Patient derived tumoroid to model rectal cancer under radiotherapy in a microphysiological system

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Organisation

Name of the organisation Belgian Nuclear Research Centre
Country Belgium
Geographical Area Flemish Region

SCOPE OF THE METHOD

The Method relates to	Human health
The Method is situated in	Translational - Applied Research
Type of method	In vitro - Ex vivo
Specify the type of cells/tissues/organs	Patient derived rectal tumor organoid

DESCRIPTION

Method keywords

colorectal
cancer
Microphysiological systems
Gut epithelium Organoid

Scientific area keywords

Radiotherapy
in vitro
probiotics
inflammation
cytotoxicity
cancer treatment
Disease modelling

Method description

Colorectal cancer is the third most prevalent cancer worldwide, with radiotherapy being a common treatment. Existing models of the gastrointestinal tract, including mouse and 2D immortalized human cell culture models, lack the combination of human representability and radiotoxicity. This study seeks to develop a human *in vitro* rectal cancer model

representing radiotherapy treatment, using patient-derived tumor organoids to form monolayers. The anticipated cellular heterogeneity of organoid allows for a closer representation of the rectal physiology specificity and enables disease modeling. To give access to both the apical and basolateral sides and to enable integration into a mesofluidic microphysiological system (MPS) monolayers are seeded from the tumor organoid culture. This allows culturing in continuously perfused wells, recreating shear forces at play between the rectal tissue and the lumen. The monolayers are put under a radiotherapy set up, modelling fragmented irradiations.

Lab equipment

- Cell culture facility
- CN Bio Physiomimix OOCMicrophysiological system

Method status

Still in development

PROS, CONS & FUTURE POTENTIAL

Advantages

Beyond giving insight into radiotoxicity mechanisms, this model provides a platform for deeper understanding of underlying biological mechanisms of rectal cancer. The aim is to bridge the gap between laboratory work and clinical treatment, addressing the lack of human representability to ultimately improve patients' quality of life.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

Links

Human Intestinal Organoids and Microphysiological Systems for Modeling Radiotox…

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