

Application Feature

Modelling Pre-Eclampsia in 3D Using High Content Analysis

Highlights

Three-dimensional (3D) cell cultures resemble the physiological environment of the cells in the human body more accurately than 2D cell cultures.

This application feature shows the development of a model for pre-eclampsia of trophoblast organoids using Inventia Life Science's RASTRUM™ 3D Cell Culture Platform and Yokogawa's CellVoyager CV8000 High-Content Screening System.

3D pre-eclampsia models using 3D bioprinted trophoblast organoids

Pre-eclampsia is a serious complication that occurs after 20 weeks of pregnancy affecting hundreds of

thousands of women every year. Researchers believe the condition is caused by dysfunction in the placenta, its underlying causes remain poorly understood. Trophoblast cells form the outer layer of the early stage embryo placenta, providing lots of nutrients for the growing baby.

The creation of a 3D cell culture of trophoblasts to stimulate the *in vitro* environment of the placenta is key in studying pre-eclampsia. The RASTRUM™ Platform can produce high-quality trophoblast organoids simply, reproducibly and at low cost to investigate disease progression of pre-eclampsia. By leveraging the combination of 3D cell culture technology and high content analysis, a 3D placenta model for pre-eclampsia was developed.

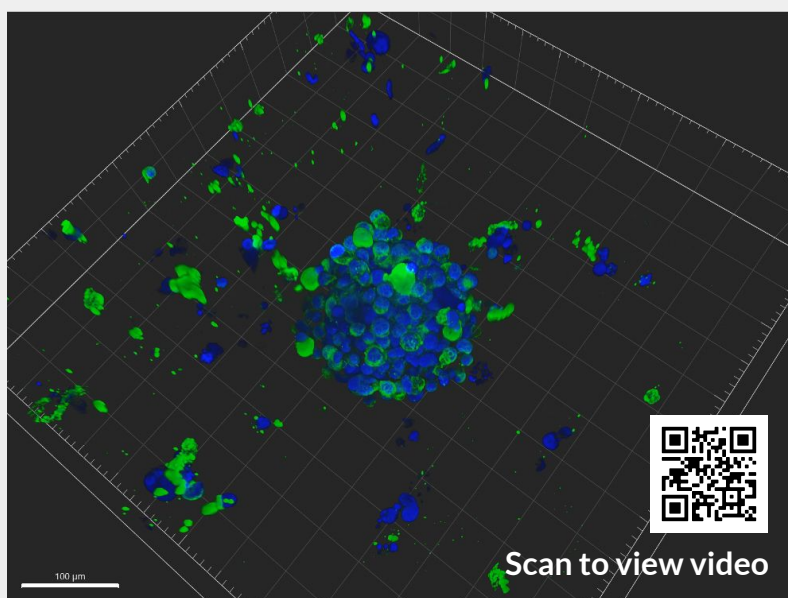
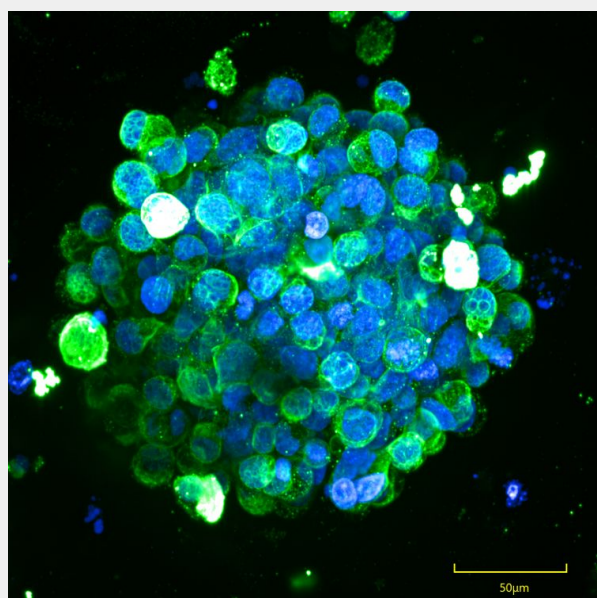


Figure 1. 3D image and rendered movie of RASTRUM™ bioprinted trophoblast organoids.

Sample Conditions: Trophoblast organoid stained with intercellular junction marker E-cadherin (green), DAPI (blue) generated by the McClements group from the University of Technology Sydney.

