

Vaccine research

Vaccine R&D has been revitalized recently in part owing to major commercial successes and increased incentives for products that address neglected diseases. Our interviewees this month describe the rewards and challenges of their complementary roles in the field.



Ian Frazer, M.D.
Director, Diamantina
Institute for Cancer,
Immunology and
Metabolic Medicine,
University of Queensland,
Brisbane, Australia.

Ian Frazer — one of the scientists who created the VLP technology enabling the development of vaccines against human papillomavirus (HPV) — has been building up the Diamantina Institute since the late 1980s. “I decided that we needed to establish a critical mass of medical research on the campus,” he explains, “and helped achieve this by growing an institute.” The translational medical research institute now includes ~160 clinician scientists, academic staff and postgraduate students.

Frazer’s interest in cancer immunology began during his undergraduate medical elective hosted by Professor Ian Mackay at the Walter and Eliza Hall Institute in Melbourne, Australia. Following Frazer’s training as a renal physician

and clinical immunologist in Edinburgh, Scotland, Professor Mackay invited him back to be a clinical research fellow in viral immunology and autoimmunity. “This was an offer too good to refuse — an opportunity to work in what was then the peak immunology research institute worldwide,” he says.

It was during his time at Mackay’s laboratory that Frazer observed that some of the HIV-positive men he treated had anal precancers caused by HPV. This observation led to his studies in the late 1980’s on immune responses to HPV, from which the HPV vaccine technology — licensed to the company CSL in 1993 — was developed with collaborator Jian Zhou. With growing epidemiological evidence indicating a link between HPV and cervical cancer, Merck licensed the technology from CSL in 1994 and developed Gardasil, the first vaccine for the prevention of cervical cancer. Frazer was named Australian of the Year in 2006, the year the vaccine was approved for use in Australia and the US.

Now, as well as directing the Diamantina Institute, Frazer is also the immunotherapy group

leader, developing strategies to help the immune system identify and eradicate cancers associated with HPV infection. Balancing the administrative and political responsibilities of an institute director with his desire to be active in his own research group is Frazer’s greatest challenge, but also brings its own rewards. “I have the opportunity to interact with many bright young scientists and students, and to encourage them to focus their research efforts on clinically relevant research problems,” he says.

During his research career Frazer has successfully moved from liver disease to HIV, from HIV to HPV and from HPV to immunotherapy. “When something exciting comes along that your gut feeling tells you is likely to be challenging and also clinically relevant, don’t be afraid to change research direction, and don’t give up too soon, or too late, if you’re finding it tough,” says Frazer. “I’ve changed track three times in my career and each time I’ve not regretted it. However, it’s easy to let your efforts become too diffuse — stay focused.”



**Baoming Jiang, D.V.M.,
Ph.D.**
Team Leader, Research
Microbiologist, National
Center for Immunization
and Respiratory Diseases,
Centers for Disease
Control and Prevention (CDC), Atlanta,
Georgia, USA.

Rotavirus is the leading cause of severe diarrhoeal disease and dehydration of infants across the globe, with the majority of the annual 600,000 deaths occurring in the developing world. As a research microbiologist, Baoming Jiang has been primarily involved in the R&D of rotavirus vaccines for children in both developed and resource-poor countries for more than 17 years.

Following his Ph.D. in virology at The Ohio State University, USA, in 1991, Jiang found his postdoctoral position while attending a scientific meeting. “I met Roger Glass, a prominent scientist from the CDC,” he says, “and chose this position over others because of my interest in and admiration for the work they were doing and a passion for vaccine research, infectious diseases and public health.”

During his postdoctoral training, Jiang was the first to delineate the genomic structure of astrovirus and conducted research on novel rotaviruses — work that led him to Wyeth (New Jersey, USA) where he contributed to the development of the first live oral rotavirus vaccine RotaShield.

After 4 years at Wyeth, Jiang was attracted back to the CDC. Jiang explains: “I was impressed by the quality and vital health work conducted at the CDC, particularly in vaccine research and immunization — a noble profession that saves hundreds of thousands of lives each year.” Currently, Jiang’s work encompasses the research of inactivated and live rotavirus vaccines, including the proof of principle for parenteral rotavirus immunization and testing of candidate vaccines in animal models and in clinical trials. He spearheads studies to address poor efficacy of live oral vaccines in resource-poor countries, and the pathogenesis and immunity of rotavirus disease in humans and animals. Importantly, his work includes the development of diagnostic methods to investigate the epidemiology and burden of non-group A rotavirus gastroenteritis in humans.

To achieve his team’s goals, Jiang collaborates with other CDC groups and state and federal

agencies. Together they provide leadership and expertise to ministries of health around the world, the World Health Organization, private industry, academia and other governmental organizations involved in public health. “It is really rewarding to work with scientists in public health and private industry of developing countries and help them introduce new technology from resource-rich countries to develop their own vaccines and improve public health,” says Jiang. “However, it is most challenging to help raise necessary resources, so that they can build their capacity and make the highest-quality products according to international standards.”

Jiang thinks that vaccine R&D is well worth the effort needed to overcome the challenges: “We in the developed countries often take vaccines and vaccination for granted, but children in many resource-poor developing countries are still dying of vaccine-preventable diseases. That is the hardest and most important lesson I have learned.”

WEB SITE

Career snapshots: http://www.nature.com/naturejobs/magazine/career_snaps.html