How mRNA vaccines protect against current and future Covid-19 variants

For the majority of healthy adults, three mRNA shots coupled with a previous infection are enough to protect them against current and future Covid-19 variants. Professor Ooi Eng Eong, an expert in emerging infectious diseases at Duke-NUS Medical School, tells **senior health correspondent Salma Khalik** why vaccines confer long-term protection.

FOUR MAIN WAYS 3 At least two antibodies binding to a virus will trigger a shemist Antibodies prevent infection They prime our immune cells Natural killer cells attack a virus **ANTIBODIES** by binding to the virus and (sweepers) to mop up antibodies to a virus will trigger a chemical that is bound to an antibody. **FIGHT A VIRUS** stopping it from entering linked to the virus. reaction that punches a hole in the viral membrane. destroving cells to reproduce. Vaccines create antibodies it. (which wane after a few months of inactivity), prime T cells to recognise the virus, and prepare B cells that can produce more antibodies when the body next encounters the virus. WHY IT'S NOT EASY FOR THE VIRUS TO ENTER CELLS TO REPLICATE For the virus to reach such a receptor, it is Although it takes less than 24 hours for infected cells The ACE2 receptor 3 Once a virus enters the A This factory always puts out a "sample" 1 of what it is producing on its surface (in on the cell surface like someone parachuting into Singapore cell, it heads to the to die, the virus needs only one round of eight hours to find Shenton Way, without a map. But if the human leukocyte antigen protein) to produce thousands of viruses to be released from is the main entry "factory" within the cell point for the hundreds of thousands are parachuted in. to get it to produce so the "police" T cells can check if what the cell to invade other cells. More than one round of Sars-CoV-2 virus. some will land in Shenton Way. is produced belongs to the body. virus production may occur before the cell dies. more virus. It is always a race between our vaccine- or infection-primed

WHY PROTECTION REMAINS AS VARIANTS CHANGE

All Sars-CoV-2 variants retain some basic, unchanging parts.



So the first mRNA vaccine would prime our body to recognise the original virus' "grey jacket".



The bivalent vaccine retains the shape of the jacket, but the colour changes – say, green for Moderna and red for Pfizer.

The virus releases its RNA

defences and the virus.



A new variant with a yellow jacket may try to infect us.

The virus also taps energy from the mitochondria in the cell for this. When a lot of energy is generated, or when the sample produced does not belong, killer T cells swoop in to destroy the entire cell, virus and all.

FACTORY



Our defences might take a little longer to react as it does not recognise the colour, but it does remember the shape of the jacket and will mount a response.

Replicated Sars-CoV-2



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