

Superstition and Religion

In the **Middle Ages** the Christian Church taught that disease was a **punishment from God** for living a sinful life.

The Roman Doctor **Claudius Galen** believed that disease was caused by the **4 humours being unbalanced**. The church taught everybody to believe Galen. Disagreeing with Galen was bad news!

Plague Doctors wore **perfumed masks** in the Renaissance and people **burned barrels of tar** in the 19th century as they believed disease was caused by **miasma (foul smells in the air)**



Chance

Jenner discovered that the milkmaids he was treating had not caught smallpox after seeing the cowpox scars on their hands - **they'd accidentally been vaccinated!**

Pasteur's assistant Charles Chamberlain injected chickens with a weakened batch of Chicken Cholera germs he'd left out overnight. **They'd become weakened by the germs in the air, didn't kill the chickens and acted as protection against a stronger dose of the disease!**

Fleming left a sample of germs out in his lab near an open window. After coming back from holiday he realised a sample of new germs had settled on the petri dish and killed the germs - **Penicillin had been discovered!**



Year 10

GCSE History - Assessment Point 2



Science and Technology

1864 - **Louis Pasteur** proved that his '**Germ Theory**' was correct after a series of experiments. **Bacteria is the true cause of disease.**

Robert Koch, Pasteur's German rival proves that bacteria cause human diseases by staining and photographing the **TB bacterium** for all to see.

In 1928 **Alexander Fleming** made the chance discovery that bacteria could kill other bacteria when he discovered the first **antibiotic** called **Penicillin**.

Time Period	Ideas about causes of disease
Middle Ages	4 Humours are out of balance. God sends disease as punishment, movement of the stars and planets affect people's health, Miasma.
Renaissance (Early Modern)	Miasma or bad air, 4 humours (still!) out of balance!
19th century	Spontaneous Generation (micro-organisms caused by decay), Germ Theory
20th century	Disease are caused by germs, some diseases have genetic causes (DNA)

Government

Renaissance - laws introduced to make people sweep the filth up from outside their doors. Pigs, dogs and cats were to be killed and large groups of people banned from meeting together = **still no understanding as to cause of disease though.**

19th century - **French** government funded Pasteur's research and **German** government funded Koch's in order to achieve victory over their closest rivals!

20th century - **British** and **US** governments funded **Howard Florey** and **Ernst Chain** to mass produce huge amounts of **Penicillin** in order to heal injured soldiers during WW2.



The Role of the Individual

Claudius Galen held back new ideas for almost 2000 years as people believed his idea about unbalanced humours was the cause of disease!

Edward Jenner realised that catching cowpox stopped you catching smallpox - but he couldn't explain why!

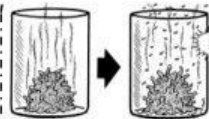
Louis Pasteur used his swan neck flask experiment to prove that germs cause liquids to become diseased.

Pasteur's 'Chicken Cholera' experiment proved that Jenner's vaccine worked after realising that those chickens not vaccinated died after being given a fresh sample of germs.



The Germ Theory

Scientists in the early 18th century no longer believed in the Four Humours or Miasma but with new powerful microscopes they could now see microbes (tiny organisms like bacteria) and they began to think of new ideas such as Spontaneous Generation.



Spontaneous Generation

Simply the idea that microbes were the product of decay (e.g. rotting food/waste) and they caused disease.

They did not think that it was actually microbes in the air that caused decay – it was wrong but still progress!

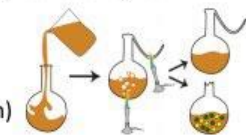
Louis Pasteur and the Germ Theory



In 1861, French scientist Louis Pasteur came up with the Germ Theory which challenged the idea of Spontaneous Generation and finally led the way to understand the true cause of disease!

Pasteur's theory claimed:

1. Microbes in the air cause decay
2. Microbes can be killed by heating them (Pasteurisation)
3. The air is full of microbes, which can cause disease



Pasteur proved this through his experiments on milk, beer and animals

Why was Pasteur so Significant

Pasteur had made a huge breakthrough! He had proved Germans were all around us, and some were harmful and could cause disease

Pasteur had little impact as doctors like Henry Bastian refused to accept that microbes like bacteria could make people ill, so they continued to believe spontaneous generation. It took a long time to convince people...

Robert Koch and the Germ Theory

I was able to develop Pasteur's ideas to **discover types of bacteria cause disease**. In 1876 I discovered the bacteria which caused Anthrax.

BREAK THROUGH
This was a major breakthrough – it was the first time anyone had identified a specific microbe (bacteria) that causes a specific disease)

I followed this by discovering the bacteria for Tuberculosis in 1882 and then Cholera in 1883 (proving John Snow right).

Robert Koch
Father of bacteriology

Koch published his methods of identifying disease causing bacteria

• It involved growing bacteria using agar jelly and a petri dish



• This would grow 'cultures' of pure bacteria, allowing Koch to identify specific bacteria causing disease



Koch had a serious impact:

- He invented a method to grow and stain bacteria to make them easier to identify
- Doctors now began to seek ways to attack the microbe that caused disease, rather than just the symptoms. A huge turning point!
- He inspired other scientists to discover the causes of pneumonia and tetanus
- His methods are still used to this day.

Impact of the Germ Theory

1. The Germ Theory solved the ideas on what caused disease despite not everyone including the British government believing it. By the 20th Century, the Germ Theory was widely accepted.
2. Scientists now look at preventing disease causing microbes- through Jenner's vaccinations and antiseptics, whilst new treatments could be developed with this new understanding.

How did they deal with PAIN?

- Patients were usually awake during the operation!
- Might be given herbal drinks (opium, mandrake, hemlock) or simply given much alcohol!
- Surgeons had to be quick to limit the pain
- Patient might be tied or held down.

Middle Ages Surgery



How did they deal with INFECTION?

- Honey, vinegar and wine were used to clean wounds.
- Boiling oil was poured onto wounds to kill the infection caused by gunpowder - killed more than it helped!
- Most surgeons believed Galen was right when he said that pus was a sign of a wound healing! Henri de Mondeville wrote book saying Galen was wrong, a wound should be cleaned of pus!

What types of surgery did they use?

- Developed 'Bradmore's Screw' - tool used to remove arrow heads from injured soldiers by inserting a metal forcep into the wound to pull the arrowhead out!
- Bleeding - to restore the balance of the 4 Humours.
- Amputating - lots of amputating!
- Cauterised wounds to stop bleeding by burning the flesh - extremely painful and usually resulted in death!

A lot of Middle Ages surgery was performed on battlefields - no wonder the survival rate wasn't huge!

What types of surgery did they use?

- Barber-Surgeons would cut your hair, give you a shave and perform basic surgery!
- They could remove external growths (tumours) and amputate limbs.
- Drilled holes into skulls to relieve pressure on the brain.

Some surgeons still bled patients to balance the humours!

How did they deal with PAIN?

- Patients are still wide awake during the surgery!
- Most patients are given alcohol to numb the pain (and to cause them to pass out!)
- Surgeons rely on speed. One French surgeon removed 200 limbs in 24 hours!
- Accidents happened - another surgeon accidentally removed his patients testicles by working too fast.

Surgery in the early 19th century (1800-1850)



An operation in the early 1800's. Patients were usually awake during the surgery whilst a team of surgical assistants held them down!

How did they deal with INFECTION?

- Still no understanding of germs (until the 1860's)
- Surgeons operated wearing surgical gowns covered in blood from previous operations.
- Rarely washed hands.
- Semmelweiss was mocked when he advised washing hands in chlorinated water.
- Surgical tools were also rarely cleaned of infection.