

Profile: Gary Kobinger — “My goal became to prevent death”

Gary Kobinger toiled in obscurity until a couple of years ago when, during the Ebola crisis, the chief of special pathogens at the Public Health Agency of Canada’s (PHAC) microbiology laboratory in Winnipeg vaulted to the rank of international hero.

In the midst of the epidemic that claimed more than 11 000 lives, he and his team announced that they had developed both an effective treatment — a drug called ZMapp — and a vaccine against the lethal virus.

Although both are still in clinical assessment, these discoveries came as heartening news to a world gripped by fear of a hemorrhagic fever that, on average, kills half of those who contract it. The twin breakthroughs received attention from media, scientists and public health authorities across the globe, and led to Kobinger being nominated for such honours as Radio-Canada’s scientist of the year.

Dr. Xiangguo Qiu of PHAC, who is first author on most of the publications related to ZMapp, says Kobinger’s support was exceptional. “He immediately saw the potential for this treatment,” said Qiu. “We established a plan together. He is very quick and knowledgeable. It is great to work with him. Without him the treatment we developed would have never seen the light.”

The praise and media attention has not distracted Kobinger from his work. He is quick to give credit to his team, and to point out that the Ebola breakthroughs were part of a much wider — and longer — battle against highly infectious diseases.

“My team and I are working on a MERS [Middle East respiratory syndrome] vaccine, currently tested in a phase one clinical trial,” he said in an interview from his Winnipeg laboratory. “We also have a vaccine against Zika that could be ready as early as this summer.”

With the mosquito-borne Zika virus spreading from Brazil to other countries and potentially causing increases in rates of both microcephaly in new-



Christopher Black/World Health Organization

Gary Kobinger extracts genetic information from blood samples for Ebola diagnostic testing at a mobile lab in the Democratic Republic of Congo.

borns and Guillain-Barré syndrome in adults, Kobinger fully understands there is no time to waste. Thankfully, he will not be starting from scratch.

“It may sound extraordinary, but we have known and developed this [method] for over 10 years. So what is in fact extraordinary is that it took an epidemic to receive the attention our work deserved,” he said. “We were working in the shadows for years and years.”

It would be hard to imagine a work environment less glamorous, or more dangerous. He often works alone in this maximum-containment facility — Canada’s only level-4 biosafety containment laboratory — wearing what looks like a blue spacesuit, complete with a hood and gloves. Most of his days end with a chemical shower. Yet it is precisely these conditions that have helped Kobinger to attain under-



Kobinger is world-renowned for his work on the Ebola vaccine and treatment.

standing of the complex mechanisms that could protect human cells from highly infectious and deadly viruses.

“It is so quiet in a level-4 lab,” he said. “The air and temperature are controlled, which allows me to reach an intense level of concentration and focus on my work.”

From the perfect ambient temperature and controlled conditions of his lab, his research took him to the heat and squalor at the heart of the Ebola outbreak. His desire to stop infectious disease in its tracks was fanned by what he witnessed there.

“You never forget the expression of fear imprinted on the face of someone who has died of Ebola,” he said.

Over the course of four trips to Africa between 2007 and 2014, he was instrumental in implementing safety protocols as cochair of the World Health Organization’s (WHO) Emerging and Dangerous Pathogens Laboratory Network. With the danger of infection all around them, he and his team were careful to follow all protocols. “I’m motivated by the fact that we can prevent deaths. I have a wife and children, and of course I was thinking about them when I saw women and children dying of Ebola in front of us.”

It was particularly tough to watch death strike when he knew he had a potential cure, as well as a vaccine, at his lab back in Canada. “The hardest thing is administrative and bureaucratic delays which slow us down. Delays

make me impatient.”

Kobinger’s sense of urgency about his mission is palpable, but the path that led the Quebec City–born scientist to the Winnipeg lab and to Africa’s shores was not always so direct. The self-described “medical school dropout” spent a year planting trees and traveling before finding his true calling.

“He came back very sick from a trip to India,” recounts his mother, Nicole Kobinger. “I think that this was a determinant for him. One day, after several months of lying ill in bed, he got up and decided to return to university.”

Kobinger’s brush with mortality gave him a sense of purpose. “I realized there was a great need to immunize and protect people from emerging infectious diseases. I became fascinated with viruses and I was convinced we could help people. My goal became to prevent death.”

He pursued his studies with those he considered the best in his field. His doctoral work was with Éric Cohen of Université de Montréal’s Institut de recherches cliniques de Montréal, who was known for his research into retroviruses such as HIV. Then from 1999 to 2004, he did postdoctoral training under James M. Wilson’s supervision at the University of Pennsylvania in Philadelphia. “He joined my lab at a time when [there was] a collection of incredibly ambitious and aggressive post-doc cohorts,” said Wilson. “He was part of that exceptional and superior class of researcher that

came through.” Wilson credits Kobinger with conducting extremely challenging experiments using bits of the HIV virus and pseudotyping them with bits of the Ebola virus, at a time when bio-threats were heightened.

“After 9/11, and biosecurity heightened, it became very hard to gain access to one of those labs. Gary was very persistent and impatient with the bureaucratic delays, but not in a reckless way. I admire that in him,” said Wilson. “He is an amazing human being; the type that I have rarely encountered. What is so amazing about him is that he is one of the very rare people who are extremely smart, pursuing ambitious goals while abiding by very high levels of principles, and with great generosity. I mean, he would give his shirt off [his back]. What he did in Africa was selfless. It is very rare in our world, where competition is fierce and ruthless, to encounter that level of selflessness and integrity in one human being.”

Vaccines usually take at least 10 years to develop, but Kobinger and his PHAC team claim to have created what he calls a “template” — or recipe — that applies to several types of vaccines, including one tested against Ebola. This type of vaccine acts on several fronts to trigger an appropriate immune response.

“When you look at the structure of the wormlike Ebola virus under the microscope, you see its surface is peppered with glycoproteins,” he said. These proteins, which form the envelope of many other viruses, bind onto human cells and act as keys, opening a target cell and allowing the virus to penetrate and infect it. By using glycoproteins in combination with features of other infectious agents, this new type of vaccine triggers an immune reaction that has produced promising results in the recent initial human tests.

Kobinger leaves PHAC in June to head Laval University’s Infectious Disease Research Centre in his hometown of Quebec City. “We will miss him greatly, says Qiu. “We love him here, and we wish him luck.” Kobinger may be moving across the country, but his goal remains the same: preventing death. — Véronique Morin, Montréal, Que.