

Report on MERIT Internship Program

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5th generation student of MERIT program, 2nd year Ph.D. coarse student
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Overview

From November 22nd of 2018 until December 22nd I have worked as a member of Nonequilibrium physics of living matter RIKEN Hakubi Research Team (Kawaguchi Lab.), in RIKEN Center of Biosystems Dynamics Research. Dr. Kyogo Kawaguchi, the leader of Kawaguchi Lab, got his Ph.D. degree at Sano Laboratory, where I got my master's degree. In Sano Lab, Dr. Kawaguchi and I are the only persons who study on the collective migration of neural stem cells, but we did not have a good opportunity to conduct experiments together. This program gave me the chance to have a collaboration with Dr. Kawaguchi, and that was quite opportune for me.

Contents of the research

Neural stem cells (NSCs) are known to show an elongated shape under adhesive culture. Dr. Kawaguchi reported that NSCs, under the high-density adhesive culture, align to the neighboring cells, each cell migrates toward the head or tail direction along its longer axis, and that the accumulation of cells at singularity points, which appear in the field of cellular axis orientation, occurs. Following his study, I have been studying on the force which NSCs generate under the high-density adhesive culture.

Studies on the aligned cells have revealed that the coarse-grained quantity, the orientation of the cells, is strongly related to the cellular movement, which would be basic knowledge to understand morphogenesis, homeostasis, etc. These studies lack strong link to the accumulated knowledge of molecular biology, however, because the roles of well-studied proteins, such as adhesion proteins or motor proteins, are left to be studied.

Therefore, we tried to inhibit the function of the adhesion protein in order to investigate the effect of adhesion inhibition on the collective migration of neural stem cells. We tried two different methods, the first one aimed to inhibit the adhesion of the protein using antibodies, the second one aimed to knock down the expression of adhesion protein using gene introduction. On the other hand, I set up the equipment for microfabrication.

Life in the lab.

Kawaguchi lab. has started at the beginning of last September. It had only two members except for Dr. Kawaguchi and me. However, we could use enough machines for our research, due to help from many people in RIKEN. Especially, members in the next-door lab, Miyamichi lab, kindly allowed us to use their machines.

Because of the small number of members, each member had vast area in the experimental room, so we had a large freedom to do experiment. I was able to do gene-engineering experiment which I had never done, thanks to kind instruction. Although we could not complete the gene introduction, but the experience at RIKEN confirmed that the equipment at UTokyo is enough to do the experiment again, and the knowledge was enough to design a simple experiment. The experiment which I was aiming in this internship would be done at Tokyo, of course with consulting Kawaguchi lab.

Life in Kobe

During the internship, I lived at a short stay apartment close to Boueki Center Station, which is a ten-minute walk from Sannomiya. It was so convenient to use Port Island Line to go to RIKEN BDR in the Port Island, the artificial island in the south of Kobe city. It took only twenty minutes to go to the lab from my temporal house.

In Kobe, an illumination festival, Luminarie, is held every mid-December to commemorate the victims of the Great Hanshin Earthquake. Large area between Boueki Center St. and Motomachi St, which is next to Sannomiya St, was dressed up with illumination during Luminarie. As the array of illumination ended at the park next to the apartment I lived, I enjoyed the atmosphere of the festival in the daily life, and sometimes ate the festival food.

An end-of-year party of RIKEN was held at the second last day of the internship. During the party, I met quite many people from several laboratories in RIKEN, who I had never seen in the vast institute. It was a precious time for me and would be a life asset.

Acknowledgement

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