UC-related and segment-specific properties of patient-derived colonic organoids.

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Inflammation environment can modify epithelial cell gene expressions in IBD patients.

To what extent do the patient-derived organoids generated from different colonic segments exhibit disease-specific phenotypes?


Suzuki, et.al, *Journal of Gastroenterology*, 2018

**Non-IBD**

**CD remission**

**CD active**

Suzuki K et al, *J Gastroenterol*, 2018

Control

CD remission

CD active

Organoid Reforming Efficiency

Number of formed organoids

0 100 200 300 400

ns ns ns ns ns ns ns ns

** forbidden area **

** forbidden area **

** forbidden area **
Conducting gene expression analysis and proliferation efficiency analysis using organoids

Organoid Culture

Microfluid-based Single-cell qPCR

Gene Expression Profile

3D scanner-assisted Organoid formation assay

Scan

Auto-recognition


Total: 55 colonic organoids
Single-cell gene expression data of ISC-marker genes revealed indistinguishable expression pattern in UC and non-IBD patients.

DNA microarray

Single-cell qPCR

**Stem cell genes**
- LGR5, Olfm4, Smoc2, Prom1, MYC, Msi1, Bmi1, ASCL2, Hopx, LRIG1, Slc12a2, KCNQ1

**PCA**

**Violin plot**

- Ascending colon
  - (15 genes: Slc2A3, Slc3A1, ESRPG, ANKRD1…),
- Transverse colon
  - (5 genes),
- Sigmoid colon
  - (3 genes)
- Rectum
  - (5 genes).
Ascending colon organoids of UC patients exhibited higher proliferation efficiency compared to the rectum.
Colonic organoids established from the ascending colon of UC patients maintain high in vitro proliferation potential compared to those established from the rectum.

Results suggest colonic segment-specific modification of colonocyte function in UC patients, which may be further revealed by deeper gene expression analysis of our patient-derived organoid library.