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Macrotumor Engineering

A simplified process creates large, clinically relevant in vitro tumor models that remain viable for weeks, offering a cost-effective alternative for evaluating drug delivery and therapies.

Researchers at Purdue University have developed a method that produces in vitro tumors in the centimeter-size range with relevant pathological traits. In contrast, current in vitro 3D cultures or "microtumors" typically yield cell aggregates less than 800 microns in size. Although these microtumors successfully mimic cell-cell and cell-matrix interactions observed in vivo, tumors in that size range are rarely detected in the clinic. Further, large engineered tumors produced by aggregation begin to die within a few hours. Larger, more stable in vitro models with clinically relevant architecture and cell phenotypes would be more relevant for testing drug delivery systems and other potential therapies. Bioprinting has been applied to the creation of large multicellular tumors that are reproducible and finely controllable; however, bioprinting requires high levels of expertise and access to expensive equipment. Using a simpler process, the Purdue researchers' tumors remain viable for weeks and have traits relevant to the clinical phenotype, including a heterogeneous composition consisting of both preinvasive and invasive phenotypes and a structure allowing for adequate diffusion of nutrients both within the construct and to an exogenous extracellular matrix.

Advantages:

-Large tumors with clinically relevant phenotype

-Tumors can survive several days (even weeks)

-Does not require access to a bioprinter or training on how to use a bioprinter

Potential Applications:

-Evaluation of drug delivery systems or other proposed therapies

TRL: 4

Technology ID

2019-LELI-68697

Category

Pharmaceuticals/Drug Delivery & Formulations

Pharmaceuticals/Research Tools & Assays

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Intellectual Property:

Provisional-Patent, 2019-06-19, United States | Utility Patent, 2020-06-09, United States

Keywords: in vitro tumors, centimeter-size tumors, large 3D cultures, stable tumor models, clinically relevant tumor architecture, cell phenotypes, drug delivery evaluation, proposed therapies, microtumors, 3D cell aggregates