

What is a vaccine?

Educator notes



Learning objectives

- Being able to explain what a vaccine is
- Understanding how a vaccine helps the immune system fight disease



Curriculum links

- Science (Biology)
 - Cells and organisation
 - Health, Interdependence
- Maths
 - Probability



Time needed: 30 minutes



Equipment needed

- Small sticky notes in two different colours, small enough to be hidden in students' hands



Resources required

- What is a vaccine? presentation slides



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Slide 2

What is a vaccine?

- Start the lesson by explaining to students that they are going to learn about vaccinations

Discussion question: Ask students if they know what a vaccine is. Have they ever had a vaccination?

Potential answer: A vaccination is a medicine that provides protection or immunity from a disease

- Continue by asking if the students know what is in a vaccine
- Explain that a vaccine contains either:

- A tiny (but not harmful) amount of the disease
- A synthesised (fake, also not harmful) version of the disease

Discussion question: Ask students if they can think of any viruses or diseases that may require a vaccine?

Potential answers: Measles, rubella, tetanus, HPV, yellow fever, tuberculosis, pneumococcal disease, meningitis, hepatitis, rotavirus, whooping cough and influenza (the flu)



Slide 3

How a vaccine works

- Use the following information to explain to the class how a vaccine works to help your body's immune system fight disease better:
 - Our immune system recognises invading cells, like viruses and bacteria
 - It responds by white blood cells producing antibodies which attach and attack the foreign disease cells
 - Tell students that our bodies can make about 1,000 antibodies – that's 10 trillion different types
 - Further explain that white blood cells therefore need to find the correctly shaped antibody to combat a disease, and they have a lot to choose from
 - Once they find the correct one, white blood cells remember which antibody is required to better fight that foreign cell next time they encounter it

cells' ability to remember might help fight disease?

Potential answer: It means that if you later contract the disease, your white blood cells can immediately fire out the correct antibody to fight it straight away before it has a chance to do harm

Discussion question: Ask students how white blood

What is a vaccine?



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Slide 4

What is an adjuvant?

- Play the video on **Slide 3**

Discussion question: Ask the students how adjuvants might help fight disease

Potential answer: Adjuvants decrease the necessary dose of the vaccine, reducing costs and making it possible for a small amount of vaccine to be used to treat more people than would be required to treat that same number of patients without the adjuvant

- Explain that adjuvants can be especially helpful when there's an outbreak of a particular disease, and there isn't a large store of vaccine, or much time to create the necessary amount



Slide 5

The vaccination game



Activity 1

The vaccination game

15 mins

- The class will now play a short simulation game to introduce them to the idea of how viruses spread through a population, and the role of vaccines in preventing the spread of disease
 - These are the game instructions for you to read aloud to the class:
 - I'm giving some students an 'infection', in the form of sticky notes, which they'll be passing on to people they speak too while we play a game
 - If you are infected, you should hold the sticky notes so your classmates can't see them
 - When we start, you're going to walk around the room
 - When I clap my hands, stop and start talking to the person closest to you
 - If you have sticky notes, subtly give one to the person you're talking to
 - Try not to react too much when you get infected
 - I'm going to clap again, and you'll keep walking, then we'll repeat
 - Once you've read the instructions, get students to stand up around the room and close their eyes
 - Give two 'infected students' a stack of sticky notes and ask them to hide them from view. The rest of class does not know who they are
 - Students open their eyes and start walking around the classroom. Play the game following the above instructions
 - After five claps, ask students to stop and get a show of hands from people who have a sticky note to see how many have been infected
- Optional:** You can increase the rate of infection in the game by giving more or fewer students stacks of sticky notes at the start, or letting them pass a stack of sticky notes on to other students, who can then also infect others

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Slide 5

The vaccination game Continued...

- Give a handful of students a different colour of sticky note to simulate a vaccine
- Play a second round of the game, where vaccinated students cannot be infected
- This will demonstrate that whilst the vaccinated students are protected from the disease, the spread is more or less the same throughout the rest of the population
- After round two, hand out more of the sticky notes that simulate a vaccine, so you can play a third round where $\frac{3}{4}$ of the class are 'vaccinated'
- After this round, even some of the unvaccinated students should be virus free



Slide 6

The vaccination game Continued...

- Discuss the following questions with the class once you've completed two rounds of the vaccination game
- What does the game show us about vaccinations?
- How quickly does an outbreak take to spread through a population?
- What happened as more students were vaccinated?



Slide 7

Herd immunity

- Bring the class back together and discuss what the game showed them
- They should be able to explain:
 - That it doesn't take many steps for an outbreak to spread through a population
 - When a high enough proportion of the population (class) were immune to the disease, this protected even unvaccinated students
- Explain that this is known as herd immunity; the disease is much less likely to find a susceptible person which helps to prevent the disease spread

Try next: Learn more about the global fight against malaria in our [Fighting malaria](#) module or read about how tuberculosis is being fought in [this case study](#). Look at the probability behind immunity in the Probability and immunity module.

