

インターンシップ体験記 (海外インターンシップの場合は英語で記入)

The purpose of this intern was to learn how to make and culture cardiomyocytes derived from human induced pluripotent stem cells (iPSC-CMs). When a first-year student of graduate school of Frontier Biosciences (FBS), I conceived that drug screening based on iPSC-CMs in conjunction with our



Fig. A. (left) John Radcliffe Hospital. (right) Dr. Daniels and I in the White Hart pub, Oxford.

chemiluminescent voltage indicator (LOTUS-V) would be more efficiently conducted than conventional methods including microelectrode array (MEA) system. After discussion with my supervisor, he kindly introduced me to Dr. Matthew J. Daniels, who is a cardiologist in the John Radcliffe Hospital (Oxford University, UK) (Fig. A). Then, I contacted him by an e-mail to ask about a visa, accommodations and so on. It was so tough for me because I had never written an e-mail in English at that time. The email for first contact was probably confusing for him because of my poor writing skill. However, I feel that the experience communicating with him made me notice the importance of thoughtfulness especially in writing e-mail, which must be more critical than a writing skill. Anyway, a visa was not needed for this short time span (a month) and an accommodation was booked beforehand.

On the way to John Radcliffe Hospital, I also had many difficulties arising from English conversation but finally reached the lab. I would like to recommend a person who planning an intern to bring some souvenirs such as Japanese confectionery. The more unique Japanese souvenirs are, the happier the lab members must be. The lab members were so kind for me and often invited me for a lunch and coffee break. To my surprise, they frequently had a relatively long (30 – 60 min) coffee break three times a day. That was the moment I felt the differences between British and Japanese culture during my stay. Dr. Brook, one of the lab members mainly taught me the experimental procedure. Culture of induced pluripotent stem (iPS) cells was easy but induction to cardiomyocytes was a quite difficult step for me. The most critical point of this procedure is to cut the aggregates of iPS cells into the appropriate size of pieces under a microscope. Then, I spent almost all of the time to learn this delicate technique. After inducing hundreds of the pieces to differentiation, finally one of them successfully differentiated into beating cardiomyocytes. Subsequently, this aggregate of cardiomyocytes was transfer to a glass bottom dish, of which glass surface was coated by collagen and induced into a thin layer for imaging. Unfortunately, LOTUS-V expression was not obtained by lipofection and Dr. Daniels suggested me to use virus mediated induction system for a future experiment in Japan.

In addition to the experiment in John Radcliffe Hospital, I attended international conference, "Nuclear Reprogramming and the Cancer Genome" organized by Nature publishing group (Fig. B). It was amazing experience because I learned the cutting edge of research, which was different from my research background. The most memorable thing is that I could have the seminar by Sir John Bertrand Gurdon, who is a Nobel Prize winner in 2012. I was impressed his talk and couldn't stop thinking about long history of cell reprogramming. I really regretted that I couldn't talk to him in

a coffee break after his seminar though there was a chance. Anyway, I enjoyed discussion with attendees in a banquet and got a lot of encouragement from them.

While I enjoyed the research life, the stay in accommodation was actually tough for me. Although the lodging charge was reasonable, my room was too small (almost occupied by only a bed) and the bathroom was shared with guests. In addition, a guest in next room

watched football games with loud volume every night, which made me really irritated. I regretted that I booked reasonable accommodation for this intern. Many people told me that a meal in England was not tasty before my intern but food served in the hospital was actually quite delicious. Although there were a lot of unappetizing food in a supermarket, sandwiches, especially BLT, and confections were very nice. In weekends, I often walked around the city center of Oxford. As you may know, there are many tourist spots in Oxford, for example a dining room in Christ church, where the movie named "Harry Potter" series are taken. Anyway, I really enjoyed sightseeing in every weekend and experienced the atmosphere of Oxford.

The intern was over in the blink of an eye. I started up setting of culturing and imaging system of iPSC-CMs immediately after I came back to my lab. According to the suggestion, I introduced lentiviral-mediated expression system to bring on LOTUS-V expression. It actually worked well and voltage recording by LOTUS-V was successfully conducted. As expected, LOTUS-V could distinguish the difference in action potential duration upon drug addition, suggested that this imaging system can be used for high throughput drug screening. Fortunately, this result was published with Dr. Daniels as a collaborative work (Inagaki. et al. *Scientific Reports*. 2017 Feb 13;7:42398.).

Collectively, this intern gave me many important things. First, considering person's thinking and feeling is more important than grammatical and speaking skills. Second, acting actively is highly important to address new thing. Also, I felt that success in this intern gave me self-confidence against not only my research life but also my daily life. I really appreciate all of the persons who gave this wonderful opportunity to me.

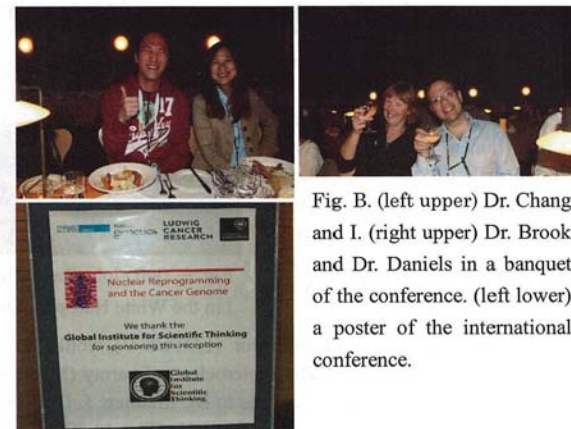


Fig. B. (left upper) Dr. Chang and I. (right upper) Dr. Brook and Dr. Daniels in a banquet of the conference. (left lower) a poster of the international conference.