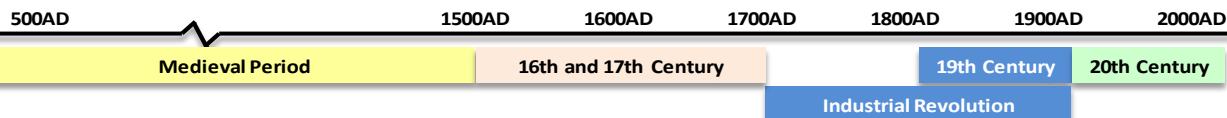


Knowledge Map: Advances in Medical Knowledge

Summary: This section of the medicine topic considers how medical knowledge has advanced over time and to what extent. It also considers what was the most significant event in the advancement of medical knowledge. The time periods examined are the medieval period, the 16th and 17th centuries, the 19th century and the 20th century.



Medieval Period and Before (Greek and Roman)

Summary

The period is marked by a lack of medical knowledge which means there was little advancement. Indeed, the period could be considered one of regression when compared to previous periods such as the Egyptians, the Greeks and the Romans.

Key Knowledge

1	Hippocrates: Four Humours	Regarded as the Father of Modern Medicine. His "Four Humours" theory is based on the idea that to prevent disease and illness one had to keep the 4 Humours (Blood, Phlegm, Yellow bile & Black Bile) in balance & to do things in moderation. This led to many attempting to keep the Humours in balance & much of the medical knowledge from the Medieval is based on his work.
2	Galen: Anatomy	He followed the ideas of Hippocrates, but took them further. He believed that dissection was the best way to discover the workings of the human body. Despite only dissecting animals, he developed a better practical knowledge of how the body worked. Working at Gladiator school it gave him many opportunities to practise. He was one of the first people to place an emphasis on listening to a patient's pulse.
3	Alchemists	As we have learnt before, alchemy was the search to turn base metals into gold, as well as the search for the 'Elixir of Life'. Whilst never successful their work had a huge impact on science and medical knowledge. Alchemists were the first to produce certain acids (hydrochloric and nitric) and is the very foundation for modern-day chemistry.
4	Influence of the Church	Whilst the Church predominately focused on curing illness through prayer, they did move medical knowledge on in some ways. The Church were the first to set up universities and schools of medicine that trained people in the teachings of Hippocrates and Galen as their ideas never contradicted the Church.

16th and 17th Centuries (Renaissance)

Summary

This period is one where people began to really question what had come before and the 'wisdom' of the Ancient World (Greeks and Romans). Key people such as Vesalius and Pare really changed peoples' understanding of illness.

Key Knowledge

5	The Renaissance Period	Renaissance means 'rebirth' in French and is one of the key periods in the evolution of humans. It is a period that saw the revival of classical art, architecture, literature and learning. Key individuals such as Michelangelo, Da Vinci and Galileo that challenged previous thinkings of art and science. It also is a period where people challenged previous medical thinking.
6	Andreas Vesalius: Anatomy	Born in Brussels in 1514, he studied in France and Italy. He believed anatomy was the key to understanding the how the body worked. He challenged Galen's work and developed more accurate views on the inside of the body by dissecting humans rather than animals. His work gave doctors a more detailed knowledge of Human anatomy.
7	Ambroise Pare: Treating Wounds	Ambroise Pare developed his skills in the French Army. He used a variety of ingredients to create dressings for wounds which numbed the pain and were more effective at healing. However, his biggest breakthrough was the use of ligatures to tie off wounds during amputations. He was pioneering in the development of artificial limbs.
8	William Harvey: Blood Circulation	Harvey challenged the work of Hippocrates and Galen. He discovered that blood was pumped around the body in a circular motion, and that the heart pumped the blood, not the liver which Galen believed. Galen had also claimed that the liver made new blood. Harvey again proved this incorrect, also challenging the idea that 'bleeding' was a cure – it was impossible for the body to have too much blood.

