Mouse retinal explants

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Organisation

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Department Biology

Country Belgium

Geographical Area Flemish Region

SCOPE OF THE METHOD

The Method relates to	Animal health
The Method is situated in	Basic Research
Type of method	In vitro - Ex vivo
Species from which cells/tissues/organs are derived	Mouse (mus musculus)
Type of cells/tissues/organs	Retina

DESCRIPTION

Method keywords

Tissue explant

retina

neurite outgrowth

immunohistochemical staining

automated morphometric analysis

preserving cell-to-cell interaction

Scientific area keywords

axonal regeneration
neurodegeneration
retinal differentation

Method description

Organotypical culture models, such as retinal explants, is an ideal alternative for *in vitro* retinal cell cultures and preclinical animal models, as they provide the necessary compromise between these two model systems. The major advantage of explant cultures is that cells are kept within their normal environment, thereby preserving cell-to-cell interactions, while maintaining a higher level of experimental control as in animal models. Organotypic cultures thereby provide an ideal platform for the identification and validation of novel neuroprotective or pro-regenerative substances. As retinal explants have previously been used to study various neural processes such as neurodegeneration and neurite outgrowth, they provide an ideal *ex vivo* system to screen promising molecules in an *in vivo*-like situation. This technique includes retinal explant dissection, culture, immunostaining, and automated analysis methods using ImageJ.

Lab equipment

Dissection microscope with light source ;
Horizontal laminar flow ;
Dissection material ;
Incubator ;
Confocal microscope.

Method status

Internally validated
Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

The major advantage of explant cultures is that cells are kept within their normal environment, thereby preserving cell-to-cell interactions. They provide an ideal *ex vivo* system to screen promising molecules.

Challenges

No time-lapse experiments no objective distinction can be made between glial and neuronal processes, which may result in a false representation of neurite outgrowth.

Modifications

Transgenic animals, that express a fluorescent protein in RGC axons, such as the thy1-YFP mice might allow for time-lapse experiments.

Future & Other applications

In diabetic retinopathy, the retinal explants will be used to test compounds known to be involved in developing perivascular membranes.
Ideal technique for screening potential regenerative molecules, both in mouse and zebrafish models.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

References

BOLLAERTS, I., VAN HOUCKE, J., ANDRIES, L., DE GROEF, L. & MOONS, L. 2017. Neuroinflammation as Fuel for Axonal Regeneration in the Injured Vertebrate Central Nervous System. Mediators Inflamm, 2017, 9478542.
BUYENS, T., GAUBLOMME, D., VAN HOVE, I., DE GROEF, L. & MOONS, L. 2014. Quantitative assessment of neurite outgrowth in mouse retinal explants. Methods Mol Biol, 1162, 57-71. GAUBLOMME, D., BUYENS, T. & MOONS, L. 2013. Automated analysis of neurite outgrowth in mouse retinal explants. J Biomol Screen, 18, 534-43.

Associated documents

Protocol P3 retinal explants.pdf

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