High-Throughput Drug Screens on a 3D Tumor-on-a-Chip to Monitor Cancer Cell Viability and Migration

The solution is a three-dimensional human renal cell carcinoma (RCC)-on-a-chip for screening drugs that could be developed as anti-metastasis agents.

What is the Problem?

Traditional methods to test preclinical therapies often use two-dimensional (2D) cultures which fail to recapitulate physiological properties. For instance, in the context of carcinomas, 2D cultures do not accurately model the properties of tumor cells within a collagen extracellular matrix. Human tumor xenografts are suitable alternatives, but they are time-consuming, expensive, and lack adaptive immune cells. As a result, there is a need to develop a better model of the tumor microenvironment to screen for anti-metastasis drugs.

What is the Solution?

The solution is a three-dimensional (3D) human renal cell carcinoma (RCC)-on-a-chip for screening drugs that could be developed as anti-metastasis agents. The 3D collagen chip enables visualization of collective spheroid migration within the extracellular matrix. This system can be used to identify drugs that inhibit spheroid collective migration without inducing cell death. A rapid imaging-based readout has also been developed for the automated quantification of spheroid migration in 3D confocal z-stack images.

What is the Competitive Advantage?

The competitive advantage of this technology lies in its ability to simultaneously monitor 3D collective cell migration and cell death in response to potential therapeutic drugs. This technology is economical and provides a more accurate in vitro platform to model 3D environments to test a wide range of emerging therapies. The microfluidic chips are commercially available with up to 48 wells per chips, supporting medium to high-throughput screenings of drugs. As the global metastatic cancer drug market size was valued at $67.7 billion in 2022 with an expected CAGR of 7.3%, there is a significant opportunity for this technology to advance the field of cancer therapeutics.

References

1. Miller, C. P., Fung, M., Jaeger-Ruckstuhl, C. A., Xu, Y., Warren, E. H., Akilesh, S., Tykodi, S. S.(2023) , https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10663960/, https://www.sciencedirect.com/journal/neoplasia, 46, 100948

Technology ID

BDP 8839

Category

Research Tools
Therapeutics/Oncology
Therapeutics/Platform Technology
Selection of Available Technologies

Authors

Shreeram Akilesh

Learn more