MERIT Long-term Overseas Dispatch Report

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Duration of overseas training 5/27/2018~8/6/2018

Abstract

I stayed in the state of Vermont in the USA from 2018.5.27 to 2018.8.6 and studied at Michael Previs Laboratory belonging to Molecular Physiology & Biophysics of The University of Vermont. I report background and progress of this overseas training.

Background

I am researching on the chemical and physical property of cardiac myosin filament which is contraction force generator of heart by optical tweezer. As the result, my research shows that cardiac myosin might have unique and essential property for heart function. However, cardiac myosin filament used in my research is made artificially and has different structure from native structure in heart. So we have to use native myosin filament which has native structure in heart to know relation between myosin ensemble property and heart function. But because isolation of native myosin filament requests a lot of technical skill, I could not succeed in isolation of native myosin filament by myself. Prof. Mike Previs group has established method of isolation native myosin filament from heart and by research about native myosin filament, his group has a lot of achievement in this filed.

Therefore, I have determined that our goal of oversea program is to learn the method of isolation native myosin filament.

Research Progress

Fortunately, about 1 month after overseas training started, I succeeded in learning method of isolation of native myosin filament from mouse heart (Fig. 1). During I tried to learn isolation, I made so many mistakes. But every time I made mistakes, Prof. Previs told me directly how to avoid such mistakes. I think this is the reason why I could learn isolation method in one month. To check that the myosin filament is not denature, I have searched that myosin filament has ability to interact actin filament by motility assay. As the result myosin filament slides actin filament which means that myosin filament is not denature (Fig. 2).

I was able to successfully adjust samples containing native myosin filaments under

suitable conditions to measure the properties of native myosin filaments using optical tweezers after returning to Japan. We will measure the properties of native myosin filaments using the measuring optical tweezer of Higuchi Lab.

Life in America

During overseas training, I had really great experiences which are not only science experience but also I was able to learn American culture very much. To learn different culture is also great outcome for me. For example, we watched soccer games in world cup (Fig. 3), went hiking in the mountains (Fig. 4), and participated load festival (Fig. 5). Through these experience, I learned not only science, but also how researchers think about science and how they live.

Acknowledgement

Dr. Motoshi Kaya contacted to Prof. Michael Previs and introduced me, which gave me an opportunity to contact to Prof. Michael Previs. Not only that, Dr. Motoshi Kaya financially supported me so I was able to go abroad. Prof. Michael Previs taught me about how to isolate native myosin filament and supported my life in USA. The MERIT gave me opportunity to go abroad. So I would like to thank everyone who supported this overseas training.

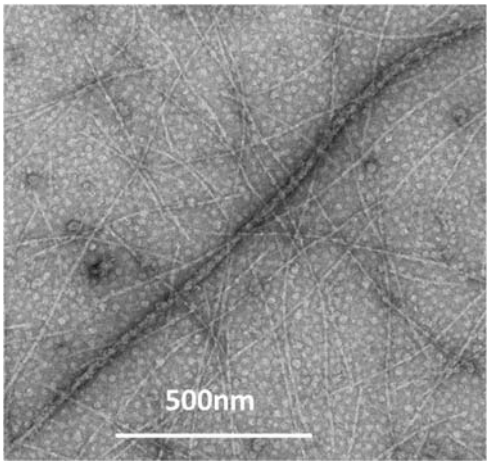

Fig. 1 Image of native myosin filament by electron] microscopy.

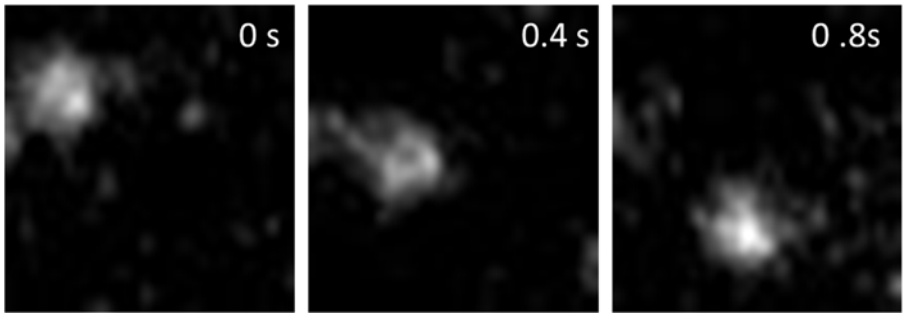

Fig.2　Movement of fluorescent labeled actin filament.

Fig.3 Watching soccer game of world cup with people who are from various country.

Fig. 4 Hiking with laboratory members.

Fig. 5 Ax throwing festival in Vermont.