Smallpox vaccine alternative identified

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University of California, Irvine infectious disease researchers have shown the effectiveness of a potential alternative to the existing smallpox vaccine that can replace the current biodefense stockpile for this lethal virus.

Philip Felgner and Huw Davies with the Department of Medicine found that the modified vaccinia virus Ankara (MVA) produced the same antiviral response in human and animal studies as the current smallpox vaccine, Dryvax. The study is part of a national effort to develop a replacement for the Dryvax vaccine, which causes serious complications in some people. The results are published in the *Journal of Virology*.

“Studies have shown MVA to be a much safer vaccine product that takes advantage of modern technology,” Felgner said. “We are pleased that our advanced analytical methods may help to bring an effective and safer vaccine to the public.”

Smallpox was declared eradicated worldwide in 1980; the last naturally occurring case in the world was in Somalia in 1977. Routine vaccination against smallpox in the U.S. stopped in 1972, and Dryvax production was halted in 1982.

Both Dryvax and MVA are strains of vaccinia virus, which is related to the smallpox virus. The antibodies created by vaccinia virus infection protect a person against a lethal smallpox infection, making it suitable for use as a vaccine. Unlike smallpox virus, vaccinia creates a very mild infection and is completely safe for healthy individuals.

Although Dryvax was effective during the eradication campaign in the 1960s and ’70s, its manufacturing methods are outdated by today’s standards, and it is also associated with significant risk of adverse reactions for immune-compromised individuals.

The National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health, identified MVA as a possible candidate to replace Dryvax. MVA was first developed in the 1970s and has been administered to animal species and humans with little or no adverse side effects.

In the study, Felgner and Davies applied blood serum samples taken from both humans and animals given the MVA or Dryvax vaccines to “microarray” chips containing more than 200 vaccinia virus proteins, on which they simultaneously studied how the serum antibodies responded to all the vaccinia proteins.

The researchers found that these antibody responses were similar in both the animal and human subjects regardless whether they were given MVA or Dryvax, suggesting that MVA contains antiviral properties similar to those in Dryvax.

This similarity is vital, Davies says, because if a vaccine initiates an immune response in humans that matches the one in animals that are protected against lethal pox viruses, then public health officials will have more confidence that the vaccine will be effective in humans.

“This is particularly important for vaccines against lethal infections like smallpox, where human clinical trials cannot be done,” he added.

Source: University of California - Irvine