10.2A How have drugs and treatments developed since 1945?

Great changes in understanding disease had taken place in the years up to 1945. The government had started to take more responsibility for public health too, including clearing the worst of the overcrowded slum areas of the dirtiest towns and building proper sewer systems. The widespread use of anaesthetics and antiseptics, and now the discovery of the first antibiotics, meant that life expectancy had increased from the age of 46 (men) and 50 (women) in 1900 to just over 60 (men) and 65 (women) in 1945. What were the medical discoveries and developments that happened in the latter half of the twentieth century?

Objectives

- **Examine** the key developments in new knowledge about the body and disease, surgery and treatments since 1945.
- **Assess** how these developments have been affected by a variety of factors.

The second half of the twentieth century saw an explosion in scientific and medical discoveries and developments that proved significant in achieving a fuller understanding of health and medicine. This resulted in life expectancy levels increasing to around 79 (men) and 83 (women). Indeed, a recent UK government article claimed that one in two babies born today is expected to live until its 100th birthday.

The timeline below charts some of the most significant changes in the fields of knowledge about the body and disease, surgery and treatment.

1948
Free vaccine for TB in the UK

1950
Canadian surgeon William Bigelow performs the first open-heart surgery to repair a 'hole' in a baby's heart

1951
Mexican company Syntex develops norethisterone: a human-made hormone that prevents women ovulating; this leads to the production of the first contraceptive pill

1952
First miniature hearing aid is produced

First kidney transplant is carried out (the first in the UK is in 1960)

1953
American Leroy Stevens discovers stem cells; these are cells in multi-cellular organisms that are able to renew themselves and differentiate into specific cell types

Scientists Francis Crick and James Watson map out the **DNA** structure; the understanding of DNA leads to such developments as gene therapy, genetic **screening** and genetic engineering

1954
Free vaccine for diptheria, whooping cough and tetanus (the 'triple vaccine') in the UK

1955
Free vaccine for polio in the UK

1957
The drug thalidomide is developed in Germany; it is used to treat morning sickness during pregnancy but it causes terrible deformities in babies; today it is used in the treatment of AIDS and some cancers

1958
First pacemaker is fitted (in Sweden); this is a mechanical device that maintains a regular heartbeat (the first in the UK is in 1960)

1960

1962
Surgeons at a hospital in America re-attach the arm of a 12-year-old boy

1964
Free vaccine for measles in the UK

Timeline key:

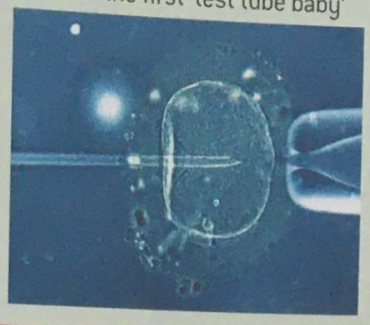
Purple: relates to body and disease

Orange: relates to surgery

Green: relates to treatment

1973
British scientist Geoff Hounsfield invents the CAT scanner, which uses x-ray images from many angles to build up a 3D image of the inside of the body

1978
Doctors use IVF fertility treatment to help childless women become pregnant throughout the 1970s, and in 1978, Louise Brown from the UK becomes the first 'test tube baby'



Key Word

DNA (deoxyribonucleic acid) screening

Work

1 Write a sentence or two about the following:
   a IVF treatment
   b DNA.

1969
Free vaccine for rubella (German measles) in the UK

1970
British scientist Roy Calne develops the drug cyclosporine, which prevents the body rejecting transplanted organs

1972
British surgeon Sir John Charnley develops hip replacements

1975
Endoscopes are developed; these are fibre-optic cables with a light source that allow doctors to go into small cuts in the skin to 'see' inside the body

1984
At Harvard University in the USA, two burn victims are given skin grafts; the skin had been grown in a laboratory 'skin farm' from tiny pieces – one square centimetre grew to half a square metre

1986
British woman Davina Thompson becomes the first heart, lung and liver transplant patient

1970

1980

1968
First British heart transplant at Papworth Hospital

1980
After a global vaccination campaign, smallpox is officially declared eradicated; so far, the only human disease where this has been possible

1987
MRI scanning is widely used to monitor brain activity, which is especially useful for finding brain tumours or stroke damage

1967
Christian Barnard, a South African heart surgeon, performs the first heart transplant; the patient lives for 18 days (the first in the UK is in 1968)

Fact

DNA (*deoxyribo nucleic acid*) is the material that makes up genes. It is like a long list of instructions, or a code, that operates every one of the cells in your body: there are 3000 million letters in the code. The instructions are grouped together in genes, and each gene has a different function. Some genes determine your eye or hair colour, for example. Others determine whether you will develop a disease or a disability. All genes can be passed from parent to child. An expert in X-rays called Rosalind Franklin photographed DNA in 1951 and identified the DNA structure. However, it was Crick and Watson at Cambridge University who publicised the mapping of the DNA structure and the fact that genes could pass information from one generation to the next.

