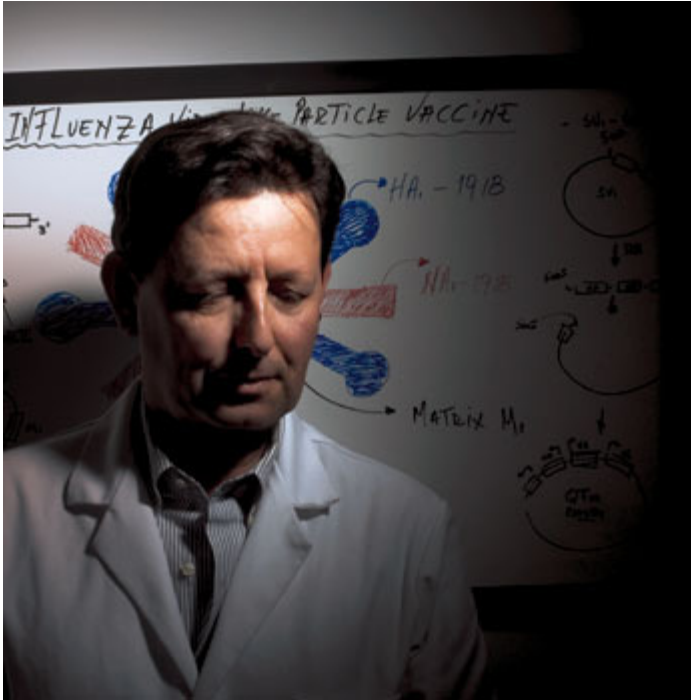


May 2006

Catching the Flu: A Photo Essay

As it tests a new way of making vaccines, TechnoVax is targeting the deadly 1918 flu virus.

By Stephan Herrera (MIT Technology Review)

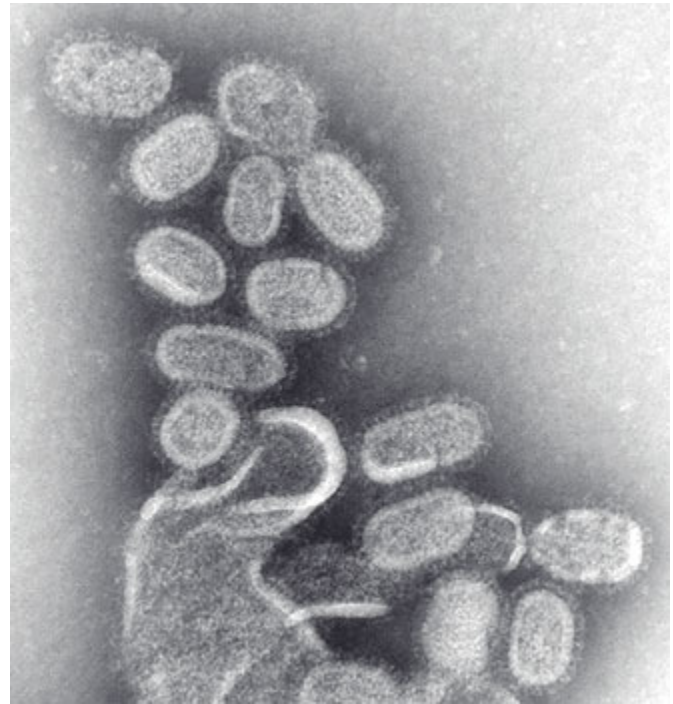


Jose Galarza is the CEO of TechnoVax, a biotechnology startup in Tarrytown, NY. His company, whose laboratory is featured in the following pages, has received a grant from the National Institutes of Health to pursue a new approach to making vaccines -- one that Galarza believes will allow for fast adaption to changing flu strains as well as rapid manufacturing.

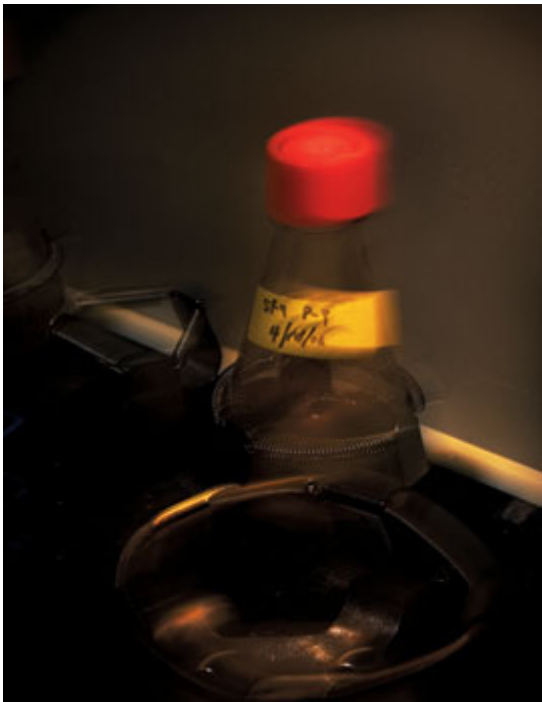


A May 1919 photo shows flu victims being treated in Lawrence, MA. The 1918–1919 influenza pandemic killed 675,000 people in the United States.

