Medicine Through Time

Revision Guide

Paper 2- Britain; Health and the People

Questions on the topic of medicine make up 25% of your final grade. You need to answer **4 questions** linked to medicine and there are a total of **40 marks** for the answers (+4 marks for SPAG on Q4) **Total = 44 marks**. All questions are compulsory (you MUST answer them).

Timing guide:

4 marks = 5 minutes *8 marks = 10 minutes *12 marks = 15 minutes *16 marks = 20 minutes

Mark scheme: You will be familiar with the following descriptions for answers as we use them in lessons.

Basic (Grade 1 and 2): Answers that identify evidence, features or material relevant to the question. Answers take features of sources or interpretations at face value.

Simple (Grade 3 and 4): Answers that describe evidence, features or material relevant to the question. Answers that display simple one step reasoning or explanation of ONE point or comment that is relevant to the question. Answers may describe and explain, simple similarities or differences in sources or interpretations.

Developed (Grade 5 and 6): Answers that display more than one step of reasoning or detailed explanation that is explicitly relevant to the question. Answers will sustain an explanation of the differences or similarities in sources or interpretations.

Complex (Grade 7, 8 and 9): Answers build on the qualities of developed answers. Answers display reasoning that shows the links or connections between evidence or details that are explicitly relevant to the question. Answers may show originality or sophistication. Answers demonstrate substantiated judgement or an awareness of the problematic nature of historical issues, evidence and interpretations.

Types of questions you will be asked:

Q1 Study Source A. How useful is Source A to a historian studying…? **(8 marks)**

- *You will be given a source (usually a picture but could be written).*
- *Use the details of the source in your answer*
- *Link what the source shows to your own knowledge*
- *Consider the provenance (origins) of the source*

Q2 Explain the significance of (event / person / idea) in the development of medicine **(8 marks)**

- You will be given an event e.g. Public Health Act of 1875
  Or an individual e.g. Edward Jenner
  Or an idea e.g. anaesthetics
- Explain the impact of the idea / recognition THEN (at the time)
- Explain the impact of the idea in the long term / relevance today = NOW

Q3 Compare _____ with _____. In what ways were they similar? **(8 marks)**

- You will be given two events to compare e.g. Black Death 1348 and Cholera 1800s
- Explain the SIMILARITIES between the events
- Focus on CAUSE / DEVELOPMENT / IMPACT
- Give examples from each event to demonstrate your own knowledge and explain the comparison

Q4 Has _____ been the main factor in the development of _____? **(16 marks +4 SPAG)**

- Big Momma question – structure as four clear paragraphs
  Paragraph 1 – explain the factor in the question
  Paragraph 2 – choose another factor
  Paragraph 3 – choose another / different factor
  Paragraph 4 – conclusion
- Consider the changing influence of these factors over time e.g. religion had vital importance in influencing medieval medicine but this influence was replaced by science and technology in the modern age.
- Consider how these factors linked together to encourage change

Suggested Activities

1/ Read through your Revision Audit / RAG sheets – at the front of each coloured booklet. Check what you know and what you need to know. Focus your revision on the areas you have identified as weaker.

2/ Divide your notes into categories and create a memory map for each one. If you don't have notes – or you have missed a lot of lessons – then copy someone else's work and use the notes in this guide.

3/ Use the tables in this booklet;

Themes

This shows how various themes (such as surgery, anatomy etc.) have developed through the various time periods. Try to use the table to answer the following questions.

A) Which things stayed the same?

B) Which things changed and when?

C) Which period saw most changes?

D) Which period saw least changes?

E) Which period saw most examples of progress (change for the better)?

F) Can you find any examples of regression (changes for the worse)?

Factors

Factors are things which affect development. This table shows how various factors have affected the development of medicine. These factors can cause or prevent changes. They can explain why there is progression in some areas but not in others. Use your table to complete the following tasks.

A) If you think a factor has hindered medicine in a particular time period shade the box in red. E.g. Religion in ancient Rome

B) If you think a factor has helped medicine in a particular time period shade the box in green. E.g. Government in the 20th Century

C) If you think a factor has helped and hindered then shade the box in red *and* green. E.g. War in the Middle Ages.

D) Choose the factor you think is the most important in each time period and explain why.

E) Choose the factor you think has helped medicine the most and explain why.

F) Choose the factor you think has hindered medicine the most and explain why.

