

Immune boosting benefits of tuberculosis vaccine seen in infants more than a year after vaccination

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The immune boosting benefits of a tuberculosis vaccine can be seen in infants more than one year after vaccination, according to a new study.

The research, led by the Murdoch Children's Research Institute (MCRI)

and published in *Science Advances*, has shown how the BCG [vaccine](#), developed to prevent the risk of tuberculosis, can produce a "trained immunity response" lasting more than 14 months after the vaccine is administered.

The randomized [controlled trial](#) involved 130 infants from the Melbourne Infant Study: BCG for the Prevention of Allergy and Infection (MIS BAIR) and cell dish models to study the immune system's response to BCG vaccination. Those randomized to be vaccinated received their jab within 10 days of birth.

Murdoch Children's Dr. Samantha Bannister said 14 months after having the BCG vaccination they saw reprogramming, a process where genes were switched off or on, in a specific blood cell type, called the monocyte.

"The off-target effects of the BCG vaccine against a range of viruses are explained in part by the reprogramming of how your genes work in the monocyte due to environmental and behavioral factors," she said. The reprogramming of monocytes, a cell previously thought to have no capacity for memory, leads to trained immunity."

Murdoch Children's Associate Professor Boris Novakovic said the off-target effects were first identified in Africa, where BCG vaccinated children had reduced overall death rates.

"The off-target effects in Africa were known to last more than a year, but previous studies looking at BCG-associated monocyte signatures only looked at one month and three months following vaccination in adults," he said. For the first time we have shown how the BCG vaccine can have long-lasting effects on the immune system of infants.

"As babies are the main population given the BCG vaccine, this study is

important because findings in adults do not always translate to children."

For the trial the [research](#) team collaborated with the lab of Professor Mihai Netea from the Radboud University Medical Center in the Netherlands that first described trained immunity and scientists from the International Trained Immunity (INTRIM) Consortium.

Murdoch Children's and University of Melbourne's Professor Nigel Curtis said the next step was to see what impact this early trained immunity offered later in childhood and into adulthood.

Professor Curtis' team at the Murdoch Children's is leading the [BRACE trial](#), the world's largest examination of the off-target effects of the BCG vaccine in more than 6,800 [healthcare workers](#) in Australia, Brazil, Spain, the Netherlands and the United Kingdom. BRACE is testing whether the vaccine can protect those exposed to SARS-CoV-2 from developing [severe symptoms](#) by boosting their frontline immunity.

More information: Samantha Bannister et al, Neonatal BCG vaccination is associated with a long-term DNA methylation signature in circulating monocytes, *Science Advances* (2022). [DOI: 10.1126/sciadv.abn4002](#). www.science.org/doi/10.1126/sciadv.abn4002

Provided by Murdoch Children's Research Institute

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