Grant funds feasibility study of microneedle patches for polio vaccination

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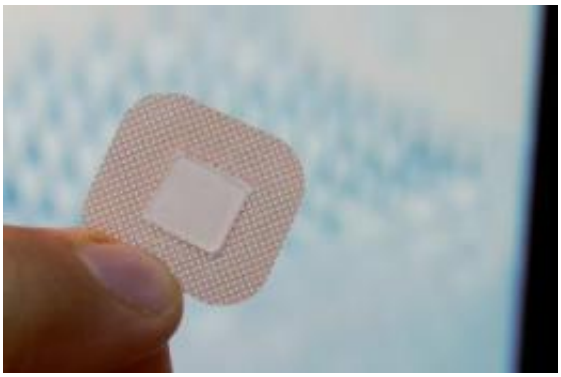
Georgia Tech Regents' professor Mark Prausnitz holds a prototype microneedle patch with a microscope image of the microneedles shown in the background. Researchers from Georgia Tech and the CDC have received funding to study the use of such patches for polio vaccination. Credit: Georgia Tech Photo: Gary Meek

The Georgia Institute of Technology will receive funding through Grand Challenges Explorations, an initiative created by the Bill & Melinda Gates Foundation that enables researchers worldwide to test unorthodox ideas that address persistent health and development challenges. Mark Prausnitz, Regents' professor in Georgia Tech's School of Chemical and Biomolecular Engineering, will pursue an innovative global health research project focused on using microneedle patches for the low-cost administration of polio vaccine through the skin in collaboration with researchers Steve Oberste and Mark Pallansch of the US Centers for

Disease Control and Prevention (CDC).

Grand Challenges Explorations funds scientists and researchers worldwide to explore ideas that can break the mold in how we solve persistent global health and development challenges. The Georgia Tech/CDC project is one of 110 Grand Challenges Explorations grants announced November 7th.

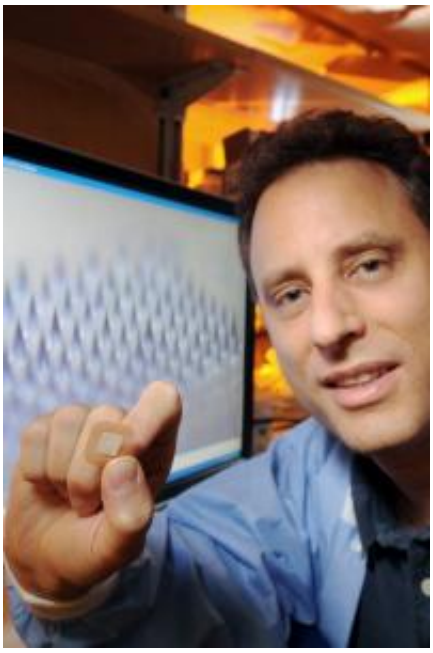


Patches containing tiny microneedles could one day replace conventional hypodermic needles for drug and vaccine delivery. Researchers from Georgia Tech and the CDC have received funding to study the use of such patches for polio vaccination. Credit: Georgia Tech Photo: Gary Meek

"We believe in the power of innovation -- that a single bold idea can pioneer solutions to our greatest health and development challenges," said Chris Wilson, director of global health discovery for the Bill & Melinda Gates Foundation. "Grand Challenges Explorations seeks to identify and fund these new ideas wherever they come from, allowing scientists, innovators and entrepreneurs to pursue the kinds of creative ideas and novel approaches that could help to accelerate the end of polio, cure HIV infection or improve sanitation."

Projects that are receiving funding show promise in tackling priority global health issues where solutions do not yet exist. This includes finding effective methods to eliminate or control infectious diseases such as polio and HIV as well as discovering new sanitation technologies.

The goal of the Georgia Tech/CDC project is to demonstrate the scientific and economic feasibility for using microneedle patches in vaccination programs aimed at eradicating the polio virus. Current vaccination programs use an oral polio vaccine that contains a modified live virus. This vaccine is inexpensive and can be administered in door-to-door immunization campaigns, but in rare cases the vaccine can cause polio. There is an alternative injected vaccine that uses killed virus, which carries no risk of polio transmission, but is considerably more expensive than the oral vaccine, requires refrigeration for storage and must be administered by trained personnel. To eradicate polio from the world, health officials will have to discontinue use of the oral vaccine with its live virus, replacing it with the more expensive and logistically-complicated injected vaccine.



Georgia Tech Regents' professor Mark Prausnitz holds a prototype microneedle patch with a microscope image of the microneedles shown in the background. Researchers from Georgia Tech and the CDC have received funding to study the use of such patches for polio vaccination. Credit: Georgia Tech Photo: Gary Meek

Prausnitz and his CDC collaborators believe the use of microneedle patches could reduce the cost and simplify administration of the injected vaccine. Use of the patches, which carry vaccine into the body by dissolving into the skin, could eliminate the need for administration by highly-trained personnel and the "sharps" disposal problems of traditional hypodermic needles. Because skin administration produces an immune response with smaller doses of vaccine than traditional deep intramuscular injection, the researchers expect to reduce the per-person cost of vaccine. And by incorporating dried vaccine into the microneedles, they hope to eliminate the need for vaccine refrigeration – a challenge in remote areas of the world.

"We envision vaccination campaigns in which minimally-trained personnel go door-to-door administering microneedle patches rather than oral polio vaccine," Prausnitz explained. "Our goal for this study will be to provide the data to scientifically justify moving the microneedle patch for polio vaccination into a human trial."

In research that will complement the Grand Challenges Exploration grant, Prausnitz and his team have also received funding from the World Health Organization (WHO) to support development of the polio vaccine application for microneedle patches. And in a project sponsored by the U.S. National Institutes of Health (NIH), Prausnitz and other Georgia Tech researchers are collaborating with Emory University scientists on development of a microneedle patch for administering flu vaccine.

Provided by Georgia Institute of Technology