



EDX.MED5 Medicine in Britain, c1250-present: Change and Continuity in Ideas About the Cause of Disease

EDEXCEL 1HI0 · Calculators not allowed · about 65 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Write in full sentences for Questions 15, 16 and 17. You are advised to spend about 65 minutes on this pack.

- 1** Name the theory, based on the idea of four bodily fluids, that remained the dominant explanation for disease from the medieval period into the seventeenth century.

(Total for Question 1 is 1 mark)

- 2** Put these four individuals in chronological order according to when they made their main contribution to ideas about the cause of disease: Robert Koch, Galen, Andreas Vesalius, James Watson and Francis Crick.

(Total for Question 2 is 2 marks)

- 3** Name the French scientist whose Germ Theory, published in 1861, first showed that specific microorganisms cause specific diseases.

(Total for Question 3 is 1 mark)

- 4** Give the year in which James Watson and Francis Crick published the double helix structure of DNA.

(Total for Question 4 is 1 mark)

- 5** State one idea about the cause of disease that was widely believed in the medieval period (c1250-1500) but had been abandoned by scientifically trained doctors by 1900.

(Total for Question 5 is 2 marks)

- 6** Name the medieval theory that bad-smelling air caused disease, which remained influential right up until Germ Theory was accepted in the later nineteenth century.

(Total for Question 6 is 1 mark)

- 7** Explain how the improvement of the microscope helped scientists such as Pasteur and Koch to develop and prove Germ Theory in the nineteenth century.

(Total for Question 7 is 2 marks)

- 8** Name the German scientist who, using solid culture media and staining techniques, identified the specific bacteria responsible for anthrax, tuberculosis and cholera between 1876 and 1883.

(Total for Question 8 is 1 mark)

- 9** Give one factor, other than the work of a scientist, that helped a new idea about the cause of disease to spread more quickly once it had been proposed.

(Total for Question 9 is 2 marks)

- 10** Name the scientist at King's College London whose X-ray diffraction photographs provided crucial evidence for the structure of DNA in 1953.

(Total for Question 10 is 1 mark)

- 11** State one similarity between how disease was explained in the medieval period and how it was sometimes explained by ordinary people even after Germ Theory had been scientifically accepted.

(Total for Question 11 is 2 marks)

- 12** Name the scientific concept, fully understood only after the 1953 discovery of DNA's structure, that explains how some diseases and characteristics are inherited from parents to children.

(Total for Question 12 is 1 mark)

- 13** Explain two reasons why it took so long, from the ancient world to the nineteenth century, for a scientifically accurate explanation of the cause of disease to be accepted.

(Total for Question 13 is 4 marks)

- 14** Describe two ways in which the role of individual scientists in developing ideas about the cause of disease was similar across different periods, from Galen to Pasteur and Koch.

(Total for Question 14 is 4 marks)

- 15** Explain why ideas about the cause of disease changed more rapidly in the nineteenth century than in any previous period covered by this course.

(Total for Question 15 is 8 marks)

- 16** Explain why some inaccurate ideas about the cause of disease, such as the Theory of the Four Humours, lasted for such a long period of British history.

(Total for Question 16 is 8 marks)

- 17** 'Science and technology have been the most important factor in changing ideas about the cause of disease in Britain in the years c1250-present.' How far do you agree with this statement? Explain your answer.

(Total for Question 17 is 16 marks)

Mark scheme · EDX.MED5 Medicine in Britain, c1250-present: Change and Continuity in Ideas About the Cause of Disease

Question 1

- **B1** the Theory of the Four Humours
- **Answer: The Theory of the Four Humours**

Question 2

- **B1** Galen placed first and Vesalius placed second
- **B1** Koch placed third and Watson and Crick placed fourth
- **Answer: Galen, then Vesalius, then Koch, then Watson and Crick.**

