WHAT ARE VACCINES

TINY "TRAINING SESSIONS" FOR YOUR IMMUNE SYSTEM

Vaccines are one of the safest and most effective tools we have to prevent disease, protect communities, and save lives. This toolkit is designed to provide clear, evidence-based information about how vaccines work, the different types available, and why they're essential for public health. Whether you're a healthcare professional, advocate, or simply looking to learn more, this resource will help you build confidence in conversations about vaccines.

Important Definitions

ANTIBODIES

Protective proteins produced by your immune system. They attach to antigens (foreign substances) — such as bacteria, fungi, viruses and toxins — and remove them from your body.

LIVE-ATTENUATED VACCINES

Vaccines that use a weakened (or attenuated) form of the germ that causes a disease.

INACTIVATED VACCINES

Inactivated vaccines use the killed version of the germ that causes a disease.

SUBUNIT AND CONJUGATE VACCINES

Vaccines that use specific pieces of the germ—like its protein, sugar, or capsid (a casing around the germ).

MESSENGER RNA VACCINES—ALSO CALLED MRNA VACCINES

Type of vaccine that uses a molecule called messenger RNA (mRNA) rather than part of an actual bacteria or virus

ANTIBODIES 101

ANTIBODIES = YOUR BODY'S ARMY OF DEFENDERS

DEFENSE

Antibodies are your body's army of defenders that recognize specific invaders (like viruses and bacteria) and take them out – pow pow pow!

B CELLS

Germs are "decorated" with molecules that distinguish them from one another–kind of like the various features (hair style, eye color) that make people unique. These molecular markings can be recognized by special cells in your body called B cells.

ACTIVATION/DESTROY

When B cells recognize these markings on invading germs, they become activated and start producing lots of antibodies that can then find and destroy those germs.

TRAINING SESSIONS

Vaccines are tiny "training sessions" that teach your B cells to recognize invaders more robustly, making your body's natural, built-in defense system much more effective!

VACCINE TYPES

Vaccines come in several types or "flavors." Each type is designed to teach your immune system how to fight off certain kinds of germs—and the serious diseases they cause.

- **Live attenuated** (e.g. MMR, varicella)
- **Inactivated** (e.g. Hep A, flu shot)
- **Conjugated/subunit** (e.g. Hib, HPV)
- **mRNA** (e.g. COVID-19)

LIVE ATTENUATED

(E.G. MMR, VARICELLA)

- Vaccines come in several “flavors.” Classic vaccines are made from a weakened–or “attenuated”–version of the germ itself.
- This attenuated germ is too weak to make an average, healthy person sick, but is just active enough to prompt alarm bells to go off in your immune system, cluing in your antibody-producing B-cells to a potential threat they should be ready for in the future. Think of it like a little tickle that your body can feel and respond to rather than a gut punch that takes you out in the process.

- Because live attenuated vaccines are just weaker forms of the actual germ they defend against, they generally lead to very hearty and long-lived immune responses.
- While live attenuated vaccines are safe for most people, they are not recommended for people (pregnant women, immunocompromised people) whose immune systems may not be able to protect them against even these weakened forms of germs.

PROTECT AGAINST

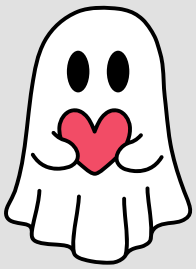
- **Measles, mumps, rubella (MMR combined vaccine)**
- **Rotavirus**
- **Smallpox**
- **Chickenpox**
- **Yellow fever**

Because they contain a small amount of the weakened live virus, some people should talk to their health care provider before receiving them, such as people with weakened immune systems, long-term health problems, or people who’ve had an organ transplant.

INACTIVATED

(E.G. HEP A, FLU SHOT)

- Inactivated vaccines contain killed viruses or bacteria, so they cannot cause disease at all, but they resemble the germs enough to teach your body how to fight the real deal.
- Think of it like the “shell” or “ghost” of the actual germ: it has all the “decorations” and germ parts needed for your body to make all the right antibodies, but none of the parts that make the germ dangerous.



- Inactivated vaccines are very safe, even for people with weakened immune systems.
- Inactivated vaccines can be less effective or long-lasting than live attenuated vaccines, sometimes (but not always!) requiring multiple doses or boosters.

PROTECT AGAINST

- **Hepatitis A**
- **Flu (shot only)**
- **Polio (shot only)**
- **Rabies**

The type of vaccine used can differ depending on the infection in question, how the immune system responds to the pathogen the vaccine will treat, and various practical considerations related to the delivery of the vaccine.

CONJUGATED/SUBUNIT

(E.G. HIB, HPV)

- Conjugate and subunit vaccines use only parts of a germ–like the molecules that “decorate” the germ–to train your immune system without ever exposing it to the germ itself.
- Because they don’t contain any whole viruses or bacteria (live or dead), they cannot cause infections even in people with weakened immune systems.
- Conjugated and subunit vaccines are extremely safe and stable, but recognize only specific “decorations” on germs rather than several different parts of the germ. Think of it like playing “Guess Who?” but only being allowed to ask one question.

- If the germ ever changes or hides that one “decoration”, your immune system might not recognize it even though all its other features are still the same.

PROTECT AGAINST

- **Hib (Haemophilus influenzae type b) disease**
- **Hepatitis B**
- **HPV (Human papillomavirus)**
- **Pneumococcal disease**
- **Meningococcal disease**
- **Shingles**

Subunit, recombinant, polysaccharide, and conjugate vaccines use specific pieces of the germ—like its protein, sugar, or capsid.

One limitation of these vaccines is that you may need booster shots to get ongoing protection against diseases.

MRNA

(E.G. COVID-19)

- mRNA vaccines get help from the body's own cells to teach the immune system how to fight diseases
- This technology was first widely used for COVID-19, but has been studied for decades
- There have been over 13 billion doses of mRNA vaccines for COVID-19 given since 2020 around the world (WHO)
- mRNA from the vaccine does not change the body's own RNA or DNA, so the genetic code is not affected by the vaccine
- The mRNA just gives your body the instructions for how to make the antibody defenders that fight specific germs–all without your body ever having to meet the germ itself.

PROTECT AGAINST

- **COVID-19**

Researchers have been studying and working with mRNA vaccines for decades and this technology was used to make some of the COVID-19 vaccines. mRNA vaccines make proteins in order to trigger an immune response. mRNA vaccines have several benefits compared to other types of vaccines, including shorter manufacturing times and, because they do not contain a live virus, no risk of causing disease in the person getting vaccinated.

WHAT CAN YOU DO?

TAKE ACTION!

Vaccines protect you, your loved ones, and your community. Here's how you can take action:

Review Your Vaccination History

Consult your healthcare provider or pharmacist to confirm you're up to date on recommended vaccines.

Schedule Necessary Vaccinations

Book appointments for any vaccines you may need, such as influenza, COVID-19, shingles, or Tdap.

Engage Your Community

Share accurate information with friends and family, and encourage them to stay current on their vaccinations.

Address Questions and Concerns

Note any questions or misconceptions you've encountered and discuss them with a trusted healthcare professional.

Rely on Credible Sources

When sharing information, use evidence-based resources such as your physician, local health department, or reputable medical organizations.

learn more at doctorsforamerica.org