

FIRST PERSON

First person – Hong-Hee Choi

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. Hong-Hee Choi is first author on 'PPE39 of the *Mycobacterium tuberculosis* strain Beijing/K induces Th1-cell polarization through dendritic cell maturation', published in JCS. Hong-Hee is a research assistant in the lab of Sung Jae Shin at Yonsei University College of Medicine, South Korea, working on the development of effective controls for mycobacterial pathogens by regulating host signaling pathways.

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

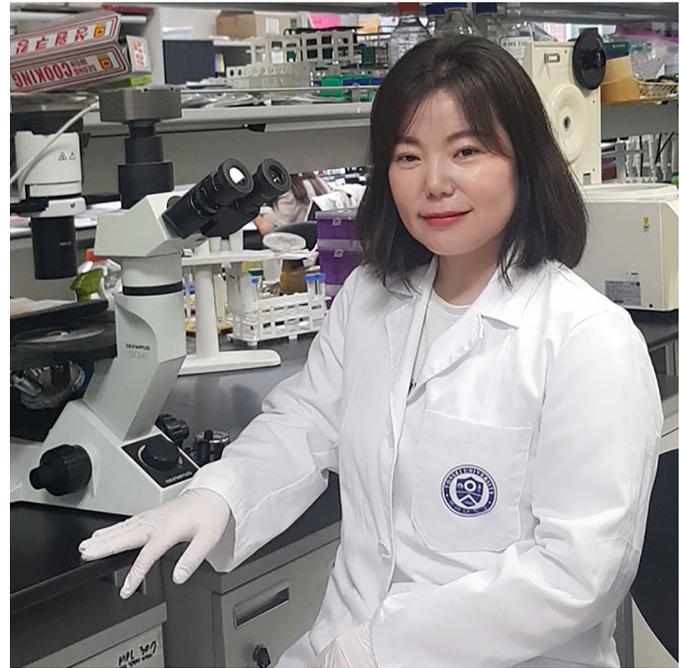
Tuberculosis (TB) is one of the three major infectious diseases defined by the WHO. It is caused by *Mycobacterium tuberculosis* (Mtb) and has high incidence and mortality. The Mtb Beijing family with the Beijing genotype is the predominant Mtb in Asia, especially in China, and shares a characteristic genotype. Moreover, this genotype is highly pathogenic and exhibits high relapse rates from the latent state. Mtb is an intracellular pathogen armed with many strategies to evade the host immune response and better its survival chances. Several studies have found proteins that are known to involve immune escape. These gene families with repetitive structures occupy a large proportion of 10% of the Mtb genome and are named the PE/PPE family. Proteins belonging to the PE/PPE family have been shown to play a role in providing immune specificity and various antigens. We have identified the protein PPE39 in Mtb and investigated the immunological mechanisms mediated by PPE39 by studying dendritic cell (DC) functions. PPE39 induced DC activation and contributed to type 1 T helper cell response, which plays an important role in the adaptive immune system.

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

We chose it because we thought it was important to highlight this contribution to the field by publishing the article in a heavyweight journal. Journal of Cell Science is an international peer-reviewed journal in the field of cell biology. In addition, we appreciate the peer-review process to select the manuscripts for publication, and this famous journal is published continuously. We thought that it was appropriate because the journal has previously published papers similar to the subject of our research. We hope that our manuscript will be exposed to a wide readership by providing a number of findings that will be of interest to biologists in many fields.

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

While studying, my biggest mentor was Prof. Sung Jae Shin, my supervisor. He always had time to discuss my results and always gave good suggestions on how to lead the project. Prof. Shin has always shared his thoughts and ideas regarding my project, so we were able to continue the project. Besides being my boss, he is an



Hong-Hee Choi

important mentor and I am deeply grateful to him. Also, I am grateful to Dr Kwon Kee Woong, the co-first author who 'suffered' with me. Moreover, I would like to thank the co-authors for their efforts to produce better research results.

