Generation of Hepatic Stellate Cells from Human Pluripotent Stem for in vitro liver fibrosis studies

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Country Belgium
Geographical Area Brussels Region

Partners and collaborations
Katholieke Universiteit Leuven (KUL)

SCOPE OF THE METHOD

<table>
<thead>
<tr>
<th>The Method relates to</th>
<th>Human health</th>
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<tbody>
<tr>
<td>The Method is situated in</td>
<td>Basic Research, Translational - Applied Research</td>
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<tr>
<td>Type of method</td>
<td>In vitro - Ex vivo</td>
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<tr>
<td>Specify the type of cells/tissues/organs</td>
<td>Non-tumor liver tissue, Non-tumor cirrhotic liver tissue</td>
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</tbody>
</table>

DESCRIPTION

Method keywords
Pluripotent stem cells
Hepatic stellate cells
organoids
Liver spheroids
In vitro liver model
Non-parenchymal cells
HepaRG

Scientific area keywords
Liver fibrosis
Disease modelling
Toxicity assessment
hepatocytes

Method description
We established a protocol to efficiently generate hepatic stellate cells (HSCs) from human pluripotent stem cells (PSCs). Our procedure generated complex in vitro spheroid cultures that better mimic the complexity of the liver as well as liver function. In co-culture, iPSC-HSCs promote maintenance of hepatocyte metabolic functionality while being able to respond to hepatocyte-mediated toxicity, activating and promoting intra-spheroid fibrogenesis, one of the main drug-associated adverse liver outcomes. iPSC-HSCs display functional and phenotypic features of human primary cultured HSCs, indicating that they may be a highly suitable cell source of human HSCs for culture-based studies.

Lab equipment
- Incubator,
- Cell culture hood,
- Flow cytometer,
- Laser Scanning Confocal microscope.

Method status
Published in peer reviewed journal
PROS, CONS & FUTURE POTENTIAL

Advantages
- Protocol is highly robust,
- Yields 70%–80% iPSC-HSCs,
- Highly reproducible.

Challenges
In 2D the responsive of iPSC-HSCs to external signals is rather limited. Thus far, the method has been used successfully in 3 different institutes using 3 different hESC/hiPSC cell lines, but more should be tested.

Modifications
Higher throughput and better quality control for the different stages of hiPSC to HSC differentiations.

Future & Other applications
Can be used for several applications, such as developmental studies, fibrosis modeling, drug screening, liver spheroid generation, and, eventually, regenerative medicine.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

References

Links
Liver cell biology research group