

## The bacteria wars

- 1 **J**ust 65 years ago, David Livermore's paternal grandmother died following an operation to remove her appendix. It was not the surgery that killed her. She succumbed to a series of infections that the pre-penicillin world had no drugs to treat. Welcome to the future.
- 2 The era of antibiotics is coming to a close. In just a couple of generations, what once appeared to be miracle medicines have been beaten into ineffectiveness by the bacteria they were designed to knock out. The post-antibiotic apocalypse is within sight. Hyperbole? Unfortunately not. The highly serious journal *The Lancet* last week posed the question in the title of a paper revealing the rapid spread of multi-drug-resistant bacteria. "Is this the end of antibiotics?" it asked. The paper by Professor Tim Walsh and colleagues takes the anxiety to a new level.
- 3 Last September, Walsh published details of a gene he had discovered, called NDM-1, which passes easily between types of bacteria such as *E coli* and *Klebsiella pneumoniae* and makes them resistant to almost all of the powerful, last-line group of antibiotics called carbapenems. Last week's paper revealed that NDM-1 is widespread in India and has arrived in the UK. "In many ways, this is it," Walsh tells me. "This is potentially the end. There are no antibiotics in the pipeline that have activity against NDM-1 producing enterobacteriaceae. We have a bleak window of maybe 10 years, where we are going to have to use the antibiotics we have very wisely, but also grapple with the reality that we have nothing to treat these infections with."
- 4 And this is the optimistic view – based on the assumption that drug companies can and will get moving on discovering new antibiotics to throw at the bacterial enemy. Since the 1990s, when pharma found itself twisting and turning down blind alleys, it has not shown enthusiasm for difficult antibiotic research. And because, unlike with heart medicines, people take the drugs for a week rather than life, and since resistance means the drugs become useless after a while, there is just not much money in it.
- 5 Dr Livermore, whose grandmother died for lack of infection-killing drugs, is director of the antibiotic resistance monitoring and reference laboratory of the UK Health Protection Agency. He is far from sanguine about the future. "A lot of modern medicine would become impossible if we lost our ability to treat infections," he says. 9, but "we are certainly scraping the bottom of the barrel to find effective antibiotics".
- 6 For a long time now, doctors have known they were in a race to stay a few steps ahead of the rapidly growing resistance of bacterial infections to antibiotics. Hygiene is an obvious weapon. Better cleaning, hand gels and stern warnings to staff and public alike have helped reduce infection rates in British hospitals. But Professor Richard James, director of the centre for healthcare-associated infections at the University of Nottingham, warns that bugs don't stay in hospitals.

7 "The worry is once these organisms are out in the community," says James. "There probably is some need for public education about infection and, for instance, kitchen hygiene when you are cooking. People of my generation were taught a lot about washing your hands before every meal. It was automatic that it was done. A lot of that 10." There are some innovative ideas about, he says, on ways of teaching children in school to wash their hands — in the hope that they will then go home and pester their parents to do the same.

8 Beyond that, there is a real need to conserve those antibiotics we have. There have now been a couple of interesting papers suggesting tax — which James defines as one levied on an agent causing an environmental problem as an incentive to mitigate that problem — for antibiotics. Antibiotic usefulness is finite. And the cost of drug resistance is not reflected in the price of the drug. "If you consider antibiotic sensitivity as a resource like oil, you want to maintain that by introducing a tax," he says. It would be worldwide and the proceeds could fund new drug development.

9 But should you tax life-saving drugs, especially in poor countries? "If you don't do anything, there won't be any antibiotics anyway," says James. "It is a suggestion of something that could be done."

10 "Frankly, pharmaceutical companies as well as governments and the European commission need to really get their act together," says Walsh, who has been urging co-ordinated efforts across the world to put in place good surveillance systems to find out what resistance is developing and where, and then look for interventions.

11 In the battle for survival of the fittest between human beings and bacteria, just now it looks as though the best we are going to get is a draw, if we are lucky.

adapted from *The Guardian Weekly*, 2010

## Tekst 4 The bacteria wars

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- 3p 7 Geef van elke van de volgende beweringen aan of deze wel of niet in overeenstemming is met de inhoud van alinea 1-3.
- 1 In the early 20th century symptoms of bacterial diseases often remained undiagnosed.
  - 2 Specially developed bacteria can help reduce the concern about the safety and effectiveness of antibiotics.
  - 3 *The Lancet* deliberately used an exaggeration to shake the medical world.
  - 4 NDM-1 is potentially becoming a global threat.
  - 5 There is hardly any prospect of a medical breakthrough in the next decade.

Noteer “wel” of “niet” achter elk nummer op het antwoordblad.

“And this is the optimistic view” (begin alinea 4)

- 2p 8 Welke twee feiten geven weinig reden voor optimisme?
- 1p 9 Which of the following fits the gap in paragraph 5?
- A It may not be over yet
  - B Medical science has never failed to find a solution
  - C There is no widespread sense of urgency
- 1p 10 Which of the following fits the gap in paragraph 7?
- A has become common practice
  - B has gone
  - C is cause for concern
  - D is superfluous

“There have now been a couple of interesting papers suggesting tax [...] for antibiotics.” (alinea 8)

2p 11 Geef van elke van de volgende beweringen aan of deze wel of niet als een positief effect van een belastingheffing op antibiotica wordt genoemd in alinea 8 en 9.

- 1 Antibiotica worden gezien als iets waar je zuinig mee om moet gaan.
- 2 Het voorschrijven van antibiotica wordt financieel aantrekkelijker.
- 3 De opbrengst kan worden gebruikt voor het onderzoek naar nieuwe medicijnen.
- 4 In arme landen zullen op den duur meer effectieve medicijnen voorhanden zijn.

Noteer “wel” of “niet” achter elk nummer op het antwoordblad.

“find out what resistance is developing and where” (alinea 10)

1p 12 To which of the following does ‘resistance’ refer?

- A the capacity to withstand an antibiotics’ attack
- B the lack of enthusiasm for research on antibiotics
- C the opposition to a European approach to antibiotics
- D the refusal to accept a tax on antibiotics

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#### Bronvermelding

Een opsomming van de in dit examen gebruikte bronnen, zoals teksten en afbeeldingen, is te vinden in het bij dit examen behorende correctievoorschrift, dat na afloop van het examen wordt gepubliceerd.