The 1918 virus can be a useful test target for vaccines made by novel methods. Jose Galarza, whose NIH grant has him using just a portion of the virus, works with viruslike - particles (VLPs), balls of protein arranged to so closely resemble a virus that they provoke an immune response. VLPs can thus serve as the basis for a vaccine, but because they do not contain a virus's genetic material, they can't replicate and cause infection. When freeze-dried, they can also last for six weeks, which makes them easy to transport.



Galarza says that his company's VLPs self-assemble quickly enough to be made in large quantities in weeks. Vaccines made the traditional way -- grown in chicken eggs -- require months to produce.



Galarza makes his VLPs with the aid of insect cells, which, in a process called transfection, have foreign DNA inserted into them. The extra DNA directs the synthesis of the VLP proteins and controls their release to the cells' surfaces. A shaker incubator agitates a flask to oxygenate the insect cells inside it and keep them in suspension.



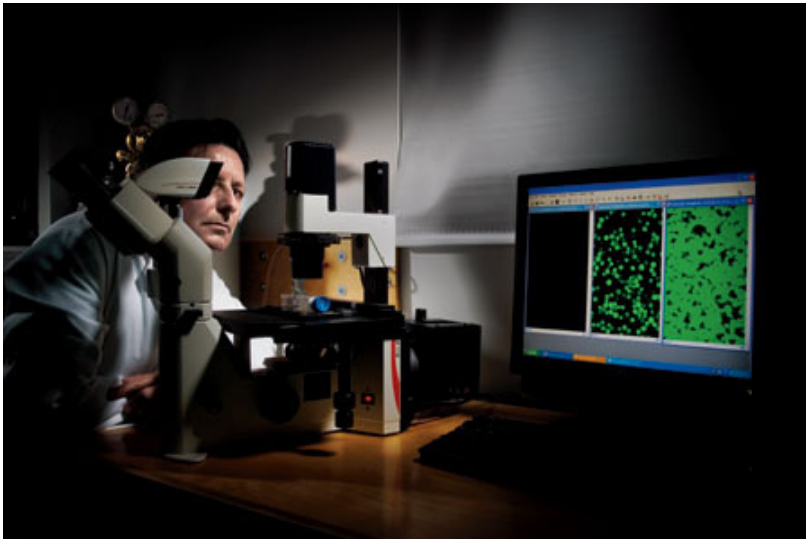
The development of a new VLP vaccine begins with the extraction and purification of the genes that code for the VLP proteins. At the end of the extraction process, purified DNA precipitates out of solution in a flask; along the way, the solution changes color to indicate the conclusion of each stage in the process. The purified DNA is placed in a polymerase chain reaction machine to be copied.



Researchers then string together the genes for the various proteins that will make up the VLP.



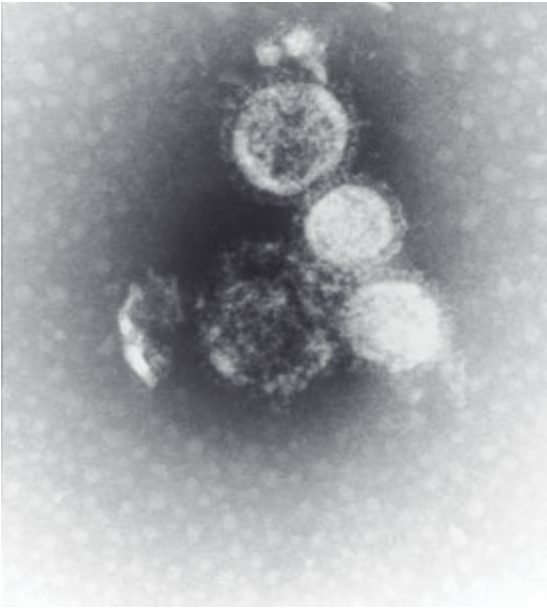
Once those genes have been introduced into the insect cells, the cells are microscopically examined to determine whether they are producing the desired proteins. All work with the cells takes place in a biosafety cabinet workstation.



Current efforts to make flu vaccines face a central difficulty: the lag time between when a new flu strain is identified and when a vaccine against it can be produced is long enough to allow for a pandemic. Currently, the H5N1 avian influenza is what most concerns health officials (the deadly 1918 virus was also

an avian flu). But unless the lag time for vaccine development shortens, there are certain to be similar worries in the future.

If VLPs can yield vaccines quickly and cheaply, they could allay some of those worries. While their efficacy has yet to be proven, it is clear that VLPs can be produced in great quantities, quickly. The images on the monitor depict the number of VLPs produced by a culture of cells on three consecutive days. The green glow indicates that the VLP production is progressing as planned.



This photo was taken in 2001; it shows VLPs that Galarza produced while working for Wyeth, a Madison, NJ-based pharmaceutical company. Galarza's NIH grant funds his work on vaccines for four different strains of flu: the 1918 flu; the H5N1 avian influenza that is spreading across Asia and Europe; the H7N7 avian influenza, which hit the Netherlands in 2003; and the current seasonal New York strain of influenza.

*Photographs by Sean Kennedy Santos
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