In vivo screening of anticancer drugs against multiple cell lines in a single live host

Technology #cu12067

70% of the nearly $1 billion spent on bringing each new small-molecule anticancer drug to market is spent on clinical trials. A significant part of this cost is attributed to the failure of many drugs early on in trials due to lack of efficacy. While animal models can help predict clinical efficacy in humans, these models typically only allow the testing of a drug candidate against a single cancer cell type at a time, which substantially slows the discovery process. This technology is an implantable microfluidic device that can hold dozens of live tumor spheroids generated from different cell lines, allowing simultaneous evaluation of a drug against multiple cancers in a single animal.

Three-layer microfluidic device allows multiple genetically distinct tumor spheroids to be tested simultaneously in a live host

The device described in this technology is comprised of three layers: a loading layer to inject genetically distinct cancer cells into the device, a chamber layer to grow and contain individual tumor spheroids, and a membrane layer to ensure separation of the chambers. The device can be implanted subcutaneously into an animal host, which is subsequently administered with the drug of interest. After treatment, the device can be extracted to allow for analysis of the size and necrotic cell distribution within each tumor spheroid. The device can be fabricated from biocompatible materials such as polydimethylsiloxane and the design can be customized to include as many or as few spheroid chambers as necessary.

Prototypes of this technology have been used in mice to evaluate both the mechanism of action and the efficacy of seven different anticancer drugs currently in clinical trials against multiple medulloblastoma cancer subtypes. A difference in signaling pathways for different subtypes was identified using this method.

Lead Inventor:

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Applications:

• Pre-clinical in vivo screening of anticancer drugs
• Research tool for determining the mechanism of action of anti-cancer drugs
• Research tool for identifying causes of cancer drug resistance
• Testing host response to different biomaterials

Advantages:

• High-throughput—allows multiple cell lines to be tested simultaneously
• Reduces the number of animals needed for pre-clinical studies
• Potentially reduces the cost and amount of time required for pre-clinical in vivo drug screening

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