

Infection biology and antibiotic research

with Professor Christoph Dehio and the NCCR AntiResist project

Talking points

Knowledge

1. What is the most prescribed antibiotic?
2. How many types of antibiotics are there?
3. What does NCCR stand for?
4. When were antibiotics first developed, and when was the last new class of antibiotics developed?

Comprehension

5. What are the roles of the three groups – medical doctors, biologists and bioengineers – that work on the NCCR AntiResist project?
6. Which four pathogens is the team researching, and why were they chosen?

Application

7. What questions would you ask the NCCR team?
8. Have you ever taken antibiotics? What diseases can antibiotics help treat?

Analysis

9. What is the difference between *in vivo* and *in vitro* methods?
10. Why do you think it might be a good idea to use a combination of both *in vivo* and *in vitro* methods during scientific research?

Evaluation

11. If you could join one team in the NCCR AntiResist project – the clinical researchers, the biologists or the bioengineers – which would you choose to join, and why?

Activity

Developing new antibiotics would be a great solution to antimicrobial resistance (AMR), but the process is a long one and will take years. In the meantime, your task is to come up with some preventative solutions that can slow the spread of AMR.

Although antibiotic resistance develops naturally over time, human actions speed up the process too. There are four main ways this can happen:

1. When health professionals overprescribe antibiotics.
2. When people do not take antibiotics as prescribed, for instance by not finishing the course of treatment.
3. Due to a lack of access to clean water, sanitation and hygiene facilities, which, for example, prevents people from washing their hands.
4. As a result of more people travelling to other countries and spreading resistant strains of bacterial infection.

What could be done to prevent these issues from happening in the first place, and how could you combat these problems?

Think about:

- Why might human and animal health professionals be tempted to overprescribe these drugs? Is there a financial or social incentive for them to do so? If so, how could governments work to reduce this incentive? What other ways might health professionals be encouraged to not overprescribe antibiotics? How can the public be taught to recognise when antibiotics are unnecessary?
- Why would people not take antibiotics as directed? Are there any ways to change this practice?
- How could poor hygiene and sanitation be improved? How can people in areas without facilities and access to clean water maintain their own personal hygiene? In areas with sanitation facilities, are there some catchy slogans that you can think of which might encourage hygiene?
- The world is becoming more globalised. How can the effects of AMR be reduced while people are travelling?

If you need more help with these answers, visit the Raise Awareness section on the REACT toolbox, which has materials for educating people about antibiotic resistance:

www.reactgroup.org/toolbox/raise-awareness

When you have your final ideas, write a letter about AMR to your local political representative explaining what AMR is, why they should focus on it and your ideas to help deal with it. By telling your representative, AMR might become a bigger priority for them in the future.

More resources

- Find the short video on the NCCR website where Christoph and other members of the team explain their project: www.nccr-antiresist.ch
- Christoph's research team is currently developing a programme to introduce nearby secondary school pupils to its work. Keep an eye on the team's website to see how the programme develops.
- Read the World Health Organization's page on AMR: www.who.int/health-topics/antimicrobial-resistance and antibiotic resistance: www.who.int/news-room/fact-sheets/detail/antibiotic-resistance

- World Antimicrobial Awareness Week (WAAW) is held each year: www.who.int/campaigns/world-antimicrobial-awareness-week. There is a selection of resources online which explain antimicrobial resistance in an easy-to-understand way: who.canto.global/v/campaigns/album/UAQVC
- The Center for Disease Control and Prevention (CDC) has great factsheets about antibiotic resistance: www.cdc.gov/drugresistance/about/how-resistance-happens.html
- Christoph recommends reading through this 2019 scientific article which examines the burden of AMR worldwide: [www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)02724-0/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext)