Roundtable: National Health Research Institutes (NHRI), Taiwan

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A round-table discussion with leading figures from Taiwan's NHRI, covering perspectives on the current state of the Taiwanese healthcare and pharmaceutical environment, links between academia and industry, the potential of biotech to drive the Taiwanese economy in the years to come, and Taiwan's China connection.

Participants: Hsing-Jien Kung, President, *National Health Research Institutes* (*NHRI)*
Hsing-Pang Hsieh, Director, *Department of Research Planning & Development, NHRI*
Chiung-Tong Chen, Deputy Director, *Institute of Biotechnology & Pharmaceutical Research, NHRI*
Chung Shi Yang, Acting Director, Institute of Biomedical Engineering and Nanomedicine*, NHRI*
Wayne Chang,Acting Director, *Technology Transfer & Incubation Center, NHRI*
Michael Hwang, Chief Executive Officer, *Bioproduction Plant, National Institute of Infectious Diseases and Vaccinology, NHRI*

Dr. Kung, as a relative newcomer to the NHRI, what is your understanding of the role of this institute in the Taiwanese pharmaceutical and healthcare ecosystem?

Hsing-Jien Kung: The NHRI was founded in 1996, and its original goal was to try to emulate the National Institutes of Health (NIH) model in the US. Throughout our years of evolution, this goal has not become a reality due to budget constraints—but we do have our share of responsibilities, and things of which we can be rightly proud.

Today, the NHRI is about one tenth the size of the NIH, which means about 140 PHD-level investigators, and 1,400 employees. To put these numbers into context, Taiwan's population is about one twelfth that of the US, so from that standpoint, our size is about right. However, from the funding side, the NHRI has only one five-hundredth the budget of the NIH. This means that we have to be much smarter.

Despite the constraints of our environment, there is a silver lining. In a sense, working under budget pressure has informed our mission: we know that we must work together across disciplines and integrate our efforts in order to succeed. That integration is something of which I am immensely proud. Our seven institutes might be staffed by relatively small teams, but our talent pool incorporates many diverse backgrounds, from engineers and physicians to physicists and virologists. On this campus, these talents come together under guidelines that were established once it became clear that the NHRI would never reach the level of its spiritual cousin in the US. It was decided that we could still do great things in terms of improving the health and wellbeing of this nation.

Our first priority, like the NIH, is to act as a center of excellence for biomedical research—but our research is oriented towards translating basic research into final products, and acting as a think tank for the industry and the government. A great example of working with the industry can be found in vaccines and infectious diseases: we work very closely with Taiwan's two vaccine companies, and to some extent they depend on our production here at the NHRI, so in this way we are more than just research partners. We are also trying to help cultivate education: we train and mentor students that are not only interested in academia but also the industry. In a sense, we are trying to be the bridge between academia and industry.

What is your opinion of the linkages in Taiwan between these two parties? Are they as strong as they could be?

Hsing-Jien Kung: In the US, the idea of promoting the relationship between academia and industry is relatively young. Back in the 1970s, when I was at UCSF, academics were very skeptical about developing ties to business people. However, in recent years, particularly in California, the situation has evolved: faculty members are now encouraged to either run their own company or to be a part of one. Here in Taiwan, we tend to follow the US, but there are still a lot of prohibitive regulations, which lead to uncertainty in the academic community. I feel that we could do a lot better in this regard.

Michael Hwang: I think that in Taiwan, people are trying very hard to encourage that bridge, and I have to give credit to the government for continuous improvement in this respect. There is, however, always room to be more creative and less cautious, and this is true of both the government and the industry. It is easy to complain about the support that we receive from the state compared to countries like China and South Korea, but our officials have been trying very hard, and the support today is much better than it was before.

Many Taiwanese researchers spend time abroad, but a significant number return to Taiwan at some point. Why do you feel such a large number of scientists come back home?

Hsing-Jien Kung: My own reason was rather simple: I was in the US for a number of years, and even though the US has promoted a culture of people working together, a lot of people at university have what I call the 'R01 culture', which comes from researchers receiving R01 grants, or individual research grants—which foster a culture of working alone, relatively unlinked to the goings-on of the university and their peers. Building a talent pool is the key, and we see this particularly here at the NHRI. A talent pool is a much more important resource than money.

Wayne Chang: I think everyone has a different reason to come home, but I believe that many people feel more joyful coming back to help their own country. However, being a small island means that we need to think carefully about the best direction in which to work, focusing on the most important and profitable areas that can also increase wellbeing in Taiwan. Today, it is generally recognized that biotech and biopharmaceuticals are good areas for Taiwan to be pursuing, but this was not always the case. These things take time to decide. In the US, this type of thinking does not have to come from the federal level, because of the size of individual states—but because Taiwan is so small, strategic planning has to be centralized.

Do you believe that biotech has the potential to be the next big economic driver for this country?

