Mouse in-vitro spermatogenesis on alginate-based 3D bioprinted constructs

Commonly used acronym: IVS

SCOPE OF THE METHOD

<table>
<thead>
<tr>
<th>Alternative method relates to</th>
<th>Animal health, Human health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative method is situated in</td>
<td>Basic Research</td>
</tr>
<tr>
<td>Type of alternative method</td>
<td>In vitro - Ex vivo</td>
</tr>
<tr>
<td>This method makes use of</td>
<td>Animal derived cells / tissues / organs</td>
</tr>
<tr>
<td>Species from which cells/tissues/organs are derived</td>
<td>Mouse</td>
</tr>
<tr>
<td>Type of cells/tissues/organs</td>
<td>Testis</td>
</tr>
</tbody>
</table>

DESCRIPTION

Method keywords
3D in vitro model
3D bioprinting
organoid culture
microscaffolds
extrusion-based 3D printing

Scientific area keywords
Method description

Studying spermatogenesis *in situ* has led to the understanding that the 3D reorganization of testicular cells into an interstitial and tubular compartment is of enormous importance for germ cell differentiation. We will rely on 3D bioprinting technology which gives control over cell deposition and scaffold design, to recreate the compartmentalization of the testis *in vitro*. Testicular constructs will be produced by culturing epithelial testicular cell fractions in the macropores of bioprinted interstitial cell-laden scaffolds. We expect these biomimetic scaffolds will also support differentiation of human germ cells.

Lab equipment

Extrusion-based 3D printer;
Air compressor;
Hydrogel;
Fluorescence activated cell sorter or magnetic activated cell sorter;
Fluorescence microscope.

Method status

Still in development
Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages
Allows manipulation of cell suspensions before culture to help understand the many mechanisms controlling testicular physiology and spermatogenesis, but also to discover new clinical targets.

**Challenges**

Requires high cell concentrations;
Lack of bioactivity or biocompatibility of the hydrogel;
Uncertainty related to the medium ingredients that drive testicular morphogenesis and spermatogenesis.

**Modifications**

Use of higher cell concentrations;
Use of alternative hydrogels;
Optimisation culture medium.

**Future & Other applications**

Tool to study testicular physiology through cell manipulation or gene editing;
*In vitro* derived sperm of prepubertal cancer patients and adult non-obstructive patients can be used to generate offspring through assisted reproduction;
Cell therapy;
Following the incorporation into multi-organs microfluidic devices, the constructs can serve as a high-throughput screening assay in preclinical tests.

**REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION**

**References**


**Associated documents**

[Baert_2019_Biofabrication.pdf](Baert_2019_Biofabrication.pdf)

**PARTNERS AND COLLABORATIONS**

**Organisation**
Name of the organisation: Vrije Universiteit Brussel
Department: Medicine and Pharmacy
Country: Belgium
Geographical Area: Brussels Region

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