Individuals

You will be asked in your exam about the importance of key individuals. You will need to be able to explain how the particular individual made their discoveries. Use the table to complete the following tasks.

A) Put the individuals in order of importance. Who do you think made the most important discovery?

B) Put the individuals in order of influence. Whose ideas stayed popular for longest?

C) For each individual draw a spider diagram to show which factors helped them and how. E.g. Science & technology, improved communication and the declining power of the Church all helped Harvey make his discovery.

4/ At the end of this booklet are example answer questions. Read these and practice writing out your answers to the questions. Time yourself.

After the fall of Rome, there was a *regression* in medicine in Europe, and a return to a more primitive outlook.

Treatments continued to be a mixture of *herbal remedies*, *bleeding* and *purging*, and *supernatural* ideas. Supernatural ideas included God, charms and luck, witchcraft or astrology.

Reasons for low life expectancy in the medieval period

In 1350 the average life expectancy was *30 years*. Infant mortality was high. One in five children died before their first birthday. Many women died in childbirth. People died from injury, diseases such as smallpox, leprosy and various fevers.

Hippocrates

Hippocrates was a doctor in *ancient Greece*. His approach was based on *natural* rather than supernatural explanations of illness. He developed the idea of *clinical observation* of the *patient*, rather than just of illness itself. His ideas also resulted in the *Hippocratic Oath*, which became a code of conduct for doctors. His ideas were written down in a collection of *medical books*.

The *Greeks* developed the idea of the *four humours*: blood, yellow bile, phlegm and black bile. It was suggested that any imbalance eg too much phlegm, was the cause of illness.

Galen

Galen was a Greek who was a doctor during the *Roman Empire*. He followed Hippocrates idea of observation and believed in the *theory of the four humours.* This led to *continuity* in medical knowledge and practice. Dissection of human bodies was banned. He trained as a doctor to gladiators and was able to increase his knowledge of human anatomy while treating wounds.

Galen *developed* the theory of the four humours by creating a *treatment by opposites*. He wrote over *100 books*. Many of his books survived the fall of the Roman Empire so his ideas lasted through the Middle Ages and into the Renaissance. His work formed the basis for *doctors' training* for the next *1400 years*.

Galen *dissected animals* and proved in his *experiment* with a *pig* that the *brain controlled the body, not the heart.* However, many of his ideas on anatomy were *incorrect* as *human anatomy* is *not the same as pigs, dogs and apes.*

Medieval explanations of disease

Galen's ideas about the cause of disease continued into the Middle Ages, therefore explanations for disease were that the *humours were out of balance*. They also believed the *movement of the sun and planets, invisible poisons in the air* and *God and the Devil* caused disease. Also commonsense reasons eg *bad smells* from toilets.

Black Death causes

In 1348 the Black Death reached England.

At the time, *people did not understand what caused the disease*, and they did not know how to stop its spread or cure it. There were both *supernatural* and *natural* explanations for it, for example, some people said that *God* had sent it as a punishment, others that the *planets* were in the wrong conjunction, or that it was caused by '*foul air.* Sometimes groups of people such as the *Jews* or *nobility* were said to be responsible.

Symptoms of the Black Death

The *victims* of Black Death suffered a *high temperature, headache* and *vomiting*, followed by *lumps* (*buboes*) in the armpit or groin. These then went black and spread all over the body.

Black Death treatments

There were *no effective cures or treatments*. People relied on *prayer* or '*magical cures'* or took *practical steps*. Some attempts included *strong-smelling posies* as a precaution against 'foul air'. they also *ate cool things*, *cut open the buboes and draining the pus*, *lighting a fire in the room*, *tidying the rubbish* from the streets and *not letting people from other places enter the town*.

Black Death Impact

Between one-third to a half of the population died.

Factor – Religion in the Medieval period

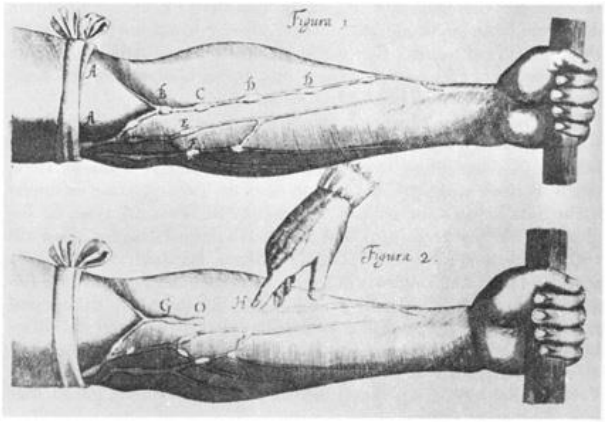
Where can you see that religion either helped or hindered the advance of medicine?

