Medicine through Time

Paper 1 Knowledge Toolkit

Paper 1 *1h15*: Medicine through Time

Middle Ages

Causes of disease

God and the Church

The Church taught that God made them ill because he was either displeased with them or was testing their faith. This was believed and meant that few new ideas about the causes of disease appeared.

Discouraged dissection.

Astrology- The alignment of planets and stars was thought to cause some diseases.

4 Humours

A natural idea from the ancient Greeks (Hippocrates) that stated the body has 4 "humours" that must be kept **in balance** for good health.

Miasma

Another theory about the cause of disease was that it was transmitted by 'bad air.

Preventing illness methods included praying, herbal remedies,bleeding,purging,balancing 4 humours, keeping healthy.

Who treated the sick? Barber surgeons, physicians (if wealthy), monks and nuns, apothecaries, women in the home.

Black Death

They had various explanations...

Most commonly - a 'punishment from God', some blamed bad airs, the alignment of planets, poison - spread by the rich, the poor, Jews. imbalance of the humours.

They dealt with it in various ways...

Flagellants - religious fanatics whipping themselves, Protecting themselves from 'bad airs' , isolating themselves, persecuting minority groups they thought were responsible for spreading the diseases - Jews etc. The usual treatments, bleeding, purging, herbal remedies, carrying charms etc.

Renaissance

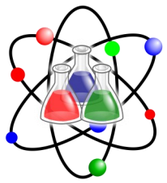
This was the "**RE-BIRTH**" of knowledge. It began around 1500 AD.

The main points about "Medicine and the Renaissance"

- People **rediscovered the knowledge of the ancient world**.
- People begun to question what had come before and began seeking new answers.
- Doctors looked to **rational** as opposed to supernatural explanations.
- Technology had a hand - "**printing press**" led to spread of ideas. The invention of mechanical pumps with valves gave clues to the working of the blood circulatory system.
- The impact of renaissance '**artists**' like 'Leonardo Da Vinci' with their highly detailed and **realistic drawing** of the human body.
- Many **more dissections** were carried out.

Thomas Sydenham and the Royal Society

A physician who did not rely on medical books to treat patients, instead did observations and recorded his findings. He said disease had nothing to do with the nature of the person who had it. He based treatment of a disease as a whole, rather than looking at individual symptoms.



The Royal Society aimed to further scientific understanding by carrying out and recording the results of experiments, sharing scientific knowledge and encouraging new theories and ideas. It sponsored scientists to enable them to carry out research.

From 1665, the Royal Society published a journal called Philosophical Transactions, in which scientists could share their work and ideas. This meant a doctor could challenge and build on other's research. King Charles II granted the Royal Society a Royal Charter. He was interested in science and this approval helped the society gain credibility.

Vesalius, Harvey & Pare (Renaissance)

Vesalius challenged Galen's ideas about anatomy. He carried out **dissections with humans** and he got his students to do the same. He **proved Galen wrong** on several points, that the human jaw had two bones not one. He said that sinews attached themselves to bones differently in humans and animals and that the blood did not pass through the septum in the heart. He was professor of anatomy at **Padua.**

Harvey discovered the complete notion of **blood circulation**. He showed that blood circulated **in one direction**, that the heart was a **pump.** He showed the difference between arteries and veins and showed that blood vessels had '**one-way' valves.** He **disproved Galen's theory that blood was manufactured in the liver** by demonstrating the amount of blood that passed through the circulatory system in a given amount of time.

Pare was a French surgeon who gained experience as a **war surgeon**. He devised new techniques for amputations using **ligatures** to prevent loss of blood. He used **soothing ointments** (egg yolk, rose oil and turpentine) rather than "cauterising oils" for gunshot wounds this was much less painful and helped wounds heal. He turned to new methods by **chance** - he'd run out of 'burning oils'. He disproved that the 'Bezoar' stone was a 'magical' antidote to all poisons.

However, all three faced obstacles...

⇒ Many doctors opposed them because he challenged the great 'Galen' who's ideas had survived for 1400 years.

⇒ Doctors were not used to new ideas or doing anatomical work them selves-they were just not trained to do so!

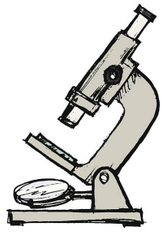
Change and continuity in prevention, treatment and care

Change	Continuity/ Lack of change
• By 1500, hospitals were treating more sick people. Most had their own apothecary to mix medicines and physicians visited patients. • By 1536, the dissolution of the monasteries caused hospitals to close. Some free, charity funded hospitals were set up, but numbers remained low. • Pest houses began to appear, where people suffering from a particular disease could go. • More emphasis on removing miasma through draining swamps and removing rubbish. • New herbal remedies from newly discovered countries. • **The Theory of Transference** led people to try to rub objects on themselves to transfer the disease to the object. • Alchemy caused chemical cures using metals and minerals became popular.	• Herbal remedies • Bleeding and purging • Cleanliness • Superstitions and prayer • Healthy living **Lack of change** • Ideas were slow to be accepted. • There was no direct improvement in treating or preventing illness. • Discoveries did not improve the understanding of the causes of disease.

Pasteur and Koch (Germ Theory)

The main man in proving this and developing future vaccines was, of course **LOUIS PASTEUR!**

In the 1850s Pasteur used his microscope to observe micro organisms growing (or germinating) in vats of alcohol that were going bad. He showed the brewers how to kill the micro organisms by heating the liquid. He theorised that if micro organisms caused organic liquids to "go bad" then they were probably the cause of disease too. In 1861 he proved that micro-organisms lived in the air with his experiment sing sealed flasks. He published his results in the paper "The Germ Theory". He then went on to prove that for the first time that a particular micro- organism caused a disease in silk-worm.



