VoxCell

The principle

The VoxCell interdisciplinary facility combines a Microfluidics technique with Biology to generate organoids and spheroids, or more generally 3D cell mono- or co-cultures.

The 'Cellular Capsule Technology' working principle starts with co-extruding a cell suspension and a polymer solution. By contacting a calcium bath, the polymer solution undergoes gelation resulting in cell-laden spherical and hollow capsules. The capsule is permeable to nutrients and favours the 3D assembly and self-organisation of the tissue or tumour microenvironment.

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Where?

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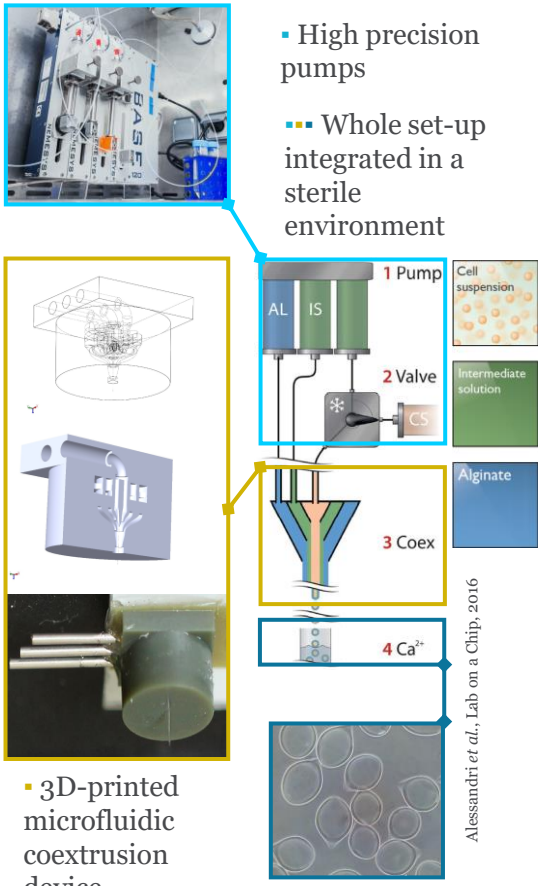
The 'Cellular Capsule Technology'

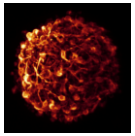
Encapsulation Set-up

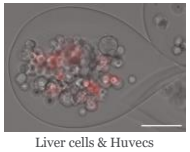
Production of thousands of submillimetric droplets filled with a cell suspension.
Size, thickness and content are tuneable

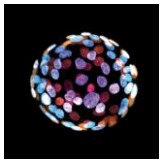


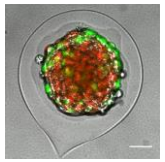
- High precision pumps
- Whole set-up integrated in a sterile environment
- 3D-printed microfluidic coextrusion device
- 5000 caps.sec^{-1}

Co-encapsulation of a great diversity of cells and matrix in capsules


TH neurons


Liver cells & Huvecs


3D Nuclear Staining

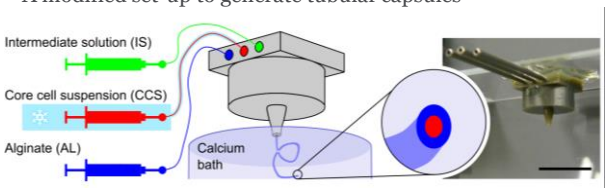

Preadipocytes

- Various types of cells, & possibility of mixing them
  Lymphoma cells, stromal cells, endothelial cells, smooth muscle cells, liver cells, preadipocytes, stem cells, fibroblasts, ...
- Diversity of matrixes
  Matrigel, GelTrex, Collagen, Fibronectin, Laminin...

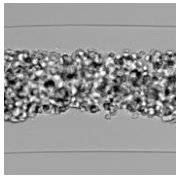
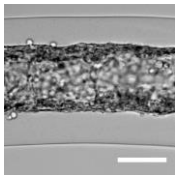
Credits: unpublished data from collaborations with IMN & U1312 Bordeaux

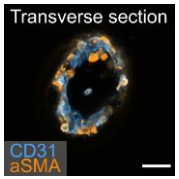
Tubular capsules to generate hollow or solid cell rods

- A modified set-up to generate tubular capsules



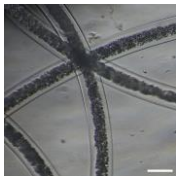
- Hollow tubes: ex: Artificial vessels

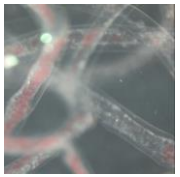


Endothelial & smooth muscle cells



Andrique *et al.*, Sci Adv, 2019

- Solid cell tubes


Liver cells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