

Viruses: what are they and how to combat them

What is a virus?

What's the difference between viruses and bacteria?

Why don't antibiotics help with viral infections such as colds and 'flu?

Why do 'flu vaccinations have to be repeated every year and why do they sometimes have no effect?

These are the questions we'd all like to ask our GPs, but don't dare because we don't want to waste their precious time. Dawn Macfarlane answered all of these questions and more when she gave an informative and interesting talk to the club in August 2016.

A virus is a small infectious agent that can only replicate inside a living cell of a host organism. They are not made up of cells, so they are not considered to be a form of life. Usually, viruses are specific to a single organism type and even to a specific cell type within the organism. In most cases, the cell that is hijacked to produce thousands of new viruses is destroyed when the viruses are released.

Virus life cycle

- a. Attachment to specific cell wall.
- b. Penetration: using the cell's own transport system.
- c. Replication: using the cell's own machinery.
- d. Assembly.
- e. Release.

Dawn outlined the rise of some historical epidemics and pandemics from a USA point of view, including the smallpox epidemic in 1633 which wiped out entire Native American tribes. The last case of smallpox in the United States was 1949. In 1918, soon after the First World War, a 'flu pandemic that unusually targeted young adults affected the whole globe. It's estimated that 50 -100 million died (3% -5% of the world's population). In comparison, the First World War caused 17 million deaths. Dawn also spoke about the polio epidemic of 1952, the Asian 'flu pandemic of 1957 and the AIDS epidemic from the 1980s up to today.

The next section of the talk was about how viruses spread; the answer was much the same as for bacteria. Dawn stressed that normal hygiene is sufficient with extra care when in an environment with a lot of sick people and when you have these ailments yourself. Viruses can survive on some surfaces between 12 and 48 hours, but they are only infectious if they get into your body via your eyes, nose or mouth.

The main differences between viruses and bacteria include: their size (bacteria are larger); their specificity (viruses are specific to an organism or even a specific cell type in an organism) and their treatment (explained below). Bacteria are responsible for diseases such as Lyme disease, tuberculosis, meningitis, pneumonia, cholera and typhoid fever.

There followed an explanation for the emergence of 'new' viruses. This can be put down to ecological, environmental and demographic factors which increases the possibility of people coming into contact with a previously unfamiliar infectious agent. War, large movements of people (migration, colonisation, international travel) and climate change are factors in new viruses. Climate change causes a change in the range of vectors or carriers of an infectious agent such as mosquitoes.

Viral infections are hard to treat because they live inside the organism's cells. There are two types of treatment: antiviral medications and vaccinations. Antiviral treatments mostly reduce the replication of viruses and so reduce the effects of the infection, while vaccinations can prevent the body becoming infected. Current antivirals help control HIV/AIDS, herpes, hepatitis B and C and influenza A and B. Vaccinations are available to prevent or control 25 infections, including diphtheria, mumps, polio and tetanus.

Dawn finished by discussing 'flu vaccines. She explained that due to the number of 'flu strains and how quickly they mutate and evolve, a new vaccine needs to be created each year. Experts determine which are the most likely to spread globally in the coming year and the 'flu vaccine is produced to combat these. This process takes about eight months. However, sometimes the wrong choice is made or the strain mutates so quickly that the vaccine is no longer able to control it.

The talk concluded with a lively question and answer session.