ENTER ROBERT KOCH…

He was a German doctor who took up Pasteur's theory and began the hunt for specific germs that caused specific human diseases. He developed CAREFUL SCIENTIFIC METHODS to hunt down germs. Injecting 'germ cultures' into a series of animals to isolate the bacteria developed a 'growth culture' for germs to grow on based on gelatine and potatoes. He using cameras with microscopes to photograph germs and **chemical dyes** to stain 'invisible' microbes. Between 1878 and 1883 he and his team positively identified the germs that cured Anthrax, Tuberculosis and Cholera.

KOCH'S SUCCESS SPURRED ON PASTEUR TO REDOUBLE HIS EFFORTS TO DISCOVER ACTUAL VACCINES

In 1879 came the breakthrough - a vaccine for ***Chicken cholera.***. This happened partly by accident, old germs, left exposed to the air over the holidays were accidentally injected into chickens and proved to provide IMMUNITY from the full strength disease.

Pasteur, thanks to chance, realised how vaccines worked . In following years Pasteur developed two more vaccines against diseases that affected Humans as well as animals.

1881 - The Anthrax Vaccine

1884—The Rabies vaccine

FROM VACCINATIONS TO CURES

Vaccines are preventative but they didn't cure. In the 1890s, a German doctor called **BEHRING** discovered **ANTI-TOXINS.** These are produced in the blood stream of animals to fight bacteria. He used these Anti-toxins from the blood of rabbits, to help cure **DIPHTHERIA.**

Jenner & Vaccinations

The first vaccine (against Smallpox) was discovered by Dr. Edward Jenner in 1796.

POINTS TO REMEMBER ABOUT JENNER AND THE SMALLPOX VACCINE

He actually used 'cowpox' matter to vaccinate against smallpox. He got the idea from his observations that milkmaids got cowpox but never smallpox. He already knew about the more dangerous produce of 'inoculations' (using smallpox "matter" to prevent the disease). He proved his theory with a 'live test' on a healthy 8 year old boy called 'James Phipps'.

Did everyone support him?

⇒ People objected on moral/religious grounds - making out people would grow cows out of their bodies!

⇒ Jenner couldn't explain why vaccination worked!

⇒ Vaccination could be dangerous in the hands of careless doctors

⇒ Nevertheless in 1852 vaccination against Smallpox was made compulsory!

⇒ ***KEY POINT - It wasn't for over 80 years that another vaccine was developed until Germ Theory was proven!***

Anaesthetics and Antiseptics

Major problems with surgery– pain, blood loss & infection.

Joseph Lister knew of PASTEUR'S PROOF OF THE GERM THEORY in 1861.

He knew of the use of the chemical CARBOLIC ACID used to clean sewers in Carlisle. So in 1865 he used CARBOLIC ACID spray to prevent infection of wounds during operations. This was an antiseptic.

ASEPTIC techniques became more widespread by the end of the century. (Removing germs from the operating theatre).

James Simpson discovered CHLOROFORM. It was used widely for childbirth as an anaesthetic. Opposed by many male doctors on religious grounds (women should have pain in childbirth, it was Gods punishment for the sin of Eve!) Opposed by others as an untested and potentially dangerous substance. Some patients did die from chloroform.

TRANSFUSIONS had been tried in the 1800s but patients often died.

Breakthrough came in 1901, scientists discovered the different BLOOD GROUPS. Then during the 1st World War a method of storing blood was discovered.

Penicillin (Fleming/ Florey & Chain)

Fleming:

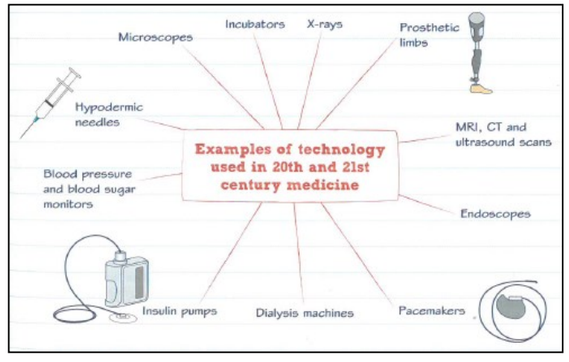
- He discovered the penicillin mould on a culture dish in 1928.
- He observed it's actions in killing bacteria in the culture dish.
- He wrote articles about the action of penicillin and that it might be useful in medicine. It was these articles that were read by Florey and Chain.

'Florey and Chain'

- They picked up on Fleming's articles and gathered together a team of scientists to develop the drug.
- They refined the mould into a useable drug and carried out tests on mice and, in 1941, conducted a human trial.
- Florey flew to America in 1941 and persuaded the huge American drugs companies to mass produce penicillin.

Modern Medicine

Discovery of **DNA by Watson and Crick**. Watson led the Human Genome Project in 1990 which set out to identify and map every gene in human DNA. As a result we have better understanding of some genetic conditions, e.g. Down's syndrome, predicting if a person is at a higher risk of developing some cancers and stem cells can be grown into different cells.



What else has modern medicine achieved?

⇒ **NHS**– free health care for all

⇒ Compulsory **vaccinations**

⇒ **Lifestyle campaigns** to prevent serious diseases like lung cancer