

Bone Tissue Engineering *in vitro* and *in vivo* using a Novel Multilayer Cell Sheet Technology

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My Research

Our continuously ageing population suffers from bone damage caused by trauma, cancer, congenital defects or common age-associated diseases, such as osteoporosis. There is an urgent clinical need to develop alternative approaches to efficaciously repair bone due to the limitations of current available technology. Cell sheet technology was developed at TWIns and is emerging as a promising solution that is already being clinically translated in regenerative therapies for other tissue types (Figure 1). Therefore this research is working in collaboration with the pioneering research group of this technology to develop cell sheet technology for bone to meet the growing demand for bone regeneration from our ageing population.

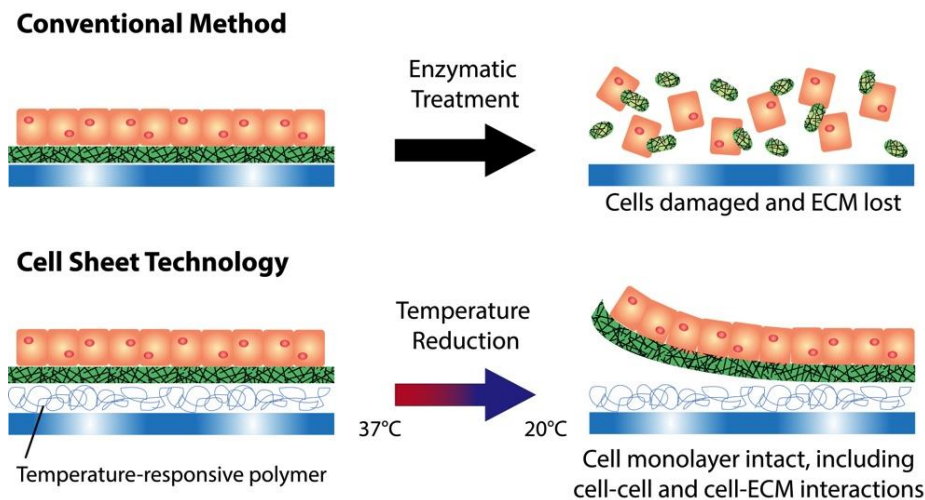


Figure 1: Advantages of multilayer cell sheet (MLCS) technology compared to conventional cell culture methods. Multilayer cell sheet (MLCS) technology provides intact monolayer sheets of confluent stem cells that can be stacked to make a 3D tissue graft. MLCS averts damage to cells and the extracellular matrix which can then be retained for clinical therapy.

The main aim of my summer research was to learn different techniques for cell sheet technology which is the key for my PhD. I was really pleased to collect good preliminary results for my PhD. It was also beneficial for me to experience research in Japan, meet and work with my collaborators, and strengthen the collaboration between our two universities. This summer fellowship was invaluable and will provide an excellent foundation of knowledge and skills for my PhD by learning first hand from the experts and pioneers of cell sheet technology.



Figure 2: Photograph of me with some of my colleagues at TWIns in the large animal surgical room.

Work in Japan

From speaking to other JSPS summer fellows, it seems like the experience of working in Japan was varied depending on your institution, lab and supervisor. Personally, I absolutely loved working at TWIns (Figure 2). Whilst Japan is renowned for their hardworking ethic, my hours were generally not too bad from 10am to about 6pm, Monday to Friday (some fellows had to work on the weekend). Plus I thought Japanese labs were really organised and had more of a community approach to research, in particular with how the lab ran and how people were really helpful in overcoming any issues that arose. Plus, the general standard of English was good so there were not any language barriers.

Life in Japan

This fellowship was not only instrumental for my research, but it has been an amazing, eye-opening cultural experience. Japanese culture is very rich and different to western culture, which has been fascinating to experience from the very traditional to the cutting-edge modern. The JSPS Summer Programme started off with a rare and untraditional cultural experience of being able to meet the Emperor and Empress of Japan, which was very special. The Japanese people are really lovely and I know I have made good friends during my time here. It was great to meet with other JSPS fellows to go to shrines, temples, festivals (祭) and to the famous Sumidagawa fireworks. I also had fun trying to learn and practice Japanese. Most Japanese people do not speak any English so you do have to make an effort to learn a few key words and useful phrases, but do not worry because the Japanese people are really nice and helpful. One of my favourite experiences was going to the Sumo Championships in Nagoya, which was a really exciting atmosphere and I would highly recommend it to everyone. After the fellowship, I would suggest in making most of the trip and extending your stay. I travelled to Okinawa, Osaka and Kyoto (definitely go to Kyoto and if you can, fly to Okinawa). Overall I absolutely loved this summer experience; it has been unforgettable and I hope I have the opportunity to return to Japan in the future. Thank you again JSPS.

My Advice

Work hard and use the research opportunity - but also play hard! Meet Japanese people, embrace the language and culture, and explore Japan!