

# NCO Takes His Place at Forefront of Army's Zika Vaccine Research

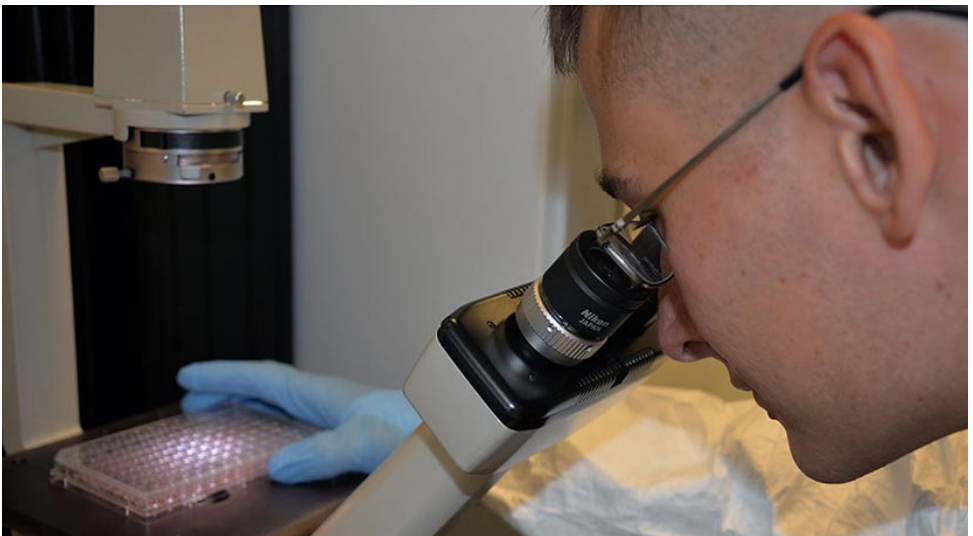
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**By Martha C. Koester**

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When Sgt. Christopher A. Springer received orders to report to the Walter Reed Army Institute of Research in Silver Spring, Maryland, all he knew of his impending assignment was that he would be working in a medical laboratory. Because of the rapid spread of Zika, Springer soon would be among the first military personnel in the country taking part in the U.S. Army's efforts to control the mosquito-borne virus.

Recognizing the threat of Zika to its service members who are located in the outbreak zones of North and South America and Southeast Asia, the Army quickly moved to develop a vaccine at the U.S. Department of Defense's

largest biomedical research laboratory. Zika, which is primarily transmitted through mosquitoes, is a flavivirus similar to yellow fever, dengue and Japanese encephalitis.



The Zika Purified Inactivated Vaccine was successfully created within a few months at WRAIR. Flaviviruses are the field of expertise at the institute, which dates back to 1893. Springer, a lab technician, played a contributing role in the team that helped in the vaccine's development.

"I had my suspicions when I got here and saw I would be working in vaccine development that there was a good chance I would get to work on something that comes out and ends up being used on a larger scale," Springer said. "I definitely felt like there would be some good opportunities here, but I had no idea that something like this could ever happen."

Springer soon was immersed in lab work with other colleagues at WRAIR. He and another colleague routinely handled the bulk majority of lab work on the Zika virus, running tests, producing paperwork and sharing the results, along with other essential lab duties. Springer has a bachelor of science in criminal justice from Sam Houston State University in Huntsville, Texas, and an associate's degree in health science laboratory technology from George Washington University in Washington, D.C.

## WRAIR leads the way

Earlier this fall, human trials began at WRAIR, where 75 healthy adults were vaccinated with the Zika Purified Inactivated Vaccine. The technology used to create the vaccine mirrors the process WRAIR undertook to produce its Japanese encephalitis vaccine, which was licensed in 2009.



“A lot of what we do here affects Soldier health every single day, so folks like Sgt. Springer are able to get an insight,” said Col. Nelson Michael, director of WRAIR’s Military HIV Research Program and Zika program co-lead. “Regardless of where they are put in this institute, they are going to be working on something that is not obscure.

“We have a lot of really young Soldiers here at WRAIR, and this will be the most unusual assignment they will ever have in the Army because we are not a troop unit,” Michael said. “We’re not a hospital unit, either. We’re something else, and we are not an administrative unit. They come here, and they are exposed to science.”

Both Michael's and Springer's laboratories are just a small sliver of an institute comprising 2,000 personnel who also work in far-flung locations in Africa and Asia, Michael said.

"[For the Soldiers,] WRAIR is basically a combination between being at the Army University and an Army company, which is making products," Michael said. "We don't do basic science for its own sake. We do a lot of very good basic science, but we do it always so we can eventually propel a scientific discovery into the field, something that protects Soldiers."

WRAIR's in-house capabilities are credited with enabling scientists to quickly develop a vaccine. The Pilot Bioproduction Facility, led by Dr. Kenneth Eckels, manufactures small doses of the vaccine to be used in clinical studies.

## **Zika's emergence**

Zika was first identified in Uganda in 1947. Researchers, who in recent years tracked the Zika infection through WRAIR laboratories in Thailand, realized the infectious disease was beginning to emerge, Michael said.

"Much like Ebola was an epidemic of disease as well as an epidemic of fear, Zika is an epidemic of disease as well as an epidemic of fear," Michael said. "Zika is new and frightening [to the public], especially if you are about to become pregnant or you are pregnant."

