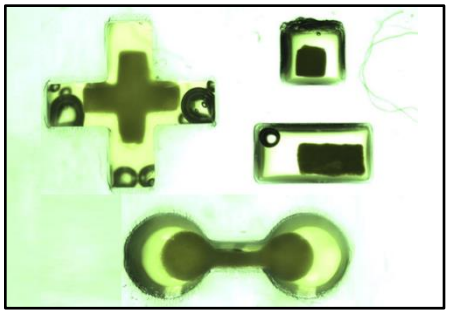
Rapid Fabrication of Self-Assembled Multicellular 3D Tissue Constructs



Rapid self-assembly of multicellular 3D structures in a mold allows for the formation of robust tissue constructs of various shapes with physiologically relevant cell densities and positioning.

Abstract

Spherical cellular aggregates (or multicellular spheroids) are useful as 3D *in vitro* models that mimic natural *in vivo* cellular microenvironment with proper cell-cell and cell-matrix interactions for applications such as drug screening. However, current fabrication techniques are typically very slow (i.e. requires several days) and limited to low cell numbers or density and/or only certain cell types.

A versatile technique has now been developed to rapidly self-assemble cells and ECM material in a mold to form multicellular tissue constructs in a variety of non-spherical shapes, which retain that shape after removal from the mold and during long-term cell culture. The self-assembly process take less than 6 h and allows for precise spatial patterning of physiologically relevant cell densities. The resulting mechanically robust 3D constructs may comprise a homogenous or heterogenous combination of several different cell types for use as 3D cell culture models in drug discovery as well as tissue grafts for implantation.

Applications

- 3D cell culture models of disease (e.g. in drug discovery)
- Tissue grafts and artificial organs for implantation

Advantages

- Simple and versatile method to rapidly self-assemble 3D multicellular constructs in 6 hours (as opposed to several days) using microfabricated molds of desired shape
- 3D constructs retain a variety of shapes (e.g. spherical, cuboidal, and hollow-channel tubular) after removal from molds and during long-term cell culture
- Allows heterogenous spatial positioning multiple cell types at their physiologically relevant cell densities to more accurately mimic *in vivo* cellular responses and interactions

Tech ID

19-063

Inventors

P.R. Selvaganapathy

A. Shahin-Shamsabadi

Patent Status

US provisional filed

Stage of Research

Proof of principle has been performed

Contact

Carmen Carrasquilla –
Business Development Officer
905-525-9140 ext. 21088
carrasc@mcmaster.ca
http://milo.mcmaster.ca

McMaster · Industry Liaison Office