

Development of a human 3D biomimetic intestinal in vitro model using digital light processing and gelatin-based biomaterial inks

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Organisation

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SCOPE OF THE METHOD

The Method relates to	Human health
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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	Human
Type of cells/tissues/organs	Intestinal epithelial cells

DESCRIPTION

Method keywords

3D bioprinting

epithelium

Gelatin

Scientific area keywords

inflammatory bowel disease

digital light processing

Method description

Gelatin-methacryloyl-aminoethyl-methacrylate (gel-MA-AEMA)-, and gelatin-methacryloyl-norbornene (gel-MA-NB)-based biomaterial inks fabricated into 3D hydrogels (“villi only” versus “crypts and villi”) with digital light processing and co-cultured Caco-2/HT29-MTX cells.

Lab equipment

- Printer (CellInk LumenX+)
- Standard cell culture equipment

Method status

Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

- Intestinal epithelial cells have more enhanced functional barrier formation and enterocyte differentiation.
- Biocompatibility of the material.

Modifications

- Inclusion of primary cells such as gut organoids.
- Addition of the 3D structures in millifluidics system, adding relevant shear stress to the cells.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

References

Maes L, Szabó A, Van Haevermaete J, Geurs I, Dewettinck K, Vandenbroucke RE, Van Vlierberghe S, Laukens D. Digital light processing of photo-crosslinkable gelatin to create biomimetic 3D constructs serving small intestinal tissue regeneration. *Biomater Adv.* 2025 Jun;171:214232.

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