



The ultra-low-cost ePatch vaccination device | Photo source [Candler Hobbs / Georgia Tech](#)

[Innovation](#) > [Health & Wellbeing](#) > [BBQ lighter fitted with microneedles used to deliver vaccines](#)

BBQ LIGHTER FITTED WITH MICRONEEDLES USED TO DELIVER VACCINES

 HEALTH & WELLBEING

Researchers have developed an ingenious vaccine delivery system that uses re-engineered BBQ lighters

Spotted: Electroporation uses short electric pulses to drive molecules into cells. It is potentially very effective at delivering vaccines, but the equipment required to deliver it is bulky, complex, and expensive. Now, researchers at Georgia Tech have found a much easier way to use electroporation to deliver vaccines. Surprisingly, the new method involves a re-purposed BBQ lighter.

Researchers re-engineered the insides of the lighter to create the same electric field in the skin as the bulkier electroporation machines. This was paired with microneedle technology from Georgia Tech's Laboratory for Drug Delivery. Although microneedles are commonly used in cosmetics, they are not generally used as electrodes. The researchers adapted them by pairing the tiny electroporation pulse with microneedle electrodes to create an electrical interface with the skin.

The microneedle-based system, dubbed 'ePatch', uses voltages similar to conventional electroporation, but with much shorter pulses and using electrodes that penetrate just .01 inches into the skin. The shorter pulses and shallow electrodes minimise pain and involuntary muscle twitching.

In tests, the ePatch has proven effective at delivering vaccines. Chinglai Yang, associate professor in the Department of Microbiology and Immunology at Emory University School of Medicine, helped test the delivery system. Yang [explains](#) that, "In the beginning, I wasn't sure that it would be successful when Georgia Tech asked me to collaborate on this project. Surprisingly, even in the first try, it went far beyond my expectations. Using this method with the same amount of vaccine, the ePatch induced an almost tenfold improved immune response over intramuscular immunization or intradermal injection."

Drug delivery systems may not seem as important as developing new drugs themselves. But improved delivery can help with everything from improving drug action to reducing side-effects and democratising access to medicine. This is why we are seeing a wide range of innovations in drug delivery, including [using cartilage](#) to delivery anti-inflammatory drugs and [micro-robots](#) steered by ultrasound for targeted drug delivery.

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16th November 2021

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Takeaway:

The ePatch could represent a real breakthrough in vaccine delivery. It appears to be more effective, far cheaper and more portable than other electroporation devices. This makes it potentially invaluable in widening the reach of vaccination programmes. The researchers are currently working on refining their system, including work to optimise the immune response and develop a more compact delivery system. There is still some way to go before human trials can take place, but the researchers estimate the ePatch could be in widespread use in around five years.