SPECIAL SEMINAR

‘Organoids to model human disease’

Hans Clevers, MD-PhD

Global Head of Pharma Research and Early Development at Roche,

Basel, Switzerland

Date: Oct. 6 (Fri) 2023

Time: 3 pm – 4 pm

Venue: Taniguchi Memorial Hall

Chair: Shigekazu Nagata (Biochemistry & Immunology, IFReC)

*A credit seminar for the Graduate School of Medicine and the Graduate School of Frontier Biosciences

Dr. Hans Clevers, a pioneer in organoids research is a member of the Royal Dutch Academy of Sciences, the National Academy of Science, USA, the Academy of Science in France and the Royal Society in UK. From 2022, Dr. Clevers has been a head of the Roche Pharma Research and Early Development, and became a member of the Corporate Executive Committee at Roche in Basel, Switzerland. He is leading research into the development of drugs for a wide variety of diseases.

ABSTRACT - The intestinal epithelium is the most rapidly self-renewing tissue in adult mammals. We originally found that Lgr5+ve crypt base columnar cells (CBC) generated all epithelial lineages throughout life, implying that they represent the stem cell of the small intestine and colon. Lgr5 was subsequently found by us to represent an exquisitely specific, yet 'generic' marker for active epithelial stem cells, including in hair follicles, kidney, liver, mammary gland, inner ear, tongue and stomach epithelium.

Single sorted Lgr5+ve stem cells can initiate ever-expanding organoids in the lab. These organoids recapitulate key aspects of the organ from which the stem cells were taken. 3D organoids have been developed for the Lgr5+ve stem cells of human stomach, liver, pancreas, prostate, kidney, breast and many others. Using CRISPR/Cas9 technology, genes can be efficiently modified in these organoids . Organoid technology opens avenues for the study of development, physiology and disease, for drug development and for personalized medicine. In the long run, cultured mini-organs may replace transplant organs from donors and hold promise in gene therapy.