0 2B How have drugs and treatments developed since 1945?

1996
Researchers in Scotland breed the first cloned animal: a sheep called Dolly, cloned from a cell taken from a six-year-old ewe. Cloning is the process of creating an identical copy of an original organism. Dolly died in February 2003 from a lung disease. The idea of using cloning technology on humans is one of the medical world's most controversial issues

2002
American surgeons implant electrodes connected to a miniature computer into the visual cortex of a blind man; using a video camera mounted onto his glasses, the man is able to 'see' well enough to drive a car

2008
First full face transplant

2006
First HPV (anti-cancer) vaccine approved

2013
First human liver is grown from stem cells

1990 2000 2010

1990
The **Human Genome Project** formally launches: it is the world's largest collaborative biological research project that aims to decode all the genes in the human body and identify their roles; the money for this international scientific project comes from the governments of the USA, Britain, Japan, China, France and Canada, as well as drug companies that hope to profit from developing drugs based on understanding DNA

2003
The Human Genome Project is declared complete with the final sequencing of the entire human genome, which is a huge breakthrough in understanding how genes help determine who a person is; ongoing research into links between genetics and treating diseases come from the information produced by this project

2006
First partial face transplant is carried out

2007
Huge breakthrough in visual prosthetics (bionic eyes) with the release of the Argus II prosthetic eye

Technology

New technologies such as **keyhole surgery** and MRI scanning have helped doctors and surgeons to develop new techniques for identifying illnesses and operating on them. Discoveries, such as understanding more about DNA, have helped gene researchers work out family relationships, trace ancestry, use DNA analysis to solve crimes, and find specific genes involved in diseases. With the ongoing research on the human genetic code (made possible by the Human Genome Project), scientists are optimistic that soon doctors can better understand cancer and lots of other illnesses.

War

Two world wars meant that the government spent a fortune on research and testing so that the latest drugs and surgical techniques were available for wounded soldiers. Doctors had to find better ways to treat casualties too, thus advancing medical knowledge. Sadly, wars and conflict continue to take place and the research, testing and development continue.

Government and finance

Governments spend far more money on research and care than ever before. For example, the British government has a huge breast and cervical cancer screening programme which aims to identify illness before it develops. Drug companies too, spend huge amounts on research and development, hoping to make money from cures.

Key Words

Human Genome Project keyhole surgery

Communication

New ideas spread rapidly due to the increased use of television, news media and the Internet. Television and radio advertisements have made more people than ever before aware of health risks associated with smoking and alcohol, for example.

Change in attitudes

Modern politicians have realised that one of their main priorities is to help and protect the people they serve. In recent years the British government has introduced 'Healthy Eating Standards'. This means that food served in schools must include high-quality meat and fresh fruit and vegetables. Schools cannot serve drinks with added sugar, crisps, chocolate or sweets in school meals and vending machines.

Reasons why drugs and treatments have developed greatly in the late twentieth century

Individual character

As across all periods of history, the late twentieth century saw some geniuses in action: Crick and Watson, and Geoff Hounsfield in Britain, for example.

Extension

GCSE

Which do you think is the main factor affecting medical progress? Write a paragraph (no more than 250 words) explaining your reasons why. Make sure you mention at least two other factors and why you think they are not the main factors.

Practice Question

Explain the significance of the individual sciences – physics, chemistry and biology – for medical progress in the twentieth century. **8 marks**

Study Tip

Show how each branch of science has contributed to progress in medical treatments.

Work

1 What is the Human Genome Project?

2 Imagine you have to choose three medical developments from the twentieth century to include on a web page entitled 'The greatest advances in medical history'. Which three developments would you choose? Give reasons for your choices.

3 a In your own words, explain how medical progress has been affected by:
- government and finance
- technology
- war
- individual character
- communication.

b Can you find examples on the timeline on pages 66–68 that match these factors?