BrainKorea FOUR 21 Mechanical Eng. SEMINAR

# Liver Organoid Platform for Disease Modeling and Safety Assessment

SPEAKER Dr. Myungjin Son (Korea Research Institute of Bioscience and Biotechnology)

DATE Thursday, Mar. 21, 2024 (4:00p.m.- )

CONTACT Prof. Dongsung Kim(279-2183)

PLACE Room No.405, 4th floor at Science Bldg. V

The liver is the most important metabolic organ in the body, which is responsible for the metabolism of substances, including pharmaceuticals, industrial chemicals, pesticides, and food additives. Some of these substances or their toxic metabolite generated through the detoxification process, can lead to acute liver failure or chronic liver diseases. Drug safety issues continue to occur despite the approval of drugs following comprehensive clinical studies. Model systems that recapitulate the complex organ structure and cell compositions of the human liver are insufficient for studying liver biology and assessing the toxicity of chemicals. Conventional *in vitro* human liver models, such as two-dimensional hepatic cell lines, lack *in vivo* physiological relevance, and animal studies have limitations due to species differences and regulatory restrictions. To resolve this issue, an increasing number of three-dimensional human liver systems, including organoids, are being developed. We have successfully established self-renewing and functionally mature human pluripotent stem cell-derived liver organoids as an alternate to primary human hepatocytes. Notably, liver organoids exhibited significant toxic responses to clinically relevant concentrations of drugs that had been withdrawn from the market due to hepatotoxicity.

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Moreover, the organoids were applied to screening platforms for evalua ting drugs that target liver metabolic diseases such as steatosis, nonalco holic steatohepatitis, and cirrhosis. Disease modeling for infectious liver diseases and genetic liver diseases is also being conducted. Overall, the se liver organoids can be a practical and renewable cell source of a vers atile and valuable platform for human cell-based and personalized 3D liver model.