The Renaissance Period

William Harvey

William Harvey became Royal Physician to James I and Charles I. He was a leading member of the Royal College of Surgeons and trained at the famous university in Padua, Italy.

In 1615 he conducted a comparative study on animals and humans. He realised that many of his findings on animals could be applied to Humans. Through this study he was able to *prove* that *Galen* had been *wrong* to suggest that blood is constantly being consumed. Instead, he argued, that *blood* was constantly *pumped* around the body *by the heart*. Harvey went on to *identify* the difference between *arteries* and *veins*. Harvey also *identified* the *way* in which *valves work in veins and arteries* to regulate the circulation of blood. His *ideas did not really change surgery or medical treatment* in general but gave people a better understanding about how the body worked.



An ilustration of William Harvey's findings. Source - wikimedia.

Vesalius

In Padua Vesalius *conducted his own dissections*: unheard of at the time and made detailed notes and drawings. His book '*The fabric of the Human body'* published in *1543* was a comprehensive study of the human body. It contained *anatomical drawings* of all parts of the body and offered many new conclusions as to the way of treating disease. The book showed how muscle is built up in layers, *highlighted errors in Galen's theories* such blood passed from one side of the heart to the other via the septum. Vesalius was anxious to ensure the accuracy of his book and personally oversaw the production of the plates that were used for his illustrations.

The book was a *major breakthrough* in medical history for a number of reasons. It developed the use of technical drawings and disproved theories that had been in place in Europe for many hundreds of years. Many people chose to dispute his theories at the time: convinced that the works of Galen were correct.

Why did people still follow Galen?

Throughout the sixteenth century, treatment continued to be based on the **four humours** and **Galen**. This is because **Vesalius** and **Harvey's** findings had **little impact** on the treatment of illness.

1665 plague – had medicine changed?

In 1665 the Great Plague arrived in Britain. It was the worst outbreak for 300 years. People believed in a variety of causes; the position of planets in the sky, the appearance of a comet, from person to person via their breath or contact with the sores, by bad air. People believed it could be cured by using lucky charms, praying to God or using remedies such as applying live pigeons cut in half to the sores.

TASK – Look back at the Black Death and decided how much medicine had changed or stayed the same.

Industrial Revolution

Jenner

Jenner's vaccination was a landmark in the development of *preventative medicine*.

Lady Montagu introduced *inoculation* from *Turkey*. In the 18th century, *smallpox* was a *major killer*. The disease was frequently fatal and usually left any survivors badly *scarred* and *disfigured*. Montagu heard that a healthy person could be *immunised* against smallpox using the pus from the sores of someone suffering with a mild form of the disease.

Unfortunately inoculation sometimes led to full-blown smallpox and death. The fear of smallpox led people to take the risk of inoculation. Doctors could become rich giving inoculations.

Edward *Jenner* was a doctor. He heard that *milkmaids* did not get smallpox but they did catch the much milder *cowpox*.

Using careful *scientific* methods Jenner investigated and discovered that it was true; people who had cowpox did not get smallpox. He tested his theory on a boy called *James Phipps* and injected him with pus from the sores of *Sarah Nelmes*, a milkmaid with cowpox. Jenner then injected him with smallpox. James didn't catch the disease. The Latin for cow, *vacca*, gives us the word *vaccination*.

In *1802* and *1806* *Parliament* gave Jenner *£10,000* and *£20,000* respectively.

Vaccination was made *free* for *infants* in *1840* and *compulsory in 1853*.

Some people *opposed* vaccination. Some doctors who gave inoculation saw it as a threat to their livelihood, and many people were worried about giving themselves a disease from *cows*.

19th Century living conditions in cities

From about *1750*, Britain underwent several changes that soon led to the emergence of an *industrial society*. This *Industrial Revolution* had a mixed effect on medicine. In terms of *public health* in the rapidly growing factory towns, it was, at first, a *negative* one.

There were *no building standards or regulations*, this led to '*gerry building* of *slum housing*. Governments maintained a laissez-*faire* attitude – that is they believed that there should be no central government interventions.

