Mouse pituitary-derived organoid model to study pituitary stem cell biology

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Organisation

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SCOPE OF THE METHOD

The Method relates to	Animal health, Human health
The Method is situated in	Basic Research, Translational - Applied Research
Type of method	In vitro - Ex vivo
Species from which cells/tissues/organs are derived	Mice
Type of cells/tissues/organs	Pituitary

DESCRIPTION

Method keywords

Organoid model
Pituitary stem cells
SOX2
WNT pathway

Scientific area keywords

Pituitary homeostasis
Pituitary plasticity
Pituitary disease
Endocrine cells
Hormonal cell differentiation
Pituitary stem cell biology

Method description

We have established organoids from mouse pituitary with the aim to generate a novel research model to study pituitary stem cell biology in both healthy and diseased glands. The organoids originated from the pituitary cells expressing the stem cell marker SOX2, were long-term expandable, displayed a stemness phenotype during expansive culture and showed specific hormonal differentiation ability, although still limited, after subrenal transplantation. Application of the protocol to transgenically injured pituitary harboring an activated stem cell population, resulted in more numerous organoids, thus reproducing the activated stem cell state. Organoid characterization further exposed facets of regulatory pathways of the stem cells of the pituitary and advanced new injury-activated markers.

Lab equipment

- Cell incubator ;
- Biosafety cabinet ;
- Cell culture ;
- Epifluorescence ;
- Confocal microscopes.

Method status

Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

Pituitary-derived organoids provide faithful and expandable *in vitro* models to scrutinize pituitary stem cell biology and activation in health and disease (such as hypopituitarism and tumorigenesis).

Challenges

Differentiation capacity of the pituitary stem cells in the organoid model still remain limited (but may represent natural behaviour).

Modifications

Typical organoids reproduce the epithelial compartment of a tissue. Developing more complex organoid systems containing other cell tissue types will further advance the model.

Future & Other applications

Further optimization of the expandability and differentiation efficiency of the organoids will allow to search for cellular and molecular pathways underlying pituitary regeneration to eventually identify potential regenerative paths and to *in vitro* model pituitary tissue as well as pituitary disease.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

References

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human endometrium showing endometrial epithelium physiology and long-term expandability. Development 1441775–1786. (doi.org/10.1242/dev.148478)

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