

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

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## Organisation

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**Department** Development and Regeneration

**Country** Belgium

**Geographical Area** Flemish Region

## SCOPE OF THE METHOD

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

Cox B., Laporte E., Vennekens A., Kobayashi H., Nys C., Van Zundert I., Uji-i H., Vercauteren Drubbel A., Beck B., Roose H., Boretto M., and Vankelecom H. Organoids from pituitary as a novel research model toward pituitary stem cell exploration. *Journal of Endocrinology*. Volume 240: Issue 2 P 287–308 (2019) [doi.org/10.1530/JOE-18-0462](https://doi.org/10.1530/JOE-18-0462)

Boretto M, Cox B, Noben M, Hendriks N, Fassbender A, Roose H, Amant F, Timmerman D, Tomassetti C, Vanhie A, et al. 2017 Development of organoids from mouse and human endometrium showing endometrial epithelium physiology and long-term expandability. *Development* 144:1775–1786. (doi.org/10.1242/dev.148478)

## Links

[prof. dr. Hugo Vankelecom, Department of Development and Regeneration, Cluster](#)

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