© 2019. Published by The Company of Biologists Ltd | Journal of Cell Science (2019) 132, jcs234310. doi:10.1242/jcs.234310

FIRST PERSON

First person – Hideaki Tanaka

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Hideaki Tanaka is first author on 'Peroxisomes control mitochondrial dynamics and the mitochondrion-dependent pathway of apoptosis', published in JCS. Hideaki is a PhD student in the lab of Yukiko Gotoh at the Graduate School of Pharmaceutical Sciences, The University of Tokyo, Japan, investigating inter-organelle interactions.

How would you explain the main findings of your paper in lay terms?

Two intracellular organelles, peroxisomes and mitochondria, are specialized cellular compartments (like organs in our body), which communicate with each other to 'burn' most of the fats and to handle dangerous reactive oxygen species; in doing so, they contribute to cellular health and tissue homeostasis. However, whether inter-organelle communication occurred between these organelles other for than their well-established cooperation in cellular metabolism had not been fully elucidated. Mitochondria are able to dynamically change their shape by fission and fusion processes, which contributes to mitochondrial health and induction of altruistic cell suicide (apoptosis). In this study, we revealed the important role of peroxisomes for the regulation of mitochondrial shapes and their functions. In humans, peroxisome deficiency causes severe disorders, such as Zellweger syndrome (ZS), by unknown mechanisms. Given that ZS patients and individuals with dysfunction of the mitochondrial fission–fusion machinery share many aspects of severe symptoms, our findings may explain the pathogenesis of ZS and provide a basis for the development of new therapies for this lethal disease.

Were there any specific challenges associated with this project? If so, how did you overcome them?

The fractionation analysis was not easy to master. We changed the fractionation method from a simple one to a classical one, which led to a successful analysis.

When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?

Our moment was when we serendipitously observed the cytochrome *c* diffusion in peroxisome-deficient cells. We were not sure at the first time whether this was a bona fide phenotype because this was quite surprising. However, the success in rescue experiments made us believe this, and we decided to continue this project.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

Input into my work from Dr Okazaki, the second author of this paper, improved my scientific abilities. He taught me most of my experimental techniques. Furthermore, he often discussed scientific themes with me, which allowed me to improve my scientific thinking.

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Hideaki Tanaka

What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?

When I was a bachelor student at The University of Tokyo, I was very excited when I learned how our lives maintain our biological systems precisely. From this time I wanted to study biology in academia. Now, whenever I conduct new experiments, in particular when the outcomes are unpredictable, I am truly excited. This kind of excitement has led me to the scientific field.

Who are your role models in science? Why?

Prof. Gotoh, the PI of our laboratory. Her passion for science and her way of thinking make her my role model in science. The amount of her scientific knowledge and her outstanding creative insight have always filled me with admiration.

What's next for you?

In order to contribute to society as much as possible, I have studied in academia; I will now work in the pharmaceutical industry.

Tell us something interesting about yourself that wouldn't be on your CV

I have plenty of overseas experience on scientific presentations. Moreover, I have done research abroad for two months. By making use of these experiences, I aim to be active on the world stage.

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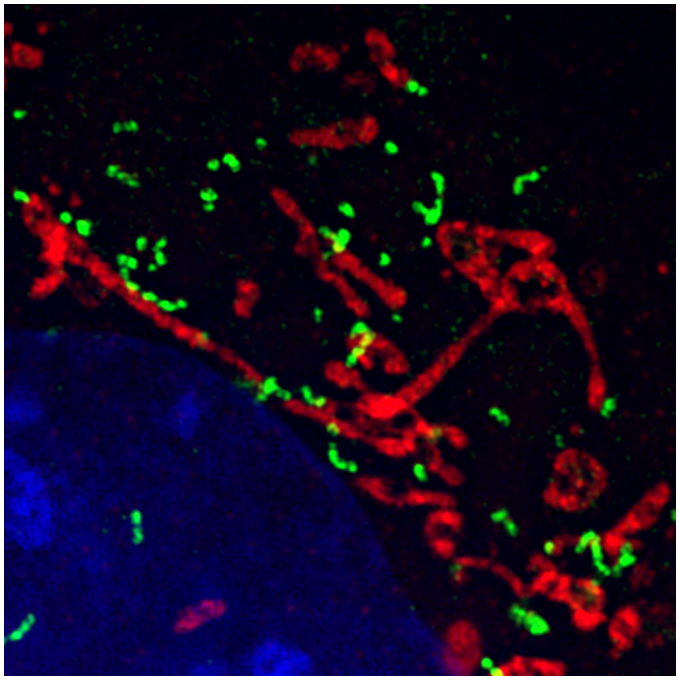

An image of a cell showing the nucleus, peroxisomes and mitochondria. This structured illumination microscopy (SIM) image shows an overlay of the nucleus stained with Hoechst 33342 (blue) and peroxisomes stained with Pex14 antibody (green) and mitochondria stained for cytochrome *c* (red). This image shows that some of the peroxisomes are close to mitochondria, suggesting an interaction between them.

If you were to continue to study in academia, what would you study?

I would further study peroxisomes in their function to unveil their importance to everyone and increase the understanding of this unique organelle within the cell system.

Reference

Tanaka, H., Okazaki, T., Aoyama, S., Yokota, M., Koike, M., Okada, Y., Fujiki, Y. and Gotoh, Y. (2019). Peroxisomes control mitochondrial dynamics and the mitochondrion-dependent pathway of apoptosis. *J. Cell Sci.* **132**, jcs224766. doi:10.1242/jcs.224766