Question 3

- **B1** Louis Pasteur
- **Answer: Louis Pasteur**

Question 4

- **B1** 1953
- **Answer: 1953**

Question 5

- **B1** identifies a valid abandoned idea, e.g. supernatural/religious explanations such as disease being sent by God as a punishment for sin, or astrological explanations
- **B1** supporting detail, e.g. by 1900 Germ Theory (from 1861) had given doctors a scientifically tested alternative that these older explanations could not compete with
- **Answer: E.g. religious or astrological explanations for disease, largely abandoned by scientifically trained doctors once Germ Theory was accepted.**

Question 6

- **B1** miasma (theory)
- **Answer: Miasma theory**

Question 7

- **B1** it allowed scientists to see microorganisms (germs/bacteria) that were invisible to the naked eye
- **B1** so they could directly observe and identify the specific organisms responsible for particular diseases, rather than relying only on theory
- **Answer: The microscope let scientists see and identify the specific microorganisms causing disease, rather than relying only on theory.**

Question 8

- **B1** Robert Koch
- **Answer: Robert Koch**

Question 9

- **B1** identifies a valid factor, e.g. the printing press, or the founding of scientific institutions and journals
- **B1** supporting detail, e.g. the printing press allowed Vesalius's illustrated findings (1543) to be copied accurately across Europe; or the Royal Society (founded 1660) published Philosophical Transactions, letting scientists share and check each other's findings
- **Answer: E.g. the printing press, which spread Vesalius's illustrated findings; or the Royal Society's journal, which let scientists share and check discoveries.**

Question 10

- **B1** Rosalind Franklin
- **Answer: Rosalind Franklin**

Question 11

- **B1** many ordinary people, especially those without much scientific education, continued to hold onto older or supernatural beliefs about illness, such as bad luck, fate, or punishment
- **B1** even once trained doctors had accepted Germ Theory, showing scientific change among experts does not always immediately change popular belief
- **Answer: Popular belief in supernatural or fate-based explanations for illness persisted among some people even after doctors had accepted Germ Theory.**

Question 12

- **B1** genes/genetics (accept 'genetic inheritance')
- **Answer: Genetics (genetic inheritance)**

Question 13

- **B2** without microscopes powerful enough to see bacteria, scientists could not directly observe the true cause of most infectious diseases, so earlier theories such as the Four Humours or miasma, though wrong, seemed to fit the evidence available at the time
- **B2** ancient authorities such as Galen were treated with great respect for centuries, especially once their ideas were adopted and protected by Church-controlled universities, which discouraged challenges to established theory
- **Answer: The lack of a powerful enough microscope meant earlier wrong theories fitted the available evidence, and the Church-backed authority of ancient writers such as Galen discouraged challenge.**

Question 14

- **B2** in each period, an individual, or small group, made a breakthrough based on careful observation of the body or of disease, whether through animal dissection (Galen), human dissection (Vesalius) or laboratory experiment (Pasteur, Koch)
- **B2** in each period, that individual's authority and findings dominated medical thinking on that question for a long time afterwards, becoming the accepted explanation taught to later generations of doctors
- **Answer: In each period an individual made a breakthrough through careful observation or experiment, and their findings then dominated medical thinking for a long period afterwards.**

Question 15

- **Level 1** (1-2): Identifies one or two general reasons for the faster pace of change, with little or no supporting detail or explanation.
- **Level 2** (3-4): Identifies and begins to explain one reason, supported by accurate detail.
- **Level 3** (5-6): Explains two reasons for the faster pace of change, each supported by accurate and relevant detail.
- **Level 4** (7-8): Explains two or more reasons in a well-developed, logically structured way, supported throughout by precise and accurate detail, showing how the reasons connect.
- **Indicative content:**
 - Scientific and technological advances, especially the improved microscope, finally allowed scientists such as Pasteur and Koch to directly observe the microorganisms that cause disease, providing the first genuinely accurate explanation to replace centuries of theories such as the Four Humours and miasma.
 - Growing scientific institutions and methods of communication, including specialist scientific journals and international scientific contact, allowed new findings to be tested, confirmed and shared more quickly than in earlier periods, when a new idea, such as Vesalius's anatomy, might spread only slowly.
 - Government and public interest in disease grew because of the pressures of rapid industrialisation and urbanisation, which created new, visible public health crises such as cholera outbreaks that increased the incentive to find and accept accurate explanations.
 - Earlier individual breakthroughs, such as Vesalius's anatomical corrections and Harvey's proof of circulation, had already established a scientific tradition of testing ideas by observation and experiment rather than simply accepting ancient authority, which made society more receptive to Germ Theory when it appeared.

