


**Report on the short-term overseas study program
for KU Engineering students
Graduate School of Engineering, Kyoto University**

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<p>In this program, I visited Dr. Christopher C.W. Hughes' laboratory at University of California, Irvine (UCI). UCI was founded in 1965 and has more than 37,000 students. The campus is well-maintained, renovated, large, and rich in nature. Anteaters are the symbols of UCI, so I could find anteaters at any place on the campus. UCI has a variety of departments and institutes on campus. Among such departments, Hughes Laboratory belongs to the department of molecular biology and biochemistry.</p> <p>His laboratory works in the same research area as my laboratory, so the laboratory is thought of as the most suitable place for me to visit. They create vascular networks in microfluidic devices, which are created by microfabrication technologies. Using the vascular networks, they evaluate the biological features of the cells in the vascular networks, create organ or disease models and explore the application of those systems for practical usage. That is the same research I am working on in my laboratory. That is why I decided to visit his laboratory to learn about how to evaluate the cells and vascular networks and how to fabricate devices and develop vascular networks in devices. Besides, I wanted to have a lot of opportunities to discuss research and careers with graduate students and post-doctors in the laboratory.</p> <p>While I was in the laboratory, post-doctors in his lab taught me a series of experiments in the laboratory: fabricating devices, developing vascular networks, and analyzing cell properties and data. First, I learned the way to fabricate devices, which they established and utilized. In my laboratory, I have fabricated microfluidic devices. The structure and components are different from ours. Thus, I found that the way to fabricate devices differs from our ways. Some of the methods were useful and new to me. Second, they showed me how vascular networks were created in the devices. Beginning with culturing cells, they taught me the methods for loading cells and maintaining cells in the devices. I tried to load cells in the devices, but I failed in many devices even though I have the skills to load cells in our devices. I figure out that the differences in device design change the required techniques. Last, I learned the ways to analyze cells: Flow cytometry, and Single-cell RNA sequencing, which were not familiar to me. Although these techniques are famous in biological research, I</p>		 <p style="text-align: center;">Student Center in UCI A statue of anteater is put at the entrance.</p>	

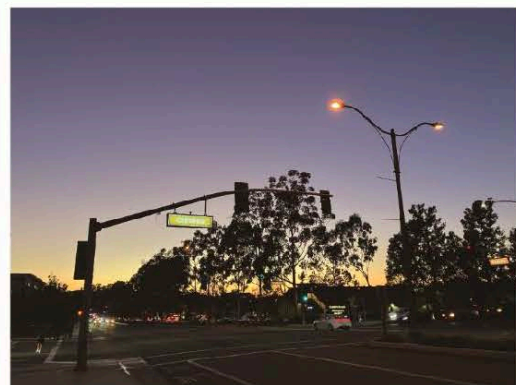
did not have opportunities to learn and use them. During this visit, the post-doctors and graduate students taught me how to prepare samples for gene or protein analysis and how to analyze data after measuring the gene or protein expression. It was fortunate that I could not only observe the experiments but also do a part of the experiments. These analytical methods can be utilized directly in my own experiments. Overall, all I learned in the laboratory must be beneficial and helpful for my research.

Additionally, two things related to work styles surprised me and had my horizons broadened. First, they were proud of their work. I was having a lot of chats with the post-doctors and graduate students while following them, I talked about careers and research lives with them. Their perspectives on their career were so clear that I could feel all of them have confidence in themselves. I thought such a mindset was important and necessary to focus on what I am doing. For example, if I had such a mindset, I would be able to focus on my research and all my studies. I respect their high motivation based on such mindsets. I would like to get such confidence by working hard and overcoming difficulties. Second, they seemed to think that their private lives were important as well as work. While they were working or researching, they highly concentrated on what they were doing. Once all they had to do on that day was finished, they returned home or left the laboratory soon. I thought I should follow their work styles. In this way, I have learned a lot about their research lifestyle as well as the research itself.

In daily life, I struggled to be familiar with a few cultures in the U.S. One thing I had difficulty getting used to was public transportation, especially buses. Public transportation is well-established, but it was not popular. Since they mainly move around by car, few people took buses and trains. Due to such low demands, buses did not come frequently. For example, buses came to bus stops once or twice an hour. If it was a holiday, the frequency was less. In big cities like Los Angeles and San Diego, I felt that buses came more often than in Irvine, but still felt it was less useful than in Japan. The other surprising thing was their developed IT systems. Basically, I did not need to use cash

when I went shopping. I could use cards or smartphones to pay in every store, restaurant, and service. It was more convenient than in Japan. In Japan, such payment styles are spreading, but the system is much less established than in the U.S. I had to get used to such an IT culture because I did not utilize the technologies so much before going to the U.S. Overall, it was a good opportunity to know such differences in daily life. During this visit, I could get accustomed to some customs, but others did not make me comfortable only for a month.

Through this experience, I could learn many new things about research, the work styles in the U.S., and their culture. In their research, I learned many new and useful methods and knowledge. I would like to make use of this knowledge in my future research life. As I mentioned before, all the methods and techniques I learned in the laboratory will help me with my research and they can be utilized directly in my experiments. In addition, I could know about the culture and customs of the laboratory and daily lives in the U.S. Now, these are familiar



Rords near to UCI
I took this picture while waiting for a bus

to me. Moreover, I could have confidence in my capability of adjusting to other cultures. I am sure that such familiarities will help me to get used to living in the U.S. immediately the next time I live there again. These experiences will encourage me to do activities in the world and have discussions with foreign researchers from all over the world. Now, I am thinking that I will make my career in not only Japan but also the U.S. or other foreign countries.