© 2023. Published by The Company of Biologists Ltd | Journal of Cell Science (2023) 136, jcs261055. doi:10.1242/jcs.261055

FIRST PERSON

# First person – Tetsuaki Miyake

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping researchers promote themselves alongside their papers. Tetsuaki Miyake is first author on 'Re-organization of nucleolar architecture in myogenic differentiation', published in JCS. Tetsuaki is a post-doc in the lab of Dr J. C. McDermott at York University, Toronto, Canada, where he is currently interested in visualizing and recording protein activities inside live cells.

Tetsuaki Miyake

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

The formation and maintenance of skeletal muscle is a necessity for all animals. As muscle develops in the embryo, and also when it repairs itself in the adult, there is an extensive requirement for protein synthesis to provide the building blocks for growth. One structure that is imperative in supporting protein synthesis is the nucleolus, which is a factory located inside the nucleus responsible for generating and assembling the ribosomal machinery necessary for protein synthesis. In this work, we describe substantial changes to the morphology of nucleoli as muscle cells develop. These changes might be linked to functional changes to support the large-scale protein synthesis necessary for differentiation and muscle repair. Characterizing this process in detail might lead to possible therapeutic approaches to prevent muscle loss associated with aging, cancer cachexia and various muscle pathologies.

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

Visualization and quantification of 3D structures from 2D images is challenging. We eventually achieved this by rendering orthogonal projection images from *Z*-stack images to compensate for the loss of *Z*-axis information. Also, we had to find ways to avoid fluorescence signal loss owing to photobleaching caused by repeated laser irradiation in order to acquire a large number of optical sections to assemble the 3D images. To solve this, we used a spinning disk confocal microscope and a photo-sensitive sensor to reduce sample acquisition time.

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

Constructing a mitochondrial localizing GFP expression vector and other fluorescence vectors that illuminate the mitochondria and nucleolus was a challenge in this work. After successfully making these expression constructs, I finally managed to transfect them into live mammalian cells. Observing the images when I turned on the laser of the confocal microscope was fascinating, seeing these subcellular structures lighting up and dynamically moving inside the cells. It felt like a great moment of scientific truth.

Tetsuaki Miyake's contact details: York University, 4700 Keele Street, Toronto, Canada.
E-mail: tmiyake@yorku.ca

**Why did you choose Journal of Cell Science for your paper?**

To exhibit the cellular images I managed to record, Journal of Cell Science is one of the best platforms for this work. Previously, I have been inspired by the cellular images published in the journal; I therefore wanted to share the cellular images I have recorded with scientists who have similar interests.

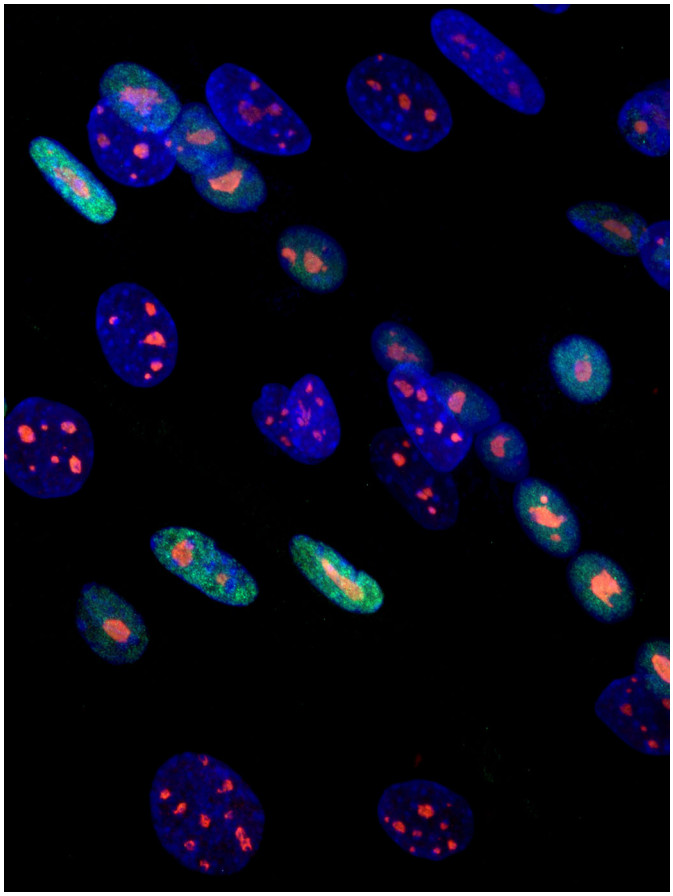
**What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?**

I love to engineer things. Designing and generating molecular tools and using these tools in living cells is an ultimate joy for me. Improving microscope technology every day and increasing the number of molecular tools we are sharing in the public domain are important driving forces for me.

**What's next for you?**

I still love to do bench work and am enjoying the moments to find and, aided by the astounding technology available to us, see new cellular structures and processes. I want to continue being a bench scientist for as long as possible.

Journal of Cell Science (2023) 136, jcs261055. doi:10.1242/jcs.261055



**C2C12 cells were maintained in differentiation medium for 4 days and fixed for immunofluorescence analysis.** Myogenin (green) was visualized in differentiated multinucleated myotubes. Fibriallin (red) represents the morphology of the nucleoli. Hoechst 33342 was used to stain nuclei (DNA).

**Reference**

**Miyake, T. and McDermott, J. C.** (2023). Re-organization of nucleolar architecture in myogenic differentiation. *J. Cell Sci.* **136**, jcs260496. doi:10.1242/jcs.260496