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FIRST PERSON

First person – Kosuke Shiraishi

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. Kosuke Shiraishi is the first author on 'Yeast Hog1 proteins are sequestered in stress granules during high-temperature stress', published in Journal of Cell Science. Kosuke was a PhD student in the lab of Professor Yasuyoshi Sakai at Kyoto University, Kyoto, Japan, investigating regulatory mechanism of nitrogen metabolism and stress response in the methylotrophic yeast.

Kosuke Shiraishi

How would you explain the main findings of your paper to non-scientific family and friends?

Proteins are present in all living organisms and perform a vast array of functions that include catalyzing metabolic reactions and responding to external stimuli. Under certain conditions, in particular stressful environments, there are proteins that interfere, delay and/or even stop growth and development of their hosts. To minimize the negative effect of those proteins, living organisms have some countermeasures that are responsible for maintaining their growth and development. The main findings of my paper shed light on this mechanism in several kinds of yeast. When cells are exposed to high temperature, my targeting protein, Hog1, is sequestered or segregated into an intracellular refuge – stress granules – to suppress its function. Hog1 is known as a key protein for cells to positively function in response to high-salt conditions. My findings are of importance in the sense that Hog1 can be a negative player under specific conditions and that this, then harmful, factor is sequestered into stress granules in a cell.

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

Understanding the physiological role of Hog1 dot formation was one of the most challenging tasks. We have mainly used the methylotrophic yeast *Candida boidinii* to elucidate intracellular dynamics of Hog1. To examine the significance of Hog1 dot formation in *C. boidinii*, we constructed and expressed a series of mutants of *C. boidinii* Hog1 (CbHog1) fused to the fluorophore Venus; fortunately, we succeeded in finding a crucial area of the CbHog1 protein required for its dot formation. When we compared cell growth among those mutants under high-temperature conditions, we found a small but reproducible and significant phenotype that helps to show the physiological role of recruitment of CbHog1 to stress granules in *C. boidinii*. Subsequently, we used the well-characterized *Saccharomyces cerevisiae* Hog1 (ScHog1) protein and its mutant constructs to study the relationship between Hog1 activity in *C. boidinii* and found a decrease in cellular survival after high-temperature stress. The use of two different yeast species, *C. boidinii* and *S. cerevisiae*, broadened my experimental skills, as well as it deepened my basic knowledge on fungi.

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

I always remember the moment when my microscopic observations showed the Hog1 dot formation in *C. boidinii* under conditions of high-temperature stress. Since the dot formation is a new localization pattern of yeast Hog1, I was immediately certain that the dynamic change of the intracellular component is an important discovery. Finding the colocalization of Hog1 and stress granule is another significant breakthrough in this work, as it resulted in our understanding that Hog1 is 'sequestered' in stress granules to downregulate its function as kinase.

Have you had any significant mentors, and how have they helped you?

I have had outstanding mentors during my PhD journey. Among them, Professor Yasuyoshi Sakai of the Graduate School of Agriculture, Kyoto University has given significant support to my professional development. His ideas and thoughts have always stimulated my scientific interests and enhanced my ability of logical thinking. I would also like to name Associate Professor Hiroya Yurimoto. His invaluable support and direct supervisions from the initial to the final stage of my research work has helped me to steer the project in the right direction.

"You may find important clues where you would have never expected it"

What's the most important piece of advice you would give first-year PhD students?

Focus on your targets but be open to any advice, and choose to have some time to enjoy yourself outside of lab. Young students are prone to fall into a negative spiral within their thoughts and ideas. Detailed and careful planning of your PhD that is based on logical

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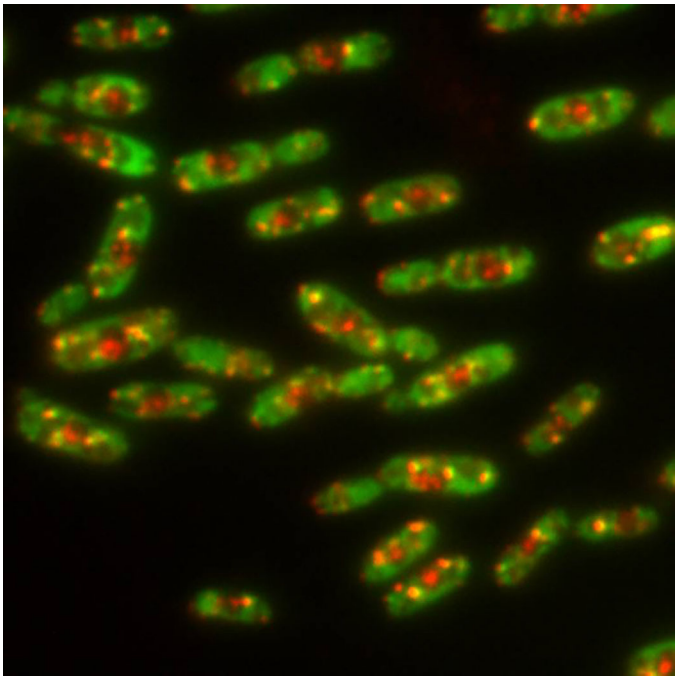

Image of the *C. boidinii* strain expressing CbHog1-mCherry (red) and CbPab1-Venus (green).

thinking is, of course, the first step to move things forward, but I recommend to listen to any kind of advice for your research; not only from your professor and supervisor, but from colleagues, students and even friends. You may find important clues where you would have never expected it. In addition, don't expect to be an expert overnight and spend your entire time in the lab. Having a balanced lifestyle is essential to come up with good ideas and thoughts, and to pursue your research in a good mental health and with lots of energy.

What changes do you think could improve the professional lives of early-career scientists?

I believe that opportunities to attend scientific conferences and/or meetings, particularly international meetings with distinguished scientists, can improve the professional development of early-career scientists. Financial support to visit other laboratories and research institutions may also help them to expand their scientific views.

What's next for you?

I am currently working for the government of Japan and realize that scientific evidence and research-based technical details are crucial for the process of policy making, even though there are few people who have a PhD or professional experience in life science in Japan. Natural processes and phenomena are complicated and, in most cases, too difficult to understand for non-scientists. I would like to act as a mediator between scientists and non-scientists as a domestic and international civil servant with the ability of translating scientific language into simple and easy words, and to provide policy makers and countries with scientific advice.

"Bridging between scientists and non-scientists is my mission in life."

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

Bridging between scientists and non-scientists is my mission in life. To achieve this goal professionally, I will be working at the Food and Agriculture Organization of the UN in Rome, Italy, as part of my PhD. I will be involved in food-safety-related work as a member of the scientific advice team.

Reference

Shiraishi, K., Hioki, T., Habata, A., Yurimoto, H. and Sakai, Y. (2018). Yeast Hog1 proteins are sequestered in stress granules during high-temperature stress. *J. Cell Sci.* **131**, jcs209114.