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## Vaccines

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### Summary

- Vaccines help reduce the risk of certain illnesses by introducing dead or weakened versions of disease-causing germs (bacteria or viruses) to the immune system.
  - Vaccines protect vulnerable people in our community – such as very young children, the elderly, or those who are too sick to be immunised.
  - Some vaccines offer lifelong immunity.
  - Immunisation greatly reduces the risk of catching a disease, which in turn reduces the risk of complications.
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Vaccines are clever, they trick our bodies into building immunity against **infectious diseases**, without causing the illness. Usually, a dead or weakened version of the disease-causing germ (bacteria or virus) is introduced to our **immune system**. In some cases, inactivated toxins produced by the germ are used in the vaccine to develop immunity (for example, **diphtheria** and **tetanus** vaccines). We call these antigens, and they are the most important ingredient of all vaccines.

Once we've been vaccinated, if our immune system encounters the 'real' disease-causing germ, it responds quickly and creates antibodies and memory cells to give the body protection.

Immunisation (vaccination) is the most effective preventative measure against serious diseases. Some vaccines offer lifelong immunity. In other cases, **'catch-ups' or booster shots** are needed.

### When were vaccines developed?

Vaccines are not new – immunisation techniques were pioneered over 200 years ago, when **smallpox** was a feared and deadly disease. An eighteenth century doctor named Edward Jenner noted that workers on farms who contracted the mild cowpox disease were immune to smallpox.

Jenner guessed that the germ responsible for cowpox was similar enough to the smallpox germ to 'train' the immune system to defeat both diseases. He was correct. **Immunisation in Australia** today relies on similar principles.

### How do vaccines work?

Our **immune system** is made up of special cells and chemicals (called antibodies) that fight infection. We gain immunity against diseases either naturally (by catching an illness), or through immunisation.

Vaccines are made up of a modified version of a disease-causing germ or toxin (known as 'antigens'). They are usually given by injection or a small drink that contains the vaccine.

The immune system responds to the weakened, partial or dead germ or inactivated toxin (antigen) as if it was a fully-fledged germ, and makes antibodies to destroy it. These antibodies are made without us catching the illness.

### How do vaccines help our immunity?

Our immune system is like a library – it stores information about every germ ever defeated. We sometimes call this immunological memory.

Some antibodies remain 'on patrol' in our bloodstream. So if we ever encounter the real germ in the future, our immune system can quickly trigger the memory cells and produce antibodies to defeat it. And this often occurs before we experience any symptoms of illness.

Each vaccine is designed according to how the specific germs make us sick. For example, **measles** is the result of

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the body's reaction to the whole virus and so the vaccine contains a weakened form of the virus. On the other hand, **tetanus** is caused by the body's reaction to the toxin produced by the tetanus bacteria and so the vaccine contains inactivated tetanus toxin.

### What is in vaccines?

Depending on the infection, ingredients in vaccines can vary. They may also change from year to year as new strains of viruses (such as the **flu**) appear. Some vaccines may contain a small dose of:

- a live (but weakened) germ
- dead germs
- small parts of germs (for example, a molecule from the surface of a germ)
- inactivated toxins produced by bacteria
- antibiotics or preservatives to stop the vaccine from becoming contaminated or going off
- diluents (such as sterile water or saline).

Australia has strict rules on vaccine safety. Before a vaccine is registered by the **Therapeutic Goods Administration (TGA)** and made available to the public it goes through rigorous testing. And, even when it is used, it is constantly monitored for safety and effectiveness.

### How are new vaccines developed?

It takes a long time to develop a new vaccine – usually between 10 and 15 years. Vaccines go through many phases of development – including research, discovery, pre-clinical testing, clinical testing (which can take up to seven years) and regulatory approval. Once the vaccine is approved (another lengthy process of up to two years), the vaccine is then manufactured and shipped to where it's needed.

After vaccines are introduced into immunisation schedules, they are closely monitored through trials and surveillance to see if they are effective and safe. In Australia, there are regional and national surveillance systems actively looking for any adverse events following immunisation. This is necessary, as sometimes unexpected side effects occur after vaccines are registered for use.

Some vaccines, such as the **flu**, need to be updated every year to respond to changing infection strains and conditions. For these updates, the process is compressed to ensure the vaccine is available as needed.

