How have modern medical advances revolutionised health and medicine?

Anouska: Welcome to the Bitesize GCSE History podcast, helping you prepare for your exam on the History of Medicine. I'm Anouska Lewis, history podcaster.

Alice: And I'm Alice Loxton, historian and author. In each episode we bring you the key facts, events, and people that have changed science and medicine as we know it.

Anouska: You may hear actors reading imagined conversations based on historical evidence, and there will be a quiz at the end so stay tuned.

Alice: In this episode, we're going back in time to a century known for its huge social, political, and economic changes.

Anouska: Women will get the vote, there will be two world wars, and technology will advance like never before.

Alice: Grab your notebook and a pen to make some notes. We've made it to the 20th century, and a lot is about to happen. By 1900, people finally understood what caused common diseases, thanks to the advances of scientists like Louis Pasteur and Robert Koch.

Anouska: By the end of the 19th century - that's the 1800s - when someone was ill, their doctor would observe them, consult medical textbooks, and diagnose them based on their symptoms.

Alice: But over the course of the 20th century this approach changed. Technological advances led to major breakthroughs in diagnosing and treating illness - so let's have a quick look at some of the key innovations.

Anouska: First used in the 1890s, X-rays were a key diagnosis tool in the 1900s. X-rays pass beams of invisible radiation through your body to show what's going on inside. This helps diagnose problems like broken bones.

Alice: Invented in the early 1900s ECGs, which is short for electro cardiograms, use electrical impulses to track heart activity and can help investigate heart conditions.

Anouska: This next one is really cool, Alice. Ultrasound scans, which began in the mid 1900s, use sound waves to create a picture of the inside of someone's body.

Alice: That's really amazing! And ultrasounds help investigate symptoms, monitor conditions, and check babies' development during pregnancy.

Anouska: Since the 1970s, CT scans have been used to create detailed images of the inside of the body, by combining X-rays with computer processing. In the 1980s MRI scans further advanced the ability to see inside the human body, using strong magnetic fields and radio waves.

Alice: These new testing methods and technological advances often removed the need for surgery, so treatment could be quicker and more comfortable for patients.

Anouska: It also meant diagnosing patients was more accurate than before. But that didn't mean scientists had all the answers. If you want to hear other episodes in this Bitesize GCSE History series, make sure you download the BBC Sounds app.

Alice: Some people can be born with what we call genetic, or hereditary conditions. They're caused by genetic variations and passed on from parents.

Anouska: Genetic conditions puzzled doctors throughout the first half of the 20th century. But the discovery of DNA had a huge impact on understanding many of these conditions.

Alice: In 1953 a group of scientists discovered the structure of DNA. It was a great example of collaboration in science, so let's meet the key players.

Rosalind: I'm Rosalind Franklin,

Maurice: and I'm Maurice Wilkins.

Rosalind: We managed to take high quality X-ray images of deoxyribonucleic acid, also known as DNA.

Maurice: Another pair of scientists, Crick and Watson, used these images to build a model of what they thought DNA looked like.

Francis: Hello! My name is Francis Crick.

James: And I'm James Watson. We worked out that DNA is shaped like a double helix, like a twisted ladder, which can unzip itself to make copies. It's where information about a person is stored, like their eye colour or blood type.

Francis: This helped other scientists understand the causes of genetic diseases like cystic fibrosis and sickle cell anaemia.

Anouska: And it didn't end there! Starting in 1990, the Human Genome Project saw scientists from all over the world work together. They were mapping all the information inside a person's DNA, also known as the human genome.

Alice: This huge amount of data has allowed scientists to identify differences in DNA that indicate genetic disease.

Anouska: For example, scientists identified genes that can lead to some types of cancer, which has since led to better treatments.

Alice: So, all of these incredible advances improved the diagnosis of disease, but what about treatment? Let's look at four examples. It might be a good idea to make some notes here.

Anouska: Number 1 - high energy X-rays allow doctors to kill cancer cells in the body. This is an effective cancer treatment known as radiotherapy.

Alice: Number 2 - the invention of smaller and more portable machines helps during surgery. For example, if a patient has a heart bypass, a machine performs the functions of the heart for them while surgeons operate on their heart.

Anouska: Number 3 - robotics are involved in treatment now too! Surgeons can use computers to control instruments inside the body during operations. This is great for procedures like brain surgery, where precision is really important.

Alice: And number 4 - using tiny cameras and narrow surgical instruments, surgeons can perform keyhole surgery with just a tiny cut. This helps patients heal quicker.

Anouska: We've come a long way. But let's go back to the early 1900s to talk about the Magic Bullet - which, in my opinion, is one of the best named medical discoveries.

Alice: Now that scientists knew microbes caused disease, they wanted to find a chemical that could wipe out the bad bacteria, without hurting the person it was meant to cure.

Anouska: In 1907 Paul Ehrlich was looking for a cure for syphilis, which is a sexually transmitted disease. He started experimenting with an arsenic based drug.

Alice: But it wasn't quite working. It could attack the disease, but it also damaged the body since arsenic is poisonous.

Anouska: It wasn't until 1909 when Ehrlich and another scientist called Sahachiro Hata discovered the first magic bullet.

Alice: It was called Salvarsan 606, because it was the 606th compound they tested, and it successfully killed the bacteria that caused syphilis.

Actor: Case study - Antibiotics

Alice: The first antibiotic was discovered in 1928. At that time, death from infection was common, but antibiotics killed bacteria or at least prevented them from spreading.

Anouska: You may have been prescribed antibiotics yourself - they're very common today. But they were actually discovered by accident.

Alice: In 1928, Dr Alexander Fleming was conducting experiments with a common type of bacteria called staphylococcus.

Anouska: While away on holiday, he left a Petri dish in his lab that contained the bacteria.

Alice: When Fleming came back, he saw there was mould growing in his Petri dish, and the mould was killing the bacteria. He worked out that the mould produced a chemical substance that could kill bacteria. And he called it penicillin.

Anouska: In 1929, Fleming wrote about his findings in a medical journal but went no further with the study. Alexander Fleming has started off strong but, ooh who's this? Coming up behind to take the baton it's Howard Florey and Ernst Chain. The crowd goes wild!

Alice: It wasn't until around ten years later, in 1937, that another group of scientists took up Fleming's work. They experimented first with giving penicillin to animals, and then human patients.

Anouska: During World War II, the allied forces, Britain and America, realised that penicillin could be used to treat injuries. They began mass producing the drug and it was used to treat infections in wounded soldiers.

Alice: Let's put our knowledge to the test now. Don't worry if you don't know the answers, that was a lot of information.

Anouska: Just have a go at writing down your answers and if you need to, rewind this episode. First up - what do we call the structure that carries information about our genetic makeup? It's DNA! In 1953, a team of scientists discovered its double helix structure.

Alice: Next question - what is the Magic Bullet? It's a chemical cure that kills bacteria in the body. It was discovered in the early 20th century, and it's great because it kills the bacteria while leaving the body unharmed.

Anouska: Thanks for listening to this episode of the Bitesize GCSE History podcast.

Alice: If you enjoyed it, there's plenty more content on BBC Sounds, with podcasts on English, science, and more!

Anouska: Join us for the next episode where we'll look at the role of government in public health. See you then.

Alice: Bye!