

# Human Intestinal Organoid as model for Alcohol Use Disorder (AUD)

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## 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>This method makes use of</b>	Human derived cells / tissues / organs
<b>Specify the type of cells/tissues/organs</b>	Human Intestinal Organoid

## DESCRIPTION

### Method keywords

Human Intestinal Organoid

Gut epithelium Organoid

## **Scientific area keywords**

Alcohol Use Disorder (AUD)

Human Stem cells

Gastro-enterology

## **Method description**

More than 3 million deaths worldwide are linked to excessive alcohol consumption. Alcohol abuse associated gut barrier dysfunction is thought to play an important role in the development of alcohol-associated liver disease. Although some aspects that contribute to this process have been elucidated, the role of intestinal epithelium, a major component of the gut barrier, and its alterations in gut barrier failure in Alcohol Use Disorder (AUD) remain poorly understood. Our preliminary data on duodenal epithelium in humans showed a disturbed proliferation-differentiation process in AUD patients. In this project, Intestinal Organoids (Enteroids) are used to model this disease. The Enteroids are generated from crypts originating from control and patient's duodenum biopsies. Interestingly, they are able to grow, differentiate and later display crypt and villi architecture mimicking *in vivo* condition. In addition, they keep their host phenotype in culture during first passages allowing us to study the different alterations occurring in the host epithelium. Moreover, we could determine the gene expression of differentiated epithelial cells represented in the model.

## **Lab equipment**

Cell culture incubator, Laminar Flow, Hood.

## **Method status**

Still in development

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

### **Advantages**

Intestinal organoids recapitulate more closely the *in vivo* architecture and can reproduce some special functions for instance mucus production. They keep their host phenotype which is a major advantage in studying and understanding a disease.

### **Challenges**

Time is a limiting factor since Intestinal Organoids grow and differentiate in two weeks. Additionally, the phenotype is lost after several passages.

### **Future & Other applications**

Human Intestinal Organoid can be used to study Microbiota and the Intestinal Epithelium interactions. Colon Organoids could be used to study Crohn's disease.

## **REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION**

### **References**

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Lin M, Hartl K, Heuberger J, et al. Establishment of gastrointestinal assembloids to study the interplay between epithelial crypts and their mesenchymal niche. *Nat Commun.* 2023. 14(1):3025. DOI:10.1038/s41467-023-38780-3

Qu M, Xiong L, Lyu Y, et al. Establishment of intestinal organoid cultures modeling injury-associated epithelial regeneration. *Cell Res.* 2021. 31(3):259-271.

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## Associated documents

### PARTNERS AND COLLABORATIONS

#### Organisation

**Name of the organisation** Université Catholique de Louvain (UCL)

**Department** GAEN/IREC

**Specific Research Group or Service** GAEN

**Country** Belgium

Brussels Region

**Geographical Area** Walloon

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