### Are vaccines safe?

Millions of people – many of them babies and young children – are immunised every year, with no **side effects**. Vaccines are much safer than getting sick from a disease. Diseases that can be prevented by vaccines can cause lifelong complications or death – even in normally healthy people.

From time to time, the safety of vaccines has been questioned. Most reactions are mild and usually last one to two days. Like any other medication, vaccines carry a small degree of risk, but serious **side effects** are rare.

The risk of serious side effects must be weighed against the risk of the disease. For example, although there is a small risk of developing the rare condition known as idiopathic **thrombocytopenic purpura (ITP)**, after the measles, mumps, rubella and varicella (MMRV) and **MMR** vaccine. However, the risk of developing ITP with **measles** itself is more than 10 times greater than the risk associated with the vaccine.

### How successful are vaccines?

Vaccination is the most effective preventative measure against **infectious diseases**. Most vaccine preventable illnesses, are highly contagious, spread quickly and can cause severe complications which may impact on our quality of life.

Vaccines give us immunity without us getting sick. They also protect vulnerable people in our community who cannot be immunised – such as very young children or those who are too sick.

When enough people in the community are vaccinated, the spread of a disease slows down or stops completely. So as long as enough people are vaccinated, diseases will not spread. We call this herd immunity or 'community immunity'. For example:

- **measles, mumps, rubella** – 95 out of every 100 people vaccinated will be completely immune
- **whooping cough** – about 85 out of every 100 people vaccinated will be completely immune.

### How long does it take for a vaccine to work?

When we receive a vaccine, our immune system gets to work immediately to create antibodies and memory cells to fight the infection. On average, an 'immune response' will take around 7-21 days.

However, the duration of immunity can depend on a number of factors, such as the nature of vaccine, the timing of dosages, our age, and whether we have had an infection naturally.

To be protected from vaccine-preventable diseases, make sure to stick to the **recommended schedules** and keep your immunisations up to date.

### Which vaccines do we need?

Vaccines not only protect us, but vulnerable people in our community (such as the young, the elderly, or those with weakened immunity).

The vaccines we may need are determined by our health, age, lifestyle and occupation. Together, these factors are known as HALO.

HALO is defined as:

- **health** – some people may benefit from additional or more frequent immunisations due to health factors. For example, **pregnant women**, **premature babies**, or those with conditions (such as **asthma**, **diabetes**, **HIV** and disorders of the **heart**, **lungs**, **spleen** or **kidneys**).
- **age** – at certain ages, we are more vulnerable to some illnesses. Such as in: **childhood**, in **secondary school** and when we are **older**.
- **lifestyle** – some lifestyle choices can put us or the community at risk, such as **overseas travel**, moving to Australia, becoming a new **parent**, **sexual activity**, **smoking**, or **playing contact sport**.
- **occupation** – some jobs have a higher risk of exposure to **infections**. Such as those who work in hospitals, childcare and emergency services.

Check your immunisation HALO using the **Immunisation for Life Infographic (pdf)** downloadable poster.

Remember, if you are not sure about what vaccines you need, talk to your GP (doctor). If you find you are not up to date with your vaccinations, your GP will tell you about **catch-ups and boosters**.

### Australia's National Immunisation Program

The National Immunisation Program (NIP) sets out recommended immunisations for infants, children, older people and other people at risk, such as Aboriginal and Torres Strait Islander people. Most recommended vaccines are available at no cost to these groups. If you need further information, talk to your **GP (doctor)** or **immunisation provider**.

### Where to get help

- Your **GP (doctor)**
- In an emergency, always call triple zero (000)
- Your local government immunisation service – (visit Know Your Council to find your local government authority)
- **Maternal and Child Health Line** (24 hours) Tel. **13 22 29**
- **NURSE-ON-CALL** Tel. **1300 60 60 24** – for expert health information and advice (24 hours, 7 days)
- **Immunisation Program**, Department of Health & Human Services, Victorian Government Tel. **1300 882 008**
- **National Immunisation Information Line** Tel. **1800 671 811**
- **Australian Immunisation Register** Tel **1800 653 809**
- Pharmacist
- Victorian vaccine safety service (SAEFVIC) Tel. **1300 882 924** (select option 1)– the line is attended between 9 am and 4 pm and you can leave a message at all other times

**This page has been produced in consultation with and approved by:**

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