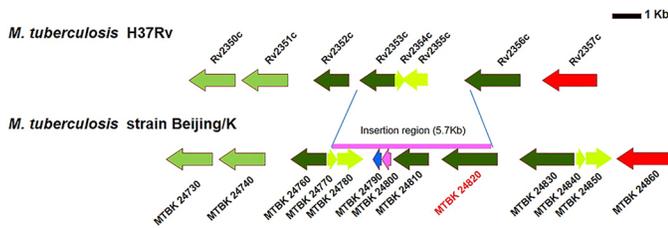
What are the potential implications of these results for your field of research?

Well-known Mtb antigens, such as ESAT-6, CFP10 and Ag85, which have been regarded as potential vaccine candidates, have been demonstrated to interact with DCs and elicit antigen-specific Th1-polarized responses during Mtb infection. PE/PPE proteins are associated with TB pathogenesis, and a deep understanding of these proteins can provide new protective strategies against Mtb infection. PPE39 exhibited a protective efficacy against Mtb challenge in a murine model, indicating vaccine potential.

What were the most rewarding moments of your research?

I covered a lot of research themes, but there were times when I wanted to give up in the middle because my research was not what I wanted. However, I was able to start again with the expectation that I would regain my composure, and I feel rewarded through good research results now. I undertook this research and carried out a very detailed analysis. I still have a long way to go, but I will go forward based on my experience in this research. It was a very vague and difficult process to start a hypothesis using the knowledge gained from papers and seminars. However, it seems that I was able to progress gradually as I set up a hypothesis under the excellent guidance of Prof. Shin. I also think that the environment of our laboratory, where various subjects about the mechanism of tuberculosis are investigated and which has a good range of materials, has had a great influence on the study. Most of all, the most rewarding moment of my research was

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Genetic map of K-specific insertion region (MTBK_24820 cluster; PPE39) in *M. tuberculosis* strain Beijing/K.

when my paper was approved for publication. I will remind myself of this moment in the future and will continue to study without stopping whenever I am in trouble.

“Doing research without understanding your peers is like not understanding the nature of research.”

What advice would you give to researchers in this field?

Although research is very complicated and difficult, the more I study, the more interested I become. I became interested in Mtb research by experimenting with mycobacteria that were unfamiliar to me during my graduate course. As I was studying tuberculosis, I came to think about the final objective of tuberculosis research, and I realized the importance of this research. There are a few things to keep in mind while doing your research. First, you must keep in mind that results are rarely achieved in a short period of time. Even if

you have a clear hypothesis, there are a lot of cases where the results of the experiment do not come out well. It may be an erroneous hypothesis, but it is important to find out what was wrong with your experiment because it can be a problem that can be resolved by changing experimental conditions or by repeated experiments. Second, it is important to focus on your research, but when you are in a slump, it is necessary to resolve it yourself. Third, the relationship with your colleagues is very important. It is very important to understand your colleagues, maintaining good interpersonal relationships. Research is undertaken to understand certain phenomena. Doing research without understanding your peers is like not understanding the nature of research.

What's next for you?

I am currently working at the Department of Microbiology at Yonsei University College of Medicine in Seoul, South Korea. My laboratory is working to investigate the mechanisms of tuberculosis and nontuberculous mycobacterial diseases, suggesting new strategies for prevention and therapies. Having finished this paper, I am now in the process of conducting an interesting study to identify further mechanisms of Mtb infection. We are planning a follow-up study on tuberculosis vaccine antigens, which was the subject of this paper. The ultimate target is to develop a new treatment for tuberculosis.

Reference

Choi, H.-H., Kwon, K. W., Han, S. J., Kang, S. M., Choi, E., Kim, A., Cho, S.-N. and Shin, S. J. (2019). PPE39 of the *Mycobacterium tuberculosis* strain Beijing/K induces Th1-cell polarization through dendritic cell maturation. *J. Cell Sci.* **132**, jcs228700. doi:10.1242/jcs.228700