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Profile

Feng-Cai Zhu: leading vaccine evaluation in China

Speaking with *The Lancet* just before he goes to Sierra Leone to coordinate an Ebola vaccine trial, it's clear that Feng-Cai Zhu is a humble man, yet he possesses a steely determination to end vaccine preventable illness both in his homeland of China and worldwide. Now Deputy Director of the Jiangsu Provincial Center for Disease Control and Prevention (JPCDC), in Nanjing, China, Zhu's work centres on developing vaccine science in China and ensuring infectious diseases are kept under control in Jiangsu Province.

The inspiration for this work comes from his childhood in China's Anhui Province where he lived on a farm with his parents and four siblings in the 1960s. "I remember the cutting poverty and how various infectious diseases swept away so many people—many of them young children", Zhu recalls. When he was later able to study preventive medicine at Anhui Medical University, he was determined to change this situation for future generations. Both at Anhui and in his subsequent postgraduate studies in epidemiology at Nanjing Railway Medical College, Zhu grasped the chances he was given to work with inspirational researchers, including the epidemiologists Xi-Ke Wu and Zhao-Zhuang Luo.

After his studies, Zhu began work at JPCDC as a public health doctor treating people with acute infectious diseases. However, his interest soon shifted to vaccines. "I realised that, in the 1990s, China was lagging behind many nations in terms of its burden of vaccine preventable disease", he explains. Zhu began working on the JPCDC's various vaccine programmes, covering hepatitis B, diphtheria, *Helicobacter pylori*, Japanese encephalitis, measles, and influenza. As the vaccine programmes took hold and reduced rates of these diseases, he says he saw that "my dream of changing things for future generations was becoming reality". Zhu's team established a complete system for vaccine clinical evaluation in Jiangsu Province—an important development since until then national regulations and standards for vaccine clinical trials did not exist or were incomplete. "Feng-Cai Zhu was and is the pioneer for many vaccine trials and for establishing a world class vaccine trial evaluation system in China", says longtime friend Tongqing Zhou of the US National Institutes of Health Vaccine Research Center in Bethesda, MD, USA. "He is the person to get things done, done fast, and done right."

Zhu has spent much time in the communities and villages of China's eastern coastal province of Jiangsu, where he has been personally involved in each clinical trial he has led communicating with trial participants to ensure they understand the procedures. But Zhu has also assumed a wider role in leading the response to several epidemics in Jiangsu and China as a whole, including the severe acute respiratory syndrome (SARS) crisis in 2003 and the H1N1 influenza epidemic in 2009, during which time he published

a safety and efficacy study of an H1N1 influenza vaccine in China.

To help propel China's efforts to deal with endemic severe hand, foot, and mouth disease, Zhu has led a series of clinical trials with enterovirus type 71 (EV71) vaccines in China, including phase 1, 2, and 3 studies involving more than 20 000 children. Data from these trials indicated that the EV71 vaccine provides high efficacy, satisfactory safety, and sustained immunogenicity. He has also published key studies on hepatitis E vaccines. Having already published a phase 1 trial on a new Ebola vaccine in *The Lancet*, this month Zhu travels to Sierra Leone to launch phase 2 of the trial and help recruit 500 participants. "Following the Ebola crisis that swept across west Africa this year, we hope that this novel vaccine could prevent similar loss of life in the future", explains Zhu. In fact, the Beijing Institute of Biotechnology began to develop a new Ebola vaccine in 2007, and after the 2014 pandemic Zhu was asked to lead the clinical evaluation of this vaccine. Back home in Jiangsu, he is also about to launch a phase 1 study of a vaccine against *Staphylococcus aureus* developed in China.

Although Zhu recognises the progress made on vaccination in China, he would like to see additional vaccines added to China's routine schedule: "In my wish list are the EV71 and *Haemophilus influenza* type b vaccines", he says. And while vaccines are the main focus of his work, Zhu is also responsible for overseeing the control of other infectious diseases in Jiangsu, including HIV/AIDS, where he applauds the Chinese Government's push to provide antiretroviral drugs free of charge to all who need them.

To continue China's progress in infectious disease control, Zhu believes educating the public and avoiding complacency are key. "There are many parts of the country very densely populated, where it is difficult to control airborne infections", he explains. "As for all other countries, improving access to medications and controlling transmission are vital." In the next decade, he is hopeful that his team can help bring several vaccines, including EV71, *Staphylococcus aureus*, and universal influenza vaccines, to market in China or overseas. He's also keen to improve access to these new vaccines in low-income countries. All of these endeavours don't leave much time for Zhu to enjoy a social life. Asked what he likes to do outside work, he laughs. "What do you mean?" he says. "My work is my life!" That commitment is fully endorsed by another longtime collaborator Ming Zeng of the National Institutes for Food and Drug Control, Beijing, China, who says Zhu "is a hugely energetic man, and it seems that no challenge can stop him, only inspire him further. He is one of the best scientists in vaccine clinical research in China."

Tony Kirby