McGill

Department of Biomedical Engineering
&
Department of Bioengineering

SEMINAR NOTICE

3D bioprinted breast cancer models for toxicological screening

Salvador Flores Torres
Master of Engineering student
BBME Graduate Program

FRIDAY, NOVEMBER 3RD, 2017
1:00 p.m. Room 267
Macdonald Engineering Building,
817 Sherbrooke St. W.

Breast cancer is the second leading cause of death in Canadian women accounting for 26% of the cancer cases. Among the subtypes, triple-negative breast cancer (TNBC) is challenging to treat because it does not respond to hormonal therapy, requiring aggressive chemotherapy treatment. In general, human tumors are heterogeneous systems composed of cancer associated fibroblasts (CAFs), cancer epithelium, immune cells, vascular endothelial cells, and the extracellular matrix (ECM).

Although important landmarks in cancer research and chemotherapeutics were done using cell monolayer cultures and small animal models, the likelihood of approval for a new drug into phase I of clinical trials remains ≤ 5%, indicating that there is a lack of robust preclinical models. Monolayer cell models are grown in non-physiological substrates and lacking cell-ECM interactions, result in gross abnormalities in their phenotype and genotype. Furthermore, animal models misplace the success rate of pre-clinical trials into clinical testing because our non-representative immunodeficient hosts as xenograft models do not recall disease characteristics and patient response.

The lack of human disease models calls for current efforts and funding to be directed into the discovery and design of relevant models that accurately recapitulate human disease progression while maintaining a reductionist approach, viable for high-throughput screens (HTS) and clinical translatable studies. Reported studies have shown that multicellular tumor spheroids (MCTSs) yield valuable information regarding malignant growth mechanisms, heterogeneity in cell type and subclones, drug discovery and response, metastasis and invasion, among others. Therefore, it is imperative to focus on designing a 3D cell culture model that recapitulates human cancer development. In our previous work, we showed that 3D extrusion bioprinting is a feasible technique to create 3D cell culture models. By using cell-laden bioinks, we are able to engineer the TME by controlling cell type, location, and density, achieving long-term cell culture (>30 days) and high cell viability. The use of hydrogel bioinks is preferred due to their bioprintability and biocompatibility. We have recently discovered bioprinted tools to study breast MCTSs development inside different crosslinked alginate/gelatin hydrogel composites. For the present project, 3D bioprinted models are proposed as cell culture platforms for drug screening and cancer research.

Dr. Christine Tardif (christine.tardif@mcgill.ca) Dr. Sebastian Wachsmann Hogiu (sebastian.wachsmannhogiu@mcgill.ca)

http://www.mcgill.ca/bbme/seminars