CUBA HAS A LUNG CANCER VACCINE—AND AMERICA WANTS IT

 Click to Open Overlay GalleryLung cancer. Coloured X-ray of the chest of an 84 year old woman with a malignant (cancerous) tumour (yellow) in the apex of the right lung (top left). DU CANE MEDICAL IMAGING LTD/GETTY IMAGES

CUBA HAS FOR several years had a promising therapeutic vaccine against lung cancer. The 55-year trade embargo led by the US made sure that Cuba was mostly where it stayed. Until—maybe—now.

The Obama administration has, of course, been trying to normalize relations with the island nation. And last month, during New York Gov. Andrew Cuomo's visit to Havana, Roswell Park Cancer Institute finalized an agreement with Cuba's Center for Molecular Immunology to develop a lung cancer vaccine and begin clinical trials in the US. Essentially, US researchers will bring the Cimavax vaccine stateside and get on track for approval by the Food and Drug Administration.

“The chance to evaluate a vaccine like this is a very exciting prospect,” says Candace Johnson, CEO of Roswell Park. She’s excited, most likely, because research on the vaccine so far shows that it has low toxicity, and it’s relatively cheap to produce and store. The Center for Molecular Immunology will give Roswell Park all of the documentation (how it’s produced, toxicity data, results from past trials) for an FDA drug application; Johnson says she hopes to get approval for testing Cimavax within six to eight months, and to start clinical trials in a year.

How did Cuba end up with a cutting edge immuno-oncology drug? Though the country is justly famous for cigars, rum, and baseball, it also has some of the best and most inventive biotech and medical research in the world. That’s especially notable for a country where the average worker earns $20 a month. Cuba spends a fraction of the money the US does on healthcare per individual; yet the average Cuban has a life expectancy on par with the average American. “They’ve had to do more with less,” says Johnson, “so they’ve had to be even more innovative with how they approach things. For over 40 years, they have had a preeminent immunology community.”

Despite decades of economic sanctions, Fidel and Raul Castro made biotechnology and medical research, particularly preventative medicine, a priority. After the 1981 dengue fever outbreak struck nearly 350,000 Cubans, the government established the Biological Front, an effort to focus research efforts by various agencies toward specific goals. Its first major accomplishment was the successful (and unexpected) production of interferon, a protein that plays a role in human immune response. Since then, Cuban immunologists made several other vaccination breakthroughs, including their own vaccines for meningitis B and hepatitis B, and monoclonal antibodies for kidney transplants.

The thing about making such great cigars is, smoking is really, really bad for you. Lung cancer is the fourth-leading cause of the death in Cuba. Medical

researchers at the Center for Molecular Immunology worked on Cimavax for 25 years before the Ministry of Health made it available to the public—for free—in 2011. Each shot costs the government about $1. A Phase II trial from 2008 showed lung cancer patients who received the vaccine lived an average of four to six months longer than those who didn't. That prompted Japan and some European countries to initiate Cimavax clinical trials as well.

To be fair, Cimavax probably won't be a game-changing cancer drug in its current form. The vaccine doesn't attack tumors directly, instead going after a protein that tumors produce which then circulates in the blood. That action spurs a person's body to release antibodies against a hormone called epidermal growth factor, which typically spurs cell growth but can also, if unchecked, cause cancer. (Although most people normally think of a vaccine as something that prevents a disease, technically a vaccine is a substance that stimulates the immune system in some way.) So the point of Cimavax is to keep lung tumors from growing and metastasizing, turning a late-stage growth into something chronic but manageable.

But in the US and Europe, people with lung cancer already have treatment options with the same goal. Roswell Park researchers say they plan to explore the vaccine's potential as a preventative intervention—making it more like a traditional vaccine. Furthermore, epidermal growth factor plays an important role in many other cancers, like prostate, breast, colon, and pancreatic cancer. "All those things are potential targets for this vaccine," says Kelvin Lee, an immunologist at the company. Mostly for financial reasons, Cubans didn't test Cimavax that way at all.

And that drug isn't the only one with potential in the Cuban pharmacopeia. Thomas Rothstein, a biologist at the Feinstein Institute for Medical Research, has for six years worked with the Center for Molecular Immunology on another vaccine to treat lung cancer called Racotumomab, with an entirely different mechanism. (It messes with a particular lipid found in tumor cell

membranes.) “Investigators from around the world are trying to crack the nut of cancer,” Rothstein says. “The Cubans are thinking in ways that are novel and clever.”

Although President Obama has used his executive power to lift some restrictions against medical and research equipment, Congress must lift the Cuban embargo before collaborative research can ramp up. Johnson hopes to see Cuba embrace more entrepreneurialism in science, and see the US soak up more creative approaches to medical research. Constrained by politics, the Cuban researchers had to innovate in ways the US and Europe did not. Now maybe they’ll be able to teach their colleagues what they learned.