Hsing-Jien Kung: We have to think somewhat differently from the big pharma companies of the West, because in Taiwan, our health and our medical issues are different from those in the States. Taiwan is relatively small, and while our primary driver has always been to develop an industry that can be of medical benefit to Taiwan, increasingly, we are looking at ways to develop the industry into an economic driver for the country. Having China as our big brother presents us with some of these opportunities: instead of developing along the same lines as the industry in the US, we should be looking to position ourselves as a niche player that can offer innovative solutions to

larger countries, and in this way derive economic benefit from our industry.

Indeed, with the China market right next door, we see a lot of companies in Taiwan focused on Asian-prevalent diseases. What specific ties does the NHRI have to China? Do you collaborate with Chinese institutes?

Hsing-Pang Hsieh: Taiwan itself has a lot of collaboration with universities and research institutes in Mainland China, but in terms of NHRI working with China, we tend to license technology to local Taiwanese companies, and then let them spend the time and money to enter the market, rather than us going there directly.

Hsing-Pang Hsieh: For example, we have licensed a technology to the local company Genovate, which is now dealing with companies in Mainland China to license the product out there, and conduct clinical trials there. In the next three years, the strategy we have taken as the NHRI is unlikely to change: we will collaborate with local companies, and let them approach the Chinese market.

Chiung-Tong Chen: The NHRI is a government-sponsored foundation, which means that we have to comply with regulation regarding the transfer of technologies, which should always go to local Taiwanese companies first. I believe this is understandable, even though it may not lead to the best possible development of our technologies given the size of the local companies here. However, we are funded with taxpayers' money, and so we should make every effort to ensure that the money invested feeds back into the Taiwanese economy.

Taiwan today has more drug candidates approved by the FDA than South Korea or Singapore. Do you feel competition with these two countries?

Hsing-Pang Hsieh: I believe in the past ten years Taiwan has done a great job in discovery. Today, the industry is excellent at discovering both new chemicals and new drugs. However, the second part is development, and this is an area where Taiwan is currently lacking. This is where the NHRI is unique in Taiwan: we can go from A to Z, from bench to clinic all the way in terms of drug discovery and development.

Wayne Chang: I believe that the biggest competition that Taiwan faces is from Korea. The Korean government offers a great deal of support to the sector—far greater than similar programs in Taiwan. For instance, currently, only universities and research centers can receive a 100 percent project grant from the government in Taiwan; at the industry level, the most that could be granted is 50 percent, and this is not for basic research, but at the product level. In Korea, however, even at

the industry level, grants can fund up to 100 percent of a project. This obviously strengthens the Korean pharma sector.

With that said, Taiwan also has strengths, including the talent pool, and the proximity to the Chinese market: it is only 300 miles away, and shares the same culture, language and traditions, which is a major advantage.

Chiung-Tong Chen: I believe that we should not only be looking at countries such as Korea and Singapore as our competition, but instead, we should look at the global level. If you want to market and sell drugs outside of Taiwan, you need to have international patent coverage.

Is biotech the right industry for this country?

Michael Hwang: I believe that it is. In addition to having many well-trained professionals that have been back in Taiwan for almost two decades developing the biotech sector, we also have some unique advantages as a country, one of which is the potential to capitalize on the learning of eastern biotechnology as well as western medicine. This is an area that an increasing number of Taiwanese companies are choosing to focus on today.

You mentioned the mission-oriented focus of this institution. Do you think Taiwan has a clear focus on where to play in the value chain?

Michael Hwang: I feel as though to a large extent, the focus has been determined in Taiwan by individual players: if companies have survived here, they must have a niche. While we cannot compete with business models that rely on cheap labor and access to cheap real estate in large quantities, those companies that focus on innovation have the potential to succeed and do well.

Wayne Chang: I would say that a niche to exploit in the future will be the opportunity to conduct clinical trials hand in hand with China. Currently, the Taiwan government is working on a treaty with the Chinese government, which says that Phase I clinical trials run in Taiwan will be accepted in China. Once this is established, early phase clinical trials can be conducted here, and late stage in China.

Some people do not believe that mutual recognition will ever happen, because of the limited advantages that it brings for China.

Wayne Chang: This is a good point, and something worth remembering. Taiwan will try its best to make the deal happen, but we cannot guarantee that it will be signed.

Michael Hwang: A treaty such as this could also be negative for Taiwan: if the door is open to Chinese drugs entering the Taiwanese market, it could have serious implications for local companies, that would be unable to compete with the price of Chinese companies.

Dr. Kung, maybe you can give a final message on behalf of NHRI to the international community, as well as your peers here in Taiwan.

Hsing-Jien Kung: I am very proud of the NHRI. We have several very good examples of bringing basic research to a point beyond most other academic universities, either to clinical trial in Phase I or II, or tech transfer to a company. All this has been achieved under extreme budget constraints. I am particularly proud of this. When people work together, there is a tremendous hope!

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