

Why does smallpox vaccine shield some, not others? It's in the genes, study finds

April 18 2013

How well people are protected by the smallpox vaccine depends on more than the quality of the vaccination: individual genes can alter their response, Mayo Clinic research shows. The findings, gathered using sophisticated genomic screening, appear in today's online issue of the journal *Genes and Immunity*.

"We were looking into the intercellular reactions that occur when vaccinated and unvaccinated persons are exposed to and infected with [smallpox virus](#). We were able to use blood samples taken directly from vaccinated patients," says senior author Gregory Poland, M.D., director of the Mayo Clinic [Vaccine Research](#) Group. "We could see what would happen based on exposing a mixed-cell peripheral blood [cell population](#) to the vaccinia virus."

While worldwide vaccination is believed to have eradicated smallpox, the highly contagious and sometimes fatal illness remains a bioterrorism concern.

Researchers studied 44 participants from Mayo Clinic and the Naval Health Research Center who had received the [smallpox vaccine](#) in the previous 48 months. Two samples were prepared from each of the 44, one uninfected and one that was infected with vaccinia, a smallpox-like virus. RNA (ribonucleic acid, molecules that represent the DNA makeup) from the samples was then tested in the high-speed sequencing facilities at Mayo Clinic's Center for Individualized Medicine. [Genetic differences](#) were found between people with robust protective antibodies

and those with lower immunity from smallpox.

Dr. Poland says this individualized medicine approach and its findings offer researchers new targets for developing tests to determine if a person should receive a specific vaccine, but also an opportunity to develop new vaccines to benefit non-responders.

Provided by Mayo Clinic

Citation: Why does smallpox vaccine shield some, not others? It's in the genes, study finds (2013, April 18) retrieved 19 April 2024 from <https://medicalxpress.com/news/2013-04-smallpox-vaccine-shield-genes.html>

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