CASE STUDY

Co-production of a microfluidic device incorporating cancer tissue-originated spheroids for personalised chemotherapy.

UK PI: Professor David Jayne, University of Leeds Japan PI: Prof Masa Inoue, University of Kyoto

Academic Surgery at the University of Leeds is interested in the biology of colorectal cancer (CRC) and the development of *in vitro* CRC models. With colleagues in the Physical Sciences, we have developed microfluidic systems for testing chemotherapy regimens on our CRC models. We wished to expand our research into patient-derived CRC models, making them more clinically relevant. We reached out to Prof Masa Inoue (Masa) at the University of Kyoto, who is an international expert in the field. This was the start of a collaboration that lead to our Royal Society – JSPS Exchange award for £12K to each group.

The premise for the award was to facilitate knowledge exchange, enabling the Leeds group to gain expertise in patient-derived CRC organoid culture whilst the Kyoto group gained expertise in microfluidic systems. Ultimately, it was aimed to co-develop a CRC microfluidics organoid system to investigate personalised chemotherapy.

The project coincided with the start of the COVID pandemic, meaning that travel plans had to be curtailed with regular meetings held by video conference. Despite this, over 18-months of quarterly meetings, involving 4-5 researchers from each country, including early career researchers, we were able to gain an in-depth understanding of our mutual strengths and activities. In October 2022, the Leeds group finally got to travel to Kyoto where they spent a week in Masa's lab learning the intricacies of patient-derived organoid culture, giving guest lectures, and partaking in seminars. In July 2023, a reciprocal visit to Leeds was made by the Kyoto group when the focus was on microfluidic techniques for cancer research.

In addition to exchange of academic knowledge, there was the opportunity to share cultural experiences, with the Leeds group visiting the Golden Temple and the Kyoto group visiting the Yorkshire Dales.

We have subsequently established a microfluidics CRC organoid programme in Leeds, achieving the aims of the award. We are seeking funding to use patient specimens from our international FOxTROT clinical trials to explore personalised chemotherapy. The award has led to a joint UK-Japan application to UKRI to use our microfluidics/organoid system to test novel anti-cancer nanomedicines.

We are extremely grateful to the Royal Society and the JSPS Exchange programme for the opportunity to forge close collaborations with Kyoto researchers. This has advanced our mutual research and provided a solid platform for collaboration in the future. Ultimately, we hope that this opportunity will lead to patient benefit through personalised cancer therapy.



Leeds researchers visiting Prof Masa Inoue's lab at University of Kyoto.



Kyoto researchers experiencing the Yorkshire Dales.