

HOW VACCINES PROTECT AGAINST DISEASE

Glossary

Antibody: a chemical produced by the immune system which can attach and help destroy a

Microbe: very small organism, such as a bacterium or virus

When vaccines may not work

Vaccines rely on a good immune response, so if a person does not have a well-functioning immune system, they may not be protected by vaccines.

For instance, if a person has had an organ transplant, such as a kidney or liver, their immune system may have been suppressed to reduce organ rejection. So people who are going to have a transplant are advised to be vaccinated before the transplant to establish immunological memory.

- Just as the military is designed to protect a country, so our immune system protects our body.
- When we first encounter a microbe, our immune system has to work out how to destroy it by producing specific proteins, called antibodies, which have an important role in killing microbes.
- But it takes time to work out which is the correct antibody and while the immune system is working this out, the microbe may be causing disease. “A” on the diagram below
- Once the immune system has worked out the correct response, then the illness starts to get better.
- But the immune system also “remembers” which was the correct antibody to destroy that microbe. So the next time that the body encounters that bacteria or virus, (“B” in the diagram below) the immune response can be swift and effective. No illness results and the person is immune.
- Vaccination uses this “immunological memory”, by administering a vaccine, a harmless form of the microbe (see the page on “What is a vaccine”). The immune system cannot tell the difference between the vaccine and a dangerous microbe and so starts to work out how to destroy it and putting this information into its memory, even though the vaccine does not cause disease.

Injection Site Pain

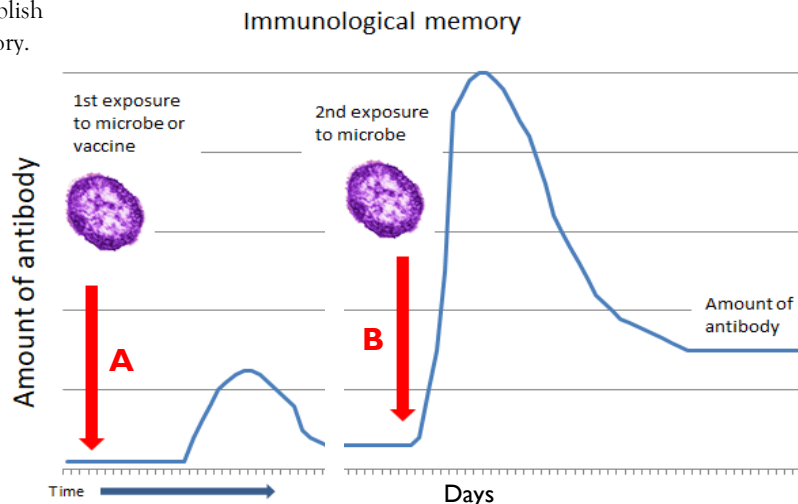
When a vaccine is injected (or a cut of any kind is sustained), the body’s immune system quickly senses that there has been an “invasion”.

In addition to working out the right antibodies to kill the “invader”, the body also sends many frontline defenses to the location. These includes attack cells and chemicals that can inhibit microbes.

This is why an injection site can feel warm to the touch and sometimes feels painful. It is all those immune cells gathering at the injection site.

Sometimes, the immune system response can be more generalized around the body - aching, a slight fever are all parts of the immune response to the breach in the skin—it’s the good guys getting their defenses going!

This why some people who get a flu shot think that they have the flu symptoms, when in fact it is the immune system—these symptoms only last a day or two, the flu symptoms last many days.



After 1st exposure, it takes a few days before sufficient antibodies are formed to suppress the infection and so microbes cause illness.

After 2nd exposure, antibody is produced quickly and the microbe is stopped from causing illness

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Further Reading

National Institute of Health <https://www.niaid.nih.gov/research/how-vaccines-work>

PBS NOVA <https://www.youtube.com/watch?v=IXMc15dA-vw>

Vaccines 101: How Vaccines Work <https://www.youtube.com/watch?v=p8OOqnLJs2Q>