18th and 19th Centuries

Summary

This period is defined by possibly the single biggest advancement in medicine. The work of Louis Pasteur in understanding that bacteria was often the cause of disease meant any previous notion that it was to do with humours or God was dispelled. The work by Robert Koch after would only advance this further.

Key Knowledge

9	Louis Pasteur: Germ Theory	Pasteur is often cited as making the single most important medical discovery. He was the first person to identify a link between germs and disease. He argued that micro-organisms were responsible for disease and that if we could find out more about these micro-organisms then a vaccine could be developed to target that disease. He started to develop effect vaccines, leading to the first rabies vaccine in 1880.
10	Robert Koch: Vaccination	Koch was able to link particular germs to particular diseases, in effect developing the science of bacteriology. He identified the specific bacteria that caused tuberculosis and cholera. He then went on to isolate the cause of many diseases, for example: typhoid, pneumonia, plague – all killer diseases. He also developed a way to stain bacteria to make it easier to study.
11	Paul Ehrlich: Antibiotics	Ehrlich was a student of Koch and epitomises the scientific approach to identifying and treating diseases. He was the first to discover a 'magic bullet' cure (a specifically designed drug to treat a disease) with Salvarsan 606 which cured Syphilis. It proved science was the means to eradicate science.

20th Century

Summary

This period is one that is characterised by improvements in technology that enable doctors to diagnose illness and disease more effectively but also the single most significant discovery: DNA. The development of genetics and how the body is created, constructed and reproduced culminates in the discovery of DNA which is essentially a blueprint for the human body, would change medical knowledge forever.

Key Knowledge

12	Wilhelm Rontgen: X-Rays	X-Rays were discovered by William Rontgen in 1895. He discovered that radiation would pass through the body at different rates, depending on whether it encountered bones or flesh. His discovery would lead to doctors being able to investigate broken bones and this would develop into other areas throughout the century.
13	Floyd Firestone: Ultrasound	Using sonar technology from the Second World War which was used to discover submarines, Firestone created a way to 'see' inside the human body by using high frequency sound waves. This avoided the need to use radiation and it also produced 3D images. It is used to examine the progress of unborn babies and to examine human organs.
14	MRI Scans	MRI (Magnetic Resonance Machines) scanning uses radio waves to build up a detailed picture of organs and tissues within the body. It uses powerful magnets to give a high resolution image. It is used to check how previous medical treatments have worked, as well as helping diagnose diseases in the human body.
15	PET and CT Scans	Positron Emission Tomography (PET) injects a slightly radioactive trace into the bloodstream, allowing 3D colour images of tissues and bones to be seen. It is used to investigate cancers and heart problems. Computed Tomography (CT) uses many x-ray images from different angles to produce a cross-section image of an area. It is used to locate cancerous cells.
16	Francis Crick, James Watson and Rosalind Franklin: DNA	They published a paper about DNA (deoxyribonucleic acid) which carries genetic information about hereditary materials in human beings. Nearly every cell contains identical information, it is how humans reproduce themselves. Understanding DNA had significant implications for medical knowledge. By modifying DNA, it became possible to eliminate genetic diseases, stop some cancer cells from multiplying and screen for life-threatening diseases.

Key Words and Definitions

Renaissance	A period in History from the 14th to the 16th century that saw a revival in critical thinking.
Anatomy	Branch of science that focuses on the structure of the human body.
Dissection	Methodically cut up (a body or plant) in order to study its internal parts.
Ligature	A cord or thread used in surgery, especially to tie up a bleeding artery.
Circulation	Continuous motion by which the blood travels through all parts of the body under the action of the heart.
Bacteria	A micro-organism that causes the decay or disease.
Syphilis	A sexually transmitted disease that was very prevalent in the 19th century.
Genetics	The study of heredity and the variation of inherited characteristics.
Cancer	A disease caused by an uncontrolled division of abnormal cells in a part of the body.
Scanner	A machine that examines the body through radiation, ultrasound, or magnetic resonance imaging.