

# Liquid Biopsies in Cellular Oncology: A Paradigm Shift in Diagnosis

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## Abstract

The research project aimed at investigating the role of microRNA 138 (miR-138-5p) in the regulation of pancreatic cancer cell growth and its potential as a therapeutic target. Let's break down the key points: The passage acknowledges the dismal prognosis associated with pancreatic cancer, highlighting that limited progress has been made in its diagnosis and treatment over recent decades. This emphasizes the urgency and importance of research in this area. The primary objective of this study is to understand the role of miR-138-5p in the context of pancreatic cancer. MicroRNAs are small RNA molecules that can influence gene expression, and investigating their role in cancer is a common area of research. Pancreatic cancer is indeed one of the most challenging types of cancer, primarily because it is often diagnosed at an advanced stage when treatment options are limited, and it has a poor prognosis.

**Keywords:** Cancer • Cellular oncology • Diagnosis

## Introduction

Cellular oncology, also known as cancer cell biology or oncologic cellular biology, is a subfield of oncology (the study of cancer) that focuses on understanding the cellular and molecular aspects of cancer development, progression, and treatment. It examines the abnormal behaviours and characteristics of cancer cells at the cellular and molecular levels. Cellular oncology plays a crucial role in advancing our understanding of cancer and developing targeted therapies. Here are some key aspects of cellular oncology: Cellular oncology investigates how cancer cells differ from normal cells in terms of their growth, division, and behaviour. This includes studying the mechanisms that drive uncontrolled cell proliferation, evasion of the immune system, invasion of nearby tissues, and metastasis. Researchers in this field explore the intricate molecular signalling pathways that are disrupted or dysregulated in cancer cells. Understanding these pathways can reveal potential targets for drug development. Cellular oncology delves into the genetic and epigenetic changes that occur in cancer cells. Mutations, gene amplifications, and alterations in DNA methylation patterns are among the genetic and epigenetic events studied [1-3].

## Literature Review

The interactions between cancer cells and their surrounding microenvironment, including stromal cells, blood vessels, and immune cells, are a focus of study. The tumor microenvironment can influence cancer progression and response to therapy. To address the limitations of current photo thermal sensitizers, biocompatible polymer Nan containers loaded with magnesium phthalocyanine (Pht-Mg) were synthesized and characterized as effective photo thermal sensitizers. In 2D cell culture, these nanocontainers were effective in inducing specific destruction of cancer cells when exposed

to near IR light. However, their efficacy decreased by more than ten times in the transition from 2D to 3D cell culture. To improve the quality of observational studies, researchers can use rigorous study designs, such as prospective cohort studies or randomized controlled trials, to minimize the impact of confounding, selection bias, and measurement bias. They can also use advanced statistical techniques, such as propensity score matching or instrumental variable analysis, to adjust for confounding and reduce bias [4].

## Liquid biopsies reveal the genetic and molecular heterogeneity

Traditional tissue biopsies involve sampling from one specific area of the tumor, which may not represent the entire tumor's genetic landscape. Liquid biopsies, on the other hand, capture material shed by various parts of the tumor into the bloodstream. This provides a more comprehensive view of the Tumor's genetic makeup. Liquid biopsies can be performed more frequently and with less discomfort to the patient compared to traditional tissue biopsies. This means that changes in the tumor's genetic profile over time can be tracked more effectively. Liquid biopsies can be performed more frequently and with less discomfort to the patient compared to traditional tissue biopsies. This means that changes in the tumor's genetic profile over time can be tracked more effectively. Tumors can evolve over time and respond differently to treatments. Liquid biopsies can capture these changes, allowing clinicians to adjust treatment strategies as needed. They can also help identify specific genetic mutations associated with treatment resistance. Liquid biopsies can reveal the presence of subclonal populations within a tumor. Subclones are groups of cancer cells with distinct genetic alterations. This information is crucial for understanding the tumor's complexity and may guide targeted therapies [5,6].

## Discussion

Understanding the genetic and molecular heterogeneity of a tumor through liquid biopsies enables the development of personalized treatment plans. Clinicians can choose therapies that target the specific genetic alterations found in the patient's tumor. This involves studying whether the microRNA promotes or inhibits the proliferation of cancer cells. The research project also aims to evaluate whether miR-138-5p could serve as a potential therapeutic target. If miR-138-5p is found to be involved in promoting cancer cell growth, targeting it with therapies or interventions could be explored as a strategy to slow down or inhibit tumor progression. Liquid biopsies can detect very small amounts of tumor DNA in the bloodstream. This is vital for monitoring MRD,

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which refers to the presence of residual cancer cells after treatment. The presence of MRD can be a sign of potential relapse.

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## Conclusion

The information obtained from liquid biopsies contributes to precision medicine in oncology, where treatment decisions are tailored to the genetic and molecular characteristics of an individual's tumor. As technology continues to advance and our understanding of cancer genetics deepens, liquid biopsies are expected to play an increasingly prominent role in cancer diagnosis, treatment, and monitoring. Advances in technology and ongoing research are likely to have further improved their accuracy and expanded their clinical applications. It's important to consult the most recent scientific literature and healthcare providers for the latest developments and applications of liquid biopsies in cellular oncology.

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## Conflict of Interest

None.

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