The Royal College of Pathologists
Pathology: the science behind the cure

RESISTANCE IS FUTILE

RESOURCE PACK

Learning Objectives

Learning about viruses and bacteria and their differences;

- Understanding how antibiotics work;
- Discovering the reasons behind antibiotic resistance;
- Understanding of social, ethical and moral implications;
- Learning to question and discuss issues that may affect their own lives, the directions of societies and the future of the world

Materials Required

For groups to share:

- A3 sheets with repeated graphics of viruses (red) and bacteria (yellow-green) showing the component parts of viruses and bacteria. (A4 copy can be found on the last page of this resource)

Download Here

A few sheets of red acetate. Can be purchased online via The London Graphic Centre.

Visit Website Here

Time Taken

Approximately 15-20 minutes

Practical

If a pathologist has been invited, allow them to give a quick background on antibiotics, antibiotic resistance and their role as a pathologist.

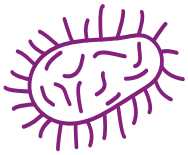
There are a few A3 sheets with repeated graphics of viruses (red) and bacteria (yellow), which also indicate the morphology of various viruses and bacteria, and a few sheets of red acetate, which will be the 'antibiotic' later.

Show students the sheets.

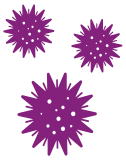
What are the differences between viruses and bacteria?

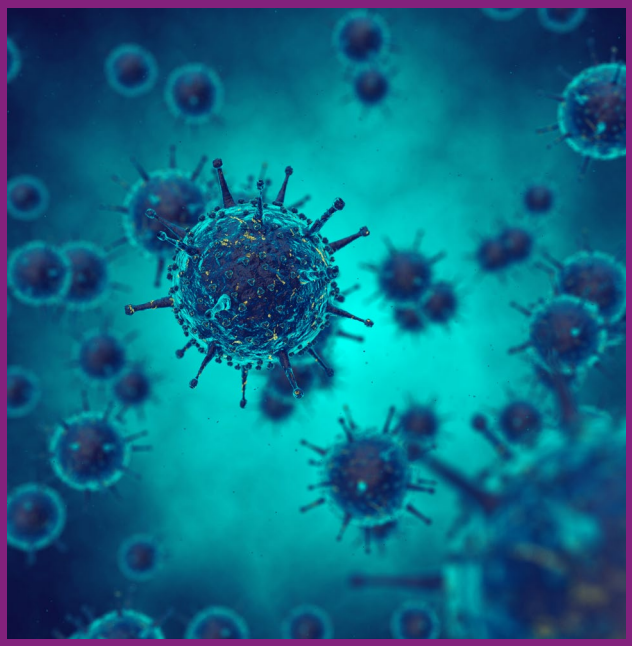
Point out the differences morphologically.

Bacteria are bigger and have a much more complicated structure than viruses: cell wall, cell membrane, DNA, plasmids, ribosomes, and maybe even some flagella to propel themselves.



Viruses on the other hand have a protein coat with either DNA or RNA inside, and maybe an envelope around the outside.





Ask students if they can think of examples of viral infections (e.g. flu) and bacterial infections (e.g. pneumonia) and those diseases that could be caused by either a virus or bacteria (e.g. meningitis).

Show students the sheets of acetate and explain that this is the 'antibiotic' (or 'antimicrobial').

Antibiotics are medicines used to treat and, sometimes prevent, a **bacterial** infection. There are different types of antibiotics that can be used to treat the various bacterial infections that we might suffer from.

Ask students if they can name an antibiotic (e.g. Penicillin).

Other examples of antibiotics include: amoxicillin, gentamicin, tetracycline, ciprofloxacin and erythromycin.

Ask students if antibiotics would work on viruses?
And so, which infections should the antibiotic wipe out?

Get the students to place the acetate over the infection sheets and watch which microbes/pathogens disappear.

Discussion

Why did the antibiotic not work on the viral infection?

Only the bacterial infection disappeared because antibiotics kill off bacteria, not viruses.

Find out from the students how many of them have taken antibiotics before, and whether they remembered to take the whole course. Why do they think it is important to take antibiotics only when it's appropriate and in the right way?

If we use antibiotics unnecessarily (overuse, inappropriately prescribed, the complete course is not taken, or they are shared with others), this can lead to antibiotic resistance. This is when bacteria can adapt and evolve to survive the effects of an antibiotic, meaning the antibiotic can no longer kill off the bacterial infection.

If antibiotics cease to work on those bacterial infections, we could have deadly pandemics on our hands!

To prevent antibiotic resistance we need to use antibiotics correctly: the right antibiotic, the right dose, at the right time for the right duration.

Staphylococcus aureus that has become resistant to the antibiotic Methicillin, is known as MRSA, and can cause severe problems for those who are infected.

Discussion +

If there's time, discuss viruses, vaccines and our immune systems (i.e. that most viral infections can clear up eventually, just need to reduce the symptoms, taking pain relief medicines, and medication that reduces fever).

Useful Links

Antibiotics:

http://www.nhs.uk/conditions/Antibiotics-penicillins/Pages/Introduction.aspx

Antimicrobial resistance:

http://www.who.int/mediacentre/factsheets/fs194/en/

Longitude Prize:

https://longitudeprize.org/challenge/antibiotics

(challenge 'to create a cost-effective, accurate, rapid and easy-to-use test for bacterial infections that will allow health professionals worldwide to administer the right antibiotics at the right time').

Giant Microbes:

http://www.giantmicrobes.com/uk/