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

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Organisation

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Department GAEN/IREC

Specific Research Group or Service GAEN

Country Belgium

Partners and collaborations

Université Catholique de Louvain (UCL), Cliniques universitaires Saint-Luc

SCOPE OF THE METHOD

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

Internally validated

Published in peer reviewed journal

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. DOI:10.1038/s41422-020-00453-x

Associated documents

3D_fluorescence_staining_and_confocal_imaging_of_l (1).pdf

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