BioMEMS – Integrative bio-engineering

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iPS-derived hepatocytes in a microfluidic bioreactor

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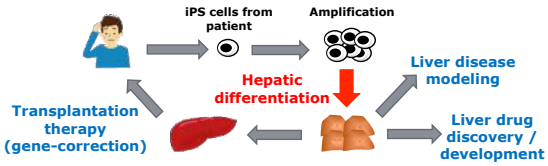
Keywords: **iPS, liver-on-chip, drug screening**

Context



iPS potential applications

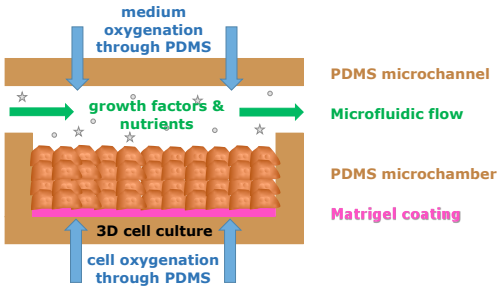
Overall goal: iPS therapeutic strategy against liver failure

Status of consensus problems:

- differentiation protocols not optimized
- primitiveness of hepatocytes
- protocols still expensive

Objectives

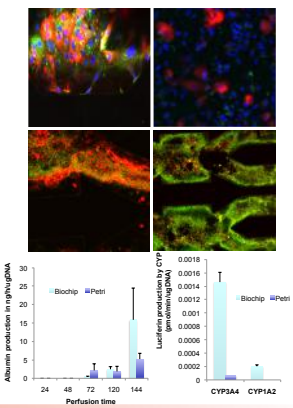
- To develop a microfluidic PDMS bioreactor suitable for iPS-derived hepatocyte culture under dynamic perfusion
- To optimize hepatic differentiation protocol
- To apply the model to epigenetic study and drug screening



Culture on-chip principle

Preliminary results

- Multicellular liver tissue on-chip: successful hepatic differentiation; hepatic, endothelial and biliary-like cells
- Hepatic biomarker expression on-chip: CYP1A2 and 3A4 positive detection
- Functional tissue on-chip: higher albumin production and higher CYP3A4 activity when compared to 2D Petri cultures



Perspectives

- Improvement of the hepatic differentiation protocol
- Application of the model to epigenetic study and/or drug screening

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