Question 16

- **Level 1** (1-2): Identifies one or two general reasons for the theory's long survival, with little or no supporting detail or explanation.
- **Level 2** (3-4): Identifies and begins to explain one reason, supported by accurate detail.
- **Level 3** (5-6): Explains two reasons for the theory's long survival, each supported by accurate and relevant detail.
- **Level 4** (7-8): Explains two or more reasons in a well-developed, logically structured way, supported throughout by precise and accurate detail, showing how the reasons connect.
- **Indicative content:**
 - The Four Humours theory, developed by ancient Greek and Roman writers such as Hippocrates and Galen, appeared to fit many everyday observations, such as fevers or the apparent effects of bloodletting, so it was not obviously wrong to contemporaries without a scientific alternative.
 - For much of the medieval and early modern period, the Church controlled university education and approved which ideas could be taught, protecting the theory's status because it did not directly contradict religious teaching.
 - No effective way existed to observe the real cause of infectious disease until the microscope was sufficiently developed and used systematically by scientists such as Pasteur and Koch in the nineteenth century, so no genuine alternative explanation was available for centuries.
 - Because doctors were trained in the theory at university and their professional authority depended on it, there was limited institutional incentive to question it, even as some individuals, such as Vesalius and Harvey, began to correct specific related errors in anatomy and physiology.

Question 17

- **Level 1** (1-4): Shows limited relevant knowledge of ideas about the cause of disease across the period, and offers only a simple, unsupported opinion on the statement.
- **Level 2** (5-8): Shows some relevant knowledge and identifies relevant factors, but the argument is only partly supported and lacks a developed judgement on how far the statement is accurate.
- **Level 3** (9-12): Shows good relevant knowledge and explains a range of factors, reaching a supported judgement on how far the statement is accurate, with some links made between factors.
- **Level 4** (13-16): Shows precise, well-selected knowledge and explains a range of factors in a balanced way, reaching a fully supported and sustained judgement on how far the statement is accurate, with clear analytical links between factors and consistently accurate use of specialist historical terminology.
- **Indicative content:**
 - Supporting the statement: the invention and improvement of the microscope was essential to Pasteur's and Koch's nineteenth-century proof that specific germs cause specific diseases, something no earlier period could have discovered without the technology to see microorganisms.
 - Supporting the statement: the discovery of the structure of DNA in 1953, made possible by X-ray diffraction technology used by Rosalind Franklin and Maurice Wilkins, opened up a scientific, genetic understanding of disease that had no equivalent in earlier centuries.
 - Against the statement: individuals mattered greatly regardless of the technology available to them, for example Vesalius's willingness to challenge Galen through his own human dissections in an age without modern scientific instruments.
 - Against the statement: religion and the Church shaped which ideas could be taught and believed for centuries, showing that social and institutional power, not only scientific capability, controlled which explanations of disease were accepted at a given time.
 - Against the statement: communication and the spread of ideas, such as the printing press from the sixteenth century, scientific institutions like the Royal Society from 1660, and later widespread literacy and publishing, were what allowed a scientific discovery to become widely accepted knowledge rather than remaining an isolated finding.
 - A balanced judgement might argue that new technology made genuinely new discoveries possible, especially the microscope and X-ray diffraction, but that other factors, particularly the power of the Church in the earlier periods and the spread of communication in the later periods, determined how quickly and widely those discoveries actually changed accepted ideas.