Potato Vaccine for Hepatitis B: Syringes off the Menu?

John Roach - National Geographic News
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Scientists have shown that, for hepatitis B vaccine, genetically modified potatoes may be an alternative to the syringe and needle.

The hepatitis B virus (HBV) causes liver failure and liver cancer. Despite the availability of a safe, injectable vaccine, the virus currently infects an estimated 350 million people worldwide and kills about a million people every year.

Vaccines are substances that start the body producing antibodies (a substance that counteracts toxins or foreign substances in the body). A vaccine for the hepatitis B virus would start the human body producing antibodies for hepatitis B making the person immune to it. Today vaccines can prevent diseases ranging from polio to chicken pox.
In recent years scientists have raced to develop oral vaccines in genetically modified plants way to deliver vaccines. Imagine eating a potato instead of getting a shot to get a flu vaccine. This is a great option for many, especially in developing countries.

"The whole concept of oral vaccines, versus injections, is a very attractive one. As you can imagine, we are used to taking things by mouth. They are easy, and there are not associated problems with potential contamination due to syringes and needles," said Yasmin Thanavala, an immunologist at the Roswell Park Cancer Institute in Buffalo, New York.

Previously researchers have shown that potatoes can deliver vaccines for intestinal pathogens such as the *E. coli* and Norwalk viruses, which enter the body via the mouth.

This week in the research journal *Proceedings of the National Academy of Sciences,* Thanavala and colleagues report on the first human, or clinical, trial for a plant-derived HBV vaccine. HBV is transmitted by blood or sexual fluids.

Clinical Trial

For the clinical trial, the researchers genetically modified potatoes to carry the gene for the hepatitis B surface antigen. An antigen is a foreign substance, usually a protein, that, when absorbed by the body, triggers an immune response.

In the trial of 42 participants previously inoculated with the traditional hepatitis B vaccine, about 60 percent showed signs of boosted immunity after eating bite-size pieces of raw genetically modified spuds.

Oral Vaccines

Thanavala and colleagues are now working to match or better the success of the syringe-and-needle hepatitis B vaccine with their potato-derived version. The traditional vaccine has a success rate of about 90 percent. About 10 percent of all people, for reasons not understood, fail to respond.

If successful, the researchers envision a plant-derived hepatitis B vaccine that could serve to boost the immune response of previously vaccinated people in countries like the U.S. And for the 60 percent of the world's children who lack the vaccine, a plant-derived version may be the solution, Arntzen said.