

研究室紹介

No risk, no gain

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Feb 1st, 2023 marks the beginning of the RNA-MIND lab as well as my journey as a standing faculty at New York University Abu Dhabi (NYUAD), a then twelve-year old portal campus of New York University (NYU) as part of NYU's global education network. The name of our lab, "RNA-MIND", stands for RNA-Modifications, Intellect, and NeuroDegeneration. No doubt still in its infant years, nevertheless my lab has set ambitious goals to connect RNA biology to cognitive functions of the brain, through activity-dependent post-transcriptional regulatory mechanisms in the brain cells. In a mature brain of an adult human, neuroplasticity relies largely on adult neurogenesis and synaptic plasticity. *De novo* RNA and protein synthesis in the brain cells are both required for establishing stable changes in the numbers, structure, and strength of synapses.

What motivated me to move my family and lab to a portal university in the Middle East? This question must have been on the mind of many colleagues in Japan. Retrospectively, it cannot be clearer that the force driving us to work toward where we are today had its origin in a scientific discovery made by my lab in Kyoto University, Japan. In 2018, we published the first draft of chemically modified RNA species at the neuronal synapses. 2921 genes were found whose RNAs were modified with N6-methyl-adenosine (m6A) and localized

at the neuron synapses (PMID: 29950670). Although the function of this modification at the synapses remains to be explored, human homologs of the identified RNAs had predicted functional relevance to neurodevelopmental and neuropsychiatric diseases. Possibly, it is important for this function to be carried out at the synaptic compartment, which is consisted of neurons, astrocytes, microglia, and possibly other brain cells in its multi-cellular, multi-compartmental structure. We were excited by this potential functional connection but perplexed by the possible cell biological mechanisms. How can the simplest of simple, an addition of CH₃ to adenosine, contribute to the most complex of the complexity, the establishment of human intelligence? Is m6A dynamic? How is it regulated by neuronal activities? In what manner does the methyl group on select RNAs contribute to neurodevelopment and cognitive functions? Is it diversity, homeostasis, coordination, or something else? What experiments can be designed and conducted to answer these questions? What exactly defines human intellectual capability? In addition to these scientific questions, there is also a practical question: where can I develop a strong research program to answer those questions? I will need time, skills, funding, infrastructures, talented people, and effective communication with other disciplines, and everything else, to move forward. Where can I be provided with sufficient



resources to carry out an ambitious plan? Where is a place that not only supports my work, but my husband's work (he is also a scientist), and our daughter's growth through education?

I had no idea, so I traveled.

There were other practical reasons that I was struggling with, such as that half of my funding was being spent on maintaining mice colonies. Meanwhile, works published from labs of Chuan He, Samie Jaffrey, Yunggui Yang, Kate Meyer, Xiaoxi Zhuang, Alon Chen, all consistently suggested that this modification can be involved in various forms of learning such as motor learning and emotional memory. Its function possibly is to add a functional switch to translation of mRNAs that can respond to the changing cellular environment, including neuronal activity. The independent works from these and other labs boosted our confidence in our research direction. RNA modifications are dynamic and responsive; thus they may be playing significant roles in adaptive gene expression programs.

Then I heard the name of a city called Abu Dhabi in the United Arab Emirates, for the first time of my life. It was when I was invited to attend a conference at NYUAD. I went. Then at the end of the first day of the program, I was told by the organizer that a speaker had

to cancel so I could have half of the slot to present my research. I did. I was invited to visit again. My husband visited NYUAD. We visited again, and again together with our daughter.

Finally, we moved, together from Kyoto to Abu Dhabi.

And here we are, entering our third year living in the Middle East. We live on campus. This place, having an Arab identity, a New York identity, and a global identity, is feeling home to us more than anywhere else we lived. Our jobs as faculties are busy and challenging, but well supported. School life for my daughter is challenging as she is graduating this year. Moving cross countries in the first year of high school was not easy but she managed with the support from her teachers and friends, and Grammarly, and ChatGPT... She has an offer from a university in New York City so she will be moving out of home next year. Having faculties from more than 70 countries and students from more than 120 countries across four divisions, working, studying, and researching on the same campus on the Saadiyat Island, our campus is a "miniaturized world". Our colleagues and students are exceptional, brilliant, hardworking, and kind. In this community, we believe in global education, in dialogue, in equality, in research, and in life. I cannot be prouder as a professor of the Global Network of

New York University. It is our dream to create a new institution of the finest higher education at NYUAD, a school of liberal arts and research, a vision that the former president John Sexton of NYU and His Highness Sheikh Mohamed bin Zayed Al Nahyan jointly conceived and shared with us.

This dream leaves me thirstier than a desert.

This year, my group grew from the size of two to twelve members. Driven by our passion, and being supported by our core facilities such as sequencing, bioinformatics, and imaging, we started to do experiments that are right to do but hard.

Mabrook (مبروك)! This is one of the Arabic words I learned in Abu Dhabi. In the photo, we raised our glass and cheered “Mabrook!” to celebrate the wonderful news of our postdoc securing an independent position in Paris.

Our journey continues and you are welcome to join us. We are recruiting students and scientists who want to join RNA-MIND lab at NYUAD with curiosity to understand our brain, who believes in contributing to humanity from one place. Feel free to drop an email at ohtan.wang@nyu.edu if you want to reach out to me.