs within a background of underlying chronic liver disease and cirrhosis, HCC is a phenotypically and genetically heterogeneous polyclonal disease and resistant to most conventional chemotherapy. Early manifestation of HCC is characteristically slow growing with few symptoms, and HCC is therefore often diagnosed at an advanced stage. Surgery currently offers the only possibility of long-term survival for HCC patients. Unfortunately, recurrence occurs in more than two-thirds of these patients and confers a dismal prognosis.

Despite recent advances in the prevention and treatment of human HCC, the prevalence of HCC, continues to grow. We employ unbiased genome-wide strategies to survey relevant human HCC tissues to identify key molecular probes and genes/pathways that are altered in HCC and to explore how changes in these genes and gene regulation affect the carcinogenesis of HCC in order to learn how to manipulate these pathways to combat HCC. Recently, we have systematically gathered molecular evidence and provided clinical corroboration of these data to discover molecular biomarkers that, independently from clinical risk factors, can provide clinically meaningful avenues for designing strategies to decipher the underlying molecular networks leading to HCC, to diagnosis early stages of HCC and to predict treatment outcomes. Specifically,

1. We perform functional genomic studies to decipher the molecular differences between cancerous and normal liver tissues to identify novel diagnostic and prognostic biomarkers relating to human hepatocellular carcinoma.
2. To better understand the molecular roles of these biomarkers in the carcinogenesis of human hepatocellular carcinoma.
3. To design and build novel diagnostic platforms for human hepatocellular carcinoma using these novel biomarkers.
4. To design and perform animal experimentation to validate novel viral- and drug-mediated therapies for human hepatocellular carcinoma.
5. To design and generate cancer-specific vaccines for human hepatocellular carcinoma.

