Shih-Hua Lin – President, National Defense Medical Center, Taiwan



We must focus on how we can continue international collaboration, maximize research potential, and build a new research environment in Taiwan

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Professor Shih-Hua Lin, president of Taiwan's National Defense Medical Center, shares an overview of the academic and research environment of the institute as well as its role in cultivating the internationally connected talent that will drive Taiwan's biomedical industry forward.

How would you describe the National Defense Medical Center's research and academic environment?

The medical research environment of Taiwan is very active, but the performance execution is different in military units such as the National Defense Medical Center. In our medical school, our aim is to do research differently to other medical units in Taiwan. For example, we have a strong tradition of disease-oriented research with a patient-facing approach, something that I, as a physician, believe is essential. At NDMC, we aim to serve the patient through the best research practices that will maximize the benefit of care.

What are the research strengths of the National Defense Medical Center?

As a medical school, we own patient resources and conduct translational research in ways different from other universities in Taiwan. Moreover, we have several multidisciplinary studies in which we

collaborate with experts not only within the biomedical field but also other professions. I am involved in an artificial intelligence study which uses deep learning methodologies to solve a clinical question. As a physician, my expertise in this study is to work directly with patients to identify their needs and the best ways to meet them. Being a nephrologist, I recognize that hyperkalemia is fatal, so my focus is on how to prevent this disease and early diagnose patients.

In this research initiative, we are applying deep learning technologies to EKG scans to enhance diagnosis speed and accuracy to improve patients' time to treatment. There are several research teams in the school working in this area which are all competing with one another. We are also applying personalized medicine to nephrology in our research. Hyperkalemia could also be a consequence of a genetic disease; therefore, we identify the pathogenic gene and provide patients with an individualized treatment that best suits their specific disorder. The research done at NDMC has the aim of having direct implications on patient care rather than just remaining at the level of basic research.

How is the research done at the school being translated into tangible innovation that can have a real impact on society?

It is true that translational research is highly regarded but is only at its beginning in our school and other institutes in Taiwan. Thanks to my mentor, who is a Canadian researcher, I know how to create and encourage collaborations internationally outside of Taiwan. We have established connections with several renowned institutes in the United States, Europe, and Japan. In this way, our school can be a model for other academic research bodies in Taiwan to follow and develop their own global networks.

After two years of effort with more than 20 top-notch geneticists in Taiwan, we inaugurated the Genetic Precision Research Center at our teaching hospital, Tri-Service General Hospital, on November 28, 2017. In this laboratory, we are pushing forward the study of personalized medicine and work directly with physicians to improve the accessibility of the high-end genetic facilities and fill the gap between the clinical diagnosis and genetic confirmation. We train the professionals in the hospital on best practices for genetic studies and how to apply the research being done to patient treatment. Furthermore, in the research lab, we are able to perform cutting-edge genetic studies, including single-cell RNA sequencing.

To what extent does the National Defense Medical Center create an open innovation culture and build connections between academia and the industry?

The NDMC has formed successful research collaborations with companies such as AstraZeneca with whom we collaborated with on a genome sequencing project. We have a large patient resource while the industry has a research base, so together we can work to drive Taiwan's healthcare and R&D ecosystem forward.

In the biomedical field, the cultivation of talent is key to success. How does the National Defense Medical Center boost development and introduce students to international research networks early on?

Building a talent pool is of paramount importance to Taiwan's research and innovation talent today. Here in the NDMC, we encourage our students to take research trips and spend time studying in other leading countries like the US and Japan. We often sponsor chosen students to have a year of training or even receive their PhD abroad so that they can build global connections and bring new mindsets and methodologies back to Taiwan.

However, the challenge we face today is that when our researchers come back to Taiwan, they find that the environment here is different. Therefore, we must focus on how we can continue international collaboration, maximize research potential, and build a new research environment in Taiwan. To ensure that research can be brought back to Taiwan without delay, we should make commitments to more considerable investment into research infrastructure and financial budget for grant support.

What vision do you have for Taiwan's research and academic ecosystem within the upcoming five years?

Taiwan has a sense of how the research environment should change; it is now a question of keeping pace with the global trends happening today. We are heading in the right direction, and I am confident in Taiwan's ability to evolve in innovation moving forward.

Reflecting on your career, what achievements are you most proud of?

I am proud to be not only a one-star general for Taiwan’s military but even more to be a researcher and professor that can share my experience and knowledge with my students and faculty.

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