

# SHOT IN THE ARM: ON THE MEDICINE NOBEL 2023

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All nominees for the [Nobel Prize in Physiology or Medicine](#) have path-breaking achievements to their credit, but often, the final choice of the winner might have a lot to do with the timing and the context. [Katalin Karikó and Drew Weissman](#) would have thus been safe bets for their work that [enabled the development of effective mRNA vaccines](#) against COVID-19. The 2023 Nobel announcement comes as no surprise, given that the benefits of the discovery are still keeping people alive and out of hospitals. It also ticks all the boxes: the Nobel prize for Medicine must be awarded for a discovery that would confer the 'greatest benefit on mankind' which mRNA undoubtedly did. This Nobel is also significant in that it recognises the contribution of a woman of science: 13 women have now won the Nobel Prize for Medicine (out of 225 awarded); and only 62 women have won any Nobel Prize (against 894 men) so far.

The best outcomes inevitably emerge from intersectoral collaborations, and steadfast scientific research conducted against all odds. Hungarian biochemist Katalin Karikó became fascinated with mRNA when it was a mere possibility. In human cells, genetic information encoded in DNA is transferred to messenger RNA (mRNA) and this is then used as a template for protein production. Proteins are the main structural component of cells, and play a key role in growth and repair. During the 1980s, a method called in vitro transcription permitted the idea of using mRNA for vaccine and therapy to take off, but enthusiasm to work on this flagged as several hurdles emerged, including challenges in delivery and inflammatory reactions. Undeterred, Karikó kept on the course of developing methods to use mRNA for therapy, when she was an assistant professor at the University of Pennsylvania. She was then joined by immunologist Weissman, who was studying dendritic cells that have important functions in immune surveillance and activation of vaccine-induced immune responses. Over the years, by making base modifications to the mRNA they managed to ease delivery paths and get rid of the inflammatory reactions. An inchoate idea was finally teased into fruition. This was in 2005, 15 years before the COVID-19 pandemic. But the time and context arrived in 2019, when scientists taught the mRNA vaccine to instruct human cells to make the S protein found on the surface of the COVID-19 virus. This causes the body to create antibodies which will fight the virus if the individual were to contract the infection. The rest, of course, is history.

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