3D model of human tumors for studying exosomes

Technology #cu16174

As tumors grow, the cancerous cells release exosomes, cargo containing specific biochemical signals such as those to increase tumor size. Understanding what these signals are, under what conditions they are produced, and how they may be manipulated are all critical for developing treatments to slow tumor progression. However, there is presently a lack of in vitro tumor models that accurately mimic in vivo conditions. This technology is a three-dimensional in vitro human tumor model that accurately recapitulates properties of tumor exosomes. This platform allows for mechanistic study of tumor cell interactions for improved evaluation of potential therapeutic targets.

Cell-scaffold 3D matrix accurately recapitulates tumor and exosome properties in vitro

This technology recapitulates the specific three-dimensional architecture, cell-matrix composition, and stiffness of the tumor matrix. These parameters play a critical role in modulating the size and biochemical composition of exosomes released by cells, and can be adjusted to result in exosomes that mimic those secreted by tumors in vivo. The biochemical composition of the exosomes from these 3D tumor models have been analyzed and found to contain high levels of potential tumor biomarkers detectable in blood. The methods described in this technology can also be used to develop co-culture models to examine how the tumor and secreted exosomes may signal to surrounding healthy cells and tissues. This technology represents the first in vitro 3D tumor model that accurately recapitulates tumor and exosome properties, providing a robust platform for studying cancer progression and evaluating cancer therapeutics.

A bioengineered 3D tumor model has been developed using Ewing’s sarcoma cells, and exosome size and composition were shown to be similar to those found in cancer patients’ plasma. This model is also being expanded to a variety of human tumors.

Lead Inventor:

Gordana Vunjak-Novakovic, Ph.D.

Applications:

- Controllable in vitro study of tumor exosomes
• Study of tumor and exosome interaction with surrounding cells and tissues through co-culture experiments
• Development of therapies for suppression of tumor growth
• Scaffold can be seeded with a patient’s own tumor cells for a personalized approach
• Method can be expanded to a wide range of human tumors

**Advantages:**

• Recapitulation of tumor 3D microenvironment
• Recapitulation of native exosome secretion
• Allows for study of tumor interaction with surrounding tissues

**Patent Information:**

Patent Pending

Tech Ventures Reference: IR CU16174

**Related Publications:**


**Inventors**

Gordana Vunjak-Novakovic