As of Nov. 30, according to the Centers for Disease Control and Prevention, 156 cases of Zika infection were confirmed in the military health system, including four pregnant service members and one pregnant family member. The CDC recommends that women and men who are returning from Zika-affected areas abstain or use condoms for six months, which is an increase from the previously recommended eight weeks.

"There has been at least one documented case of a Soldier who was infected with Zika overseas, came home, had sex with his wife and transmitted it," Michael said. "Zika has some twists to it — [such as] the fact that it can be transmitted sexually, because usually when you think of a disease that was borne by mosquitoes you think, 'Make sure you don't get

bitten by a mosquito.' Now, you have got to be thinking about something else."

Though the disease has been around a long time, scientists did not know much about it until very recently because no one studied it, Michael said. Infection during pregnancy was found to cause birth defects.

"Zika has hit the map big time because it causes neurological disease in developing fetuses," Michael said. "One person in 4,000 actually develops a very serious complication called Transverse Myelitis or Guillain-Barré Syndrome. Basically what it means is your muscles stop working, your sensations stop working, and it comes up in your lower extremities. If it goes high enough, you stop breathing. For all these reasons — sexual transmission, the rare but finite chance of developing neurological disease if you are an adult, and the fact that we don't have a vaccine for it — this is why we all jumped on it."

## **Collaboration counts**

Progress on a vaccine came quickly once Michael and his WRAIR colleagues — now-retired Col. Stephen Thomas, an infectious disease physician and a vaccinologist specializing in flaviviruses, and Dr. Kenneth Eckels, who runs the Pilot Bioproduction Facility — banded together. Thomas is the former deputy commander for operations at WRAIR and the former Zika program lead.

In March, Michael received a phone call from Dr. Dan Barouch, professor of medicine at Harvard Medical School. Barouch, who is also director of the Center for Virology and Vaccine Research at Beth Israel Deaconess Medical Center in Boston, Massachusetts, was seeking to collaborate with Michael and his colleagues at WRAIR. Barouch's center was developing mouse and monkey models to test the Zika vaccine, but did not have a vaccine. Michael's team had made a vaccine, but did not have the mouse and monkey models to test it.

A deal was struck, and a couple of weeks later WRAIR shipped Barouch the vaccine. In quick succession, it was proved that the vaccine protected mice and monkeys when they were exposed, Michael said.

The usual timeframe from making a vaccine to human studies is about four years, Michael said. They did it all in 200 days.

“We all put it together, and everyone shared,” Michael said. “No one tried to compete with each other.”

WRAIR has deep and durable connections with the best and brightest in Health and Human Services, including the National Institutes of Health, National Institute of Allergy and Infectious Diseases, CDC, and the Office of the Assistant Secretary for Preparedness and Response, Michael said. WRAIR is also working in collaboration with Sanofi Pasteur, one of the biggest pharmaceutical companies in the world.

“We have weekly calls where everybody — academia, government — is on the same call, talking about their own data at the same time,” he said.

“The secret for why we work quickly is that people put their egos away, which wasn’t easy because we are all competitive,” he said. “We decided to work toward a common problem. The Army has an interest in this. It’s a readiness issue. It’s affecting Soldiers. It’s affecting their families. We know that the best chance of making a vaccine is the way the Army did it — by growing up the virus and killing it.”

Another candidate — a DNA vaccine — is undergoing separate testing by the NIH in clinical trials.

“The vaccine that the NIH is making is more of a riskier vaccine,” Michael said. “It’s based on a newer technology that has never been shown to work for humans.”

## **In the spotlight**

With the advent of WRAIR’s vaccine came the national spotlight, which has highlighted the research institute and its scientists’ work on Zika. Two of their reports on the Zika Vaccine Program were published in Science and Nature journals. An article in New Yorker magazine followed, as well as many others.

“If you’re a young sergeant [such as Springer] and you’re watching this happen, this is pretty amazing,” Michael said. “Zika is probably the most topical infectious disease of 2016. People are talking about it all the time, and here he is: sitting in this environment, watching it happen. He is the tip of the spear. That’s what we do here.”

Because of his work in the lab, Springer has participated in media interviews that most young NCOs usually don’t handle. Though he has thrived on the intensity of working on a critical project such as Zika and has enjoyed seeing his name in print, Springer is ready to move on to other projects at the institute.

“I hope everything goes well in human trials and the vaccine successfully gets distributed,” Springer said. “I hope I don’t have to do anymore work on Zika — that’s what I hope more than anything. I’m overworked from Zika. I am ready to be done with it. I want that virus to be extinct.”

Though the World Health Organization announced recently that Zika is no longer a world health emergency, WRAIR officials say the fight will continue to limit its spread and prevent a future outbreak.

“The military has lots of reasons why people may not want to join us [the Army],” Michael said. “Part of what we need to be able to do is make a pact with a Soldier and his family. If we are going to send him in harm’s way — damage doesn’t just come from bullets and bombs, it comes from other sources — we want to keep him healthy. We protect them from frostbite, we protect them from heatstroke, and we protect them from diseases such as malaria, HIV, Zika and everything else. This is part of what we do.”

It’s all about readiness, and WRAIR is focused on supporting the readiness of the force whose service members are deployed around the world, Michael said. Licensing the Army’s vaccine for commercial use would probably take about two years if human testing proves to be successful, he said.

“If the DNA vaccine were to work and it were licensed, then that would be the one the Army would buy and use,” Michael said. “If our vaccine works, it’s the one the Army would buy and use. Even though I have a dog in the

fight, I really don't care which dog wins. I just want to have a tool that protects Soldiers.”