Acquisition Conditions: Images acquired on the Yokogawa CV8000 with objective lens of 20x water and Z-range of 100-130 μm (depending on organoid size).

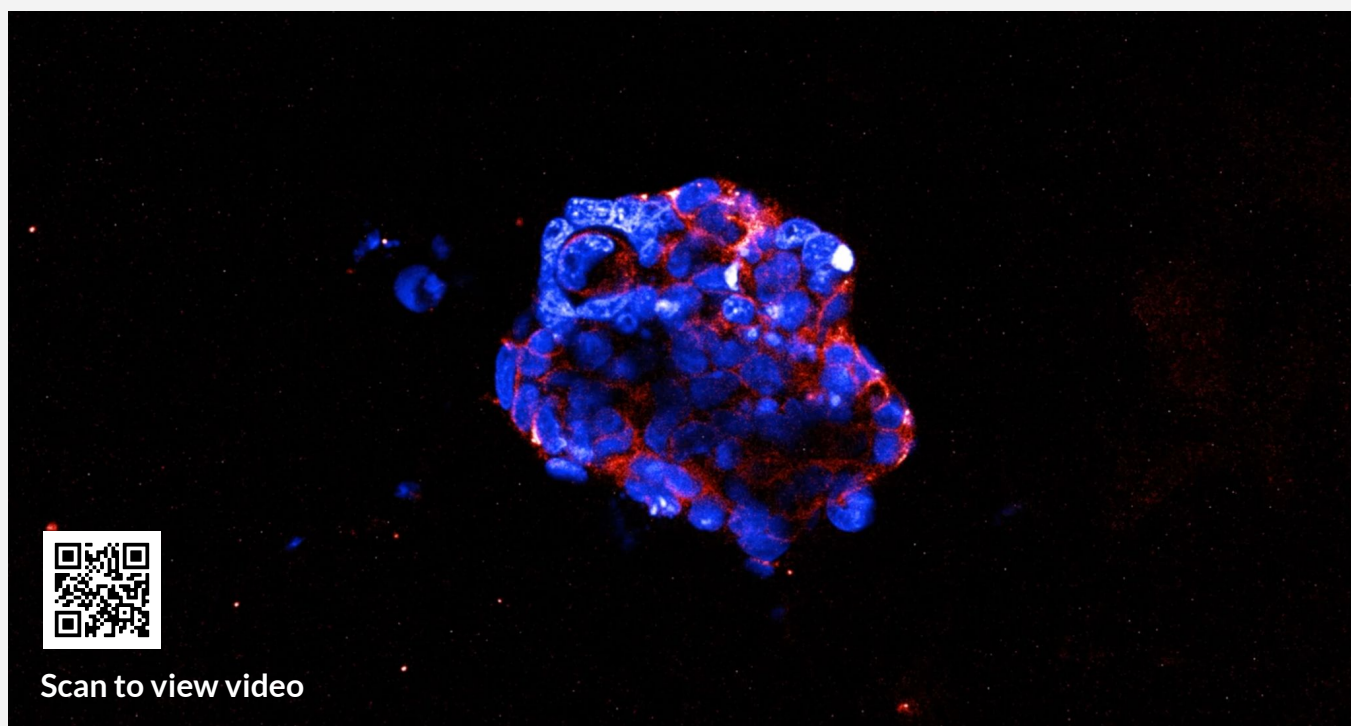


Figure 2. Z-slice movie of RASTRUM™ bioprinted trophoblast organoids.

Sample Conditions: Trophoblast organoid stained with a biomarker for detection of pregnancy, Beta human chorionic gonadotropin (B-hCG) (red) and DAPI (blue) generated by the McClements group from the University of Technology Sydney.

Acquisition Conditions: Images acquired on the Yokogawa CV8000 with objective lens of 20x water and Z-range of 100-130 um (depending on organoid size).

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Product Information

RASTRUM™ 3D Cell Culture Platform

RASTRUM™ is the world's first high-throughput and automated 3D cell culture platform that has been designed specifically for cell biology. RASTRUM™ combines drop-on-demand bioprinting technology with proprietary, synthetic hydrogel matrices to enable the creation of matrix-embedded 3D cell cultures in a simple and reproducible manner.



YOKOGAWA

Product Information

CellVoyager CV8000 High-Content Analysis System

The CellVoyager CV8000 is a high-end, high content analysis system. The CV8000 features a cell incubator with an improved airtight design that facilitates the observation of cell behaviour over long periods of time.

