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## **Tattooing, Found to Be the Best Method of Vaccination!**

### *A 16-time stronger immune response*

Tattoos have been part of human culture for thousands of years. But in the last century, the practice spread worldwide. A tattoo says a lot about you and your life history. And a German team has found that tattoos may be more than that: they could represent the best method of delivering vaccines. The research published in the journal "Genetic Vaccines and Therapy" details tests made on mice proving that vibrating tattoo needles could be much more effective in causing an immune response in the case of many therapeutic vaccines, including the ones for some cancers. In many cases, vaccines fail to induce the expected immune response when delivered through injection. The team used a coat protein from the human papillomavirus (HPV, the cause of cervical, oral, anal, penile cancers) as a model DNA vaccine antigen, and this was delivered by tattooing the skin of mice, or by standard intramuscular injection with and without the molecular adjuvants favoring the immune reaction. The investigation revealed that tattooing provoked the synthesis of 16 times more antibodies than a simple injection into the muscle tissue. The adjuvants boosted the effect of intramuscular injection, but not of tattooing. "The greater damage to the body caused by the tattoo needle may explain the better immune response," said co-author Dr. Martin Mueller of the Deutsches Krebsforschungszentrum (German Cancer Research Center), Heidelberg, Germany, pointing to the wound and inflammation effect of the tattooing. Tattoos also cover a larger area of the skin than an injection, so the DNA vaccine affects more cells. But the tattoo needles could not be used for preventative vaccines in children (like the one for measles), as the pain would be unbearable for them, but they could be widely employed in the routine vaccination of livestock. "Vaccination with naked DNA has been hampered by its low efficiency. Delivery of DNA via tattooing could be a way for a more widespread commercial application of DNA vaccines", said Muller.