In vitro endothelial spheroid sprouting assay for angiogenesis


Contact person

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Organisation

Name of the organisation: Ghent University (UGent)
Department: Morphology
Country: Belgium
Geographical Area: Flemish Region

SCOPE OF THE METHOD

<table>
<thead>
<tr>
<th>The Method relates to</th>
<th>Animal health, Human health</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Method is situated in</td>
<td>Basic Research</td>
</tr>
<tr>
<td>Type of method</td>
<td>In vitro - Ex vivo</td>
</tr>
<tr>
<td>Species from which cells/tissues/organs are derived</td>
<td>Human</td>
</tr>
<tr>
<td>Type of cells/tissues/organs</td>
<td>endothelial</td>
</tr>
</tbody>
</table>

DESCRIPTION

Method keywords

collagen
endothelial
Sprouting spheroids

Scientific area keywords

angiogenesis
tip cell
endothelial sprouts
sprouting angiogenesis

Method description

This method evaluates sprouting propensity of endothelial cells in a collagen matrix. The effect of pro-angiogenic growth factors or co-cultured cells can be measured by quantifying the amount of vascular sprouts that form on endothelial spheroids. Endothelial spheroids are obtained by growing endothelial cells in hanging drops, which forces the cells to adhere to each other. The peripheral cells acquire a flat phenotype, similar to the flattened endothelial wall of blood vessels. After generation of the spheroids, they are embedded in a collagen matrix in which endothelial growth factors or specific cell types can be embedded. Finally the amount of endothelial sprouts is quantified as a measure of the endothelial sprouting propensity.

Lab equipment

Biosafety cabinet;
CO2 incubator;
Inverted microscope.

Method status

Internally validated

PROS, CONS & FUTURE POTENTIAL

Advantages

The method is simple and the vascular sprouts share multiple morphological characteristics of vascular tip cells in vivo.
Challenges
The model is limited to evaluating sprout propensity, which is only the first step in the angiogenic cascade. The subsequent steps of tubule and network formation cannot be evaluated.

Modifications
Spheroids can also be made from a mix of cells. We have performed this with hepatic cancer cells and this lead to a core of cancer cells surrounded by a flattened endothelial layer, similar to an inside out blood vessel.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

References

Links
An alternative spheroid sprouting protocol