Researchers develop a dissolvable needle-free Nanopatch for vaccine delivery

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University of Queensland research has found the Nanopatch - a needle-free, pain-free method of vaccine delivery - is now dissolvable, eliminating the possibility of needle-stick injury.

Project leader Professor Mark Kendall, from the Australian Institute for Bioengineering and Nanotechnology, said the finding confirmed that the Nanopatch was a potential safer, cheaper alternative to needle vaccines.

The study was published recently in scientific journal *Small*.

“What we have been able to show for the first time is that the Nanopatch is completely dissolvable,” Professor Kendall said.

“That means zero needles, zero sharps, zero opportunity for contamination and zero chance of needle-stick injury.

“The World Health Organisation estimates that 30 percent of vaccinations in Africa are unsafe due to cross contamination caused by needle-stick injury. That's a healthcare burden of about $25 per administration.”

The Nanopatch is smaller than a postage stamp and is packed with thousands of tiny projections - invisible to the human eye - now dried to include the vaccine itself together with biocompatible excipients.

When the patch is placed against the skin, these projections push

through the outer skin layer and deliver the biomolecules to the target cells.

When dry, the device is stable and strong. When the Nanopatch is applied to the skin, the projections immediately become wet, dissolving within minutes.

Research published in journal Plos One in April found that the Nanopatch achieved a protective immune response using an unprecedented one-hundredth of the standard needle and syringe dose.

Professor Kendall said this was 10 times better than any other delivery method.

Being both painless and needle-free, the Nanopatch offers hope for those with needle phobia, as well as improving the vaccination experience for young children.

"When compared to a needle and syringe, a Nanopatch is cheap to produce and it is easy to imagine a situation in which a Government might provide vaccinations for a pandemic such as swine flu to be collected from a chemist or sent in the mail," Professor Kendall said.

He said the work had been in progress for five years and his team hoped to start clinical trials soon.

The study was conducted using influenza vaccine but Professor Kendall said any vaccine could potentially be delivered via the Nanopatch.

Also published in a separate paper in *Small* is research showing the Nanopatch's success extends to candidate vaccines for West Nile virus and Chukunga virus.