

Title of Research:

17_PT01-01

Chip device for in vitro systemic toxicology

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Summary of Research:

The purpose of this study is to fabricate microdevices for *in vitro* drug testing to evaluate systemic toxicity of chemicals, so-called Body on a chip. Unlike previous typical animal testing alternatives, our device may possibly enable to replicate *in vivo* kinetics and interactions between several tissues and organs including the skin, the small intestine, and the lung for drug absorption, liver and myocardial tissues for drug metabolism and exposure.

In the first year of the project, we engineered skin and small intestine tissues as cellular layers and liver tissues as spherical aggregates. Furthermore, a microdevice where these tissues were integrated and connected with micro fluidic channels was fabricated. To circulate culture medium in the microdevice, a seesaw-like bioreactor was designed, with which culture medium were perfused in the microdevice without any external pump and air pressure supply. We demonstrated that multiple tissues were formed and cultured in the microdevice on the bioreactor. Our next step is to demonstrate that our approach can be used to evaluate absorption dynamics of chemical substances passing through the skin and small intestine tissues and metabolic dynamics with the liver tissues.

Timeline:

May 1, 2017-

Topics:

Junji Fukuda, "Chip device for in vitro systemic toxicology", JCIA LRI Research Conference, Tokyo, Japan, Aug 2017

Publications:

Keito Iseki and Junji Fukuda, "Development of drug screening device using seesaw type bioreactor", 30th The Japanese Society for Alternative to Animal Experiences, Tokyo, Japan, Nov 2017