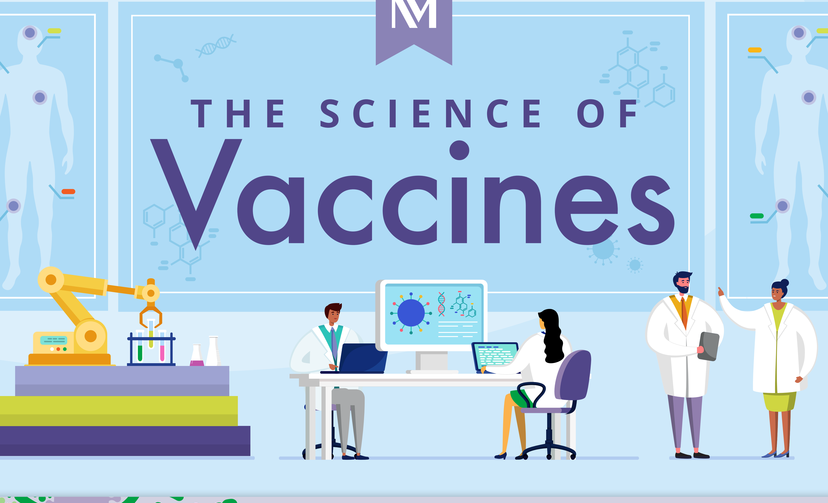
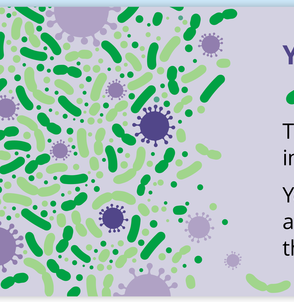
THE SCIENCE OF Vaccines





You and Immunity

Bacteria and Viruses

These are the intruders — **antigens** — that get into your body and try to make you sick.

Your immune system recognizes these intruders and produces special proteins called **antibodies** that can lock onto and destroy the antigens.

Trick and Teach

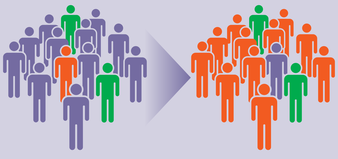
Vaccines use **dead or weakened antigens**, or parts of them like proteins, to trick your immune system into thinking there's an intruder in your body. As a result, your immune system creates **antibodies** to fight the antigen. Once your body knows how to make these antibodies, it stores the assembly instructions in **"memory cells,"** and destroys the rest of the antigens present. If the antigen ever makes its way back into your body, your immune system will know how to assemble the antibodies to destroy the intruder quickly.

Helping the Herd

Vaccines protect individuals...and entire populations.

Take the highly infectious measles virus, for example...

If only a **few** people get vaccinated...



...measles can spread to up to **90%** of the population.

If **92% to 94%** of the population gets vaccinated against measles...

...the virus has nowhere to go and will not spread to the unprotected **6% to 8%**.

Healthy, non-vaccinated | Healthy, vaccinated | Non-vaccinated, sick, contagious

Vaccine Variance

Here are five common types of vaccines and how they work.

Type	How It Triggers Immune Response	Example
mRNA	Uses messenger ribonucleic acid (mRNA) to cause cells to make a protein or a piece of a protein to mimic the antigen.	COVID-19 vaccine
Live-Attenuated	Uses a weakened form of the antigen that causes disease.	Chickenpox vaccine
Inactivated	Uses a dead form of the antigen that causes disease.	Flu vaccine
Subunit, Recombinant, Polysaccharide and Conjugate	Use a specific piece of the antigen, like a protein, sugar or casing around it.	Shingles vaccine
Toxoid	Uses a toxin made by the antigen that causes a disease.	Tetanus vaccine

Sources:

Centers for Disease Control and Prevention (CDC)
cdc.gov/vaccines/index.html
cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/mrna.html
U.S. Department of Health & Human Services
vaccines.gov

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