

# Ovarian cancer-derived organoid models for experimental and preclinical studies

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## Organisation

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**Country** Belgium

**Geographical Area** Flemish Region

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Human health
<b>The Method is situated in</b>	Basic Research, Translational - Applied Research
<b>Type of method</b>	In vitro - Ex vivo
<b>Specify the type of cells/tissues/organs</b>	ovarian cancer tissues

## DESCRIPTION

### Method keywords

organoids

Preclinical study models

drug screening

Neuregulin-1

High-grade serous ovarian cancer

### **Scientific area keywords**

Disease modeling

Ovarian cancer

Experimental model

Preclinical model

Tumour-derived

Organoid biobank.

### **Method description**

We have established organoid cultures from patient-derived ovarian cancer (OC), in particular from the most prevalent high-grade serous ovarian cancer (HGSOC). Testing multiple culture medium components identified neuregulin-1 (NRG1) as key factor in maximizing OC organoid development and growth, although overall derivation efficiency remained moderate (36% for HGSOC patients, 44% for all patients together). Established organoid lines showed patient tumor-dependent morphology and disease characteristics, and recapitulated the parent tumor's marker expression and mutational landscape. Moreover, the organoids displayed tumor-specific sensitivity to clinical HGSOC chemotherapeutic drugs. Patient-derived OC organoids provide powerful tools for the study of the cancer's pathobiology (such as importance of the NRG1/ERBB pathway) as well as advanced preclinical tools for (personalized) drug screening and discovery.

### **Lab equipment**

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

### **Method status**

Published in peer reviewed journal

## **PROS, CONS & FUTURE POTENTIAL**

### **Advantages**

- Established epithelial OC-derived organoids capture disease cellular characteristics and molecular phenotype.
- Epithelial OC-derived organoids are amenable to drug screening and show differential sensitivity of individual patient organoid lines to the chemotherapeutic agents tested.
- Organoids are state-of-the-art research models that bridge the gap between bench and bedside, more reliably than animal models do, and may thus in the future gradually substitute for the latter.

### **Challenges**

Typical organoids reproduce the epithelial compartment of a (diseased) tissue. Hence, more advanced models, also incorporating other cells (such as stromal, endothelial and immune cells), are still needed to fully replicate the original tissue.

### **Modifications**

More studies are required to enhance the derivation efficiency (as is also true for other cancer-derived organoids). Developing more complex organoid models containing the different cell types of a tissue.

### **Future & Other applications**

- Epithelial OC organoid models can be highly instrumental in moving into the field of immunotherapy (e.g., using CAR-T and natural killer cells).
- Since organoids are typically composed of the epithelial compartment of the original tissue, further perfecting the model by adding stromal and immune components of the tumor/tissue microenvironment will eventually be needed to reach the organoid model's full potential.

- Strong potential as an experimental and preclinical research model, and in particular as impetus to revive NRG1/ERBB research in OC, which may eventually identify response-predictive biomarkers, assist in clinical decision making, and provide personalized therapeutic options, particularly for patients in whom standard clinical routes have been exhausted.

## REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

### References

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