The main problems were caused by *sewage being dumped into rivers*, *overflowing cesspits and human waste being thrown into the streets.*

Attempts at providing fresh water and removing sewage and rubbish were local efforts. These were haphazard and insufficient to cope with the problem.

Another problem was the *smoke* from the *closely-packed houses* and *factories*, many of them also discharged *dangerous chemicals*.

In large *industrial towns* people lived in *overcrowded areas* with poor public health.

There were frequent *epidemics* of *infectious diseases*, such as *influenza, smallpox, typhus* and *typhoid fever*.

John Snow and Cholera

In *1854, John Snow* discovered the connection between *contaminated water and cholera* by plotting the course of a cholera outbreak in the Broad street area of London. He noticed *that all the victims used the same wate*r pump. When he removed the handle from the pump, the epidemic ended.

It was his **scientific** way of plotting the deaths on a map which helped him make this discovery.

Pasteur and germ theory

Pasteur was the first to suggest that *germs* cause disease.

Micro-organisms had been seen through *18th century microscopes*, but scientists thought they were caused by disease and appeared because of illness. This was the theory of *spontaneous generation*. Instead of blaming the microbes, people looked for *noxious gases* called *miasmas*.

Louis Pasteur was employed in 1857 to find the explanation for the souring of sugar beet used in fermenting industrial *alcohol*. his answer was to blame *germs* in the air. Pasteur proved there were germs in the air by *sterilising* some water and keeping in a flask that didn't allow airborne particles to enter. This *stayed sterile* – but sterilised water kept in an *open flask* bred micro-organisms again.

Robert Koch

A German scientist Robert *Koch* began the process of linking diseases to the *microbe* that caused them. Koch developed a *solid medium* to grow cultures and dying techniques to colour microbes, which he viewed through *high-powered microscopes.*

Hearing of Koch's work, Pasteur came out of retirement in 1877 and started to compete in the race to find *new microbes* and combat them.

Pasteur looked for cures to anthrax and chicken cholera. Both he and Koch worked with large teams of scientist in the Franco-German competition for national prestige.

Pasteur's theory was a huge *turning point* for medicine. His theory allowed others to build on his work and identify microbes and ways to combat them.

Florence Nightingale (1820-1910)

During the *Industrial Revolution*, the poorer classes often relied on *informal midwives* and '*wise-women'.*

The first signs of change came in *nursing* following the work of Florence Nightingale during the *Crimean War*. During her time there the *death rate* in Scutari *fell from 43% to 2%.* She believed disease was caused by *miasma* and emphasised *cleanliness* and *fresh air*. Her work was reported in British newspapers.

Mary Seacole also played an important part in improving nursing care during the war. However, probably because she was a *black woman* from *Jamaica*, she was not given much credit and was not allowed to work as a nurse in England after her return.

As a result of these developments nursing started to become a *respectable medical profession*. In **1859** Florence Nightingale's book *Notes on Nursing* was published and a public fund was launched to raise money for a proper nursing school. The *Nightingale School of Nursing* was based at *St.Thomas' Hospital*, London. Other training schools followed. By **1900** there were *64,000 trained nurses*. Florence Nightingale also wrote over 200 books about hospital design and organisation.

Elizabeth Garrett Anderson (1836-1917)

Inspired by Elizabeth Blackwell, the first woman in the USA to qualify as a doctor. Repeatedly turned away by medical schools, she worked as a *nurse* while *attending lectures for doctors*, until she was forced to stop. *Turned away by medical schools*, which refused to accept a woman. Needed a certificate from one of the three medical organisations to become a doctor – in **1865** she was accepted by the *Society of Apothecaries*. Set up a medical practice in London. Still wanted a medical degree so she learned French and gained the qualification at Paris University. In **1876** an Act of Parliament allowed women to enter the medical profession. She was the *first woman* to *qualify* as a *doctor* in *Britain*.

Revision Task

Create an acrostic to help you remember the significance of the two women mentioned above.

1. Read this example for Florence Nightingale:

Nightingale, first name Florence

Unimpressed by the way nurse were trained

Really wanted to do something about it

So she sent a report to the government

It got in the press, and people gave money for…

Nightingale's School of Nursing –

Gave nursing a more professional and respectable feel

2. Elizabeth Garrett Anderson, try using the word **DOCTOR** or maybe **FEMALE DOCTOR** if you come up with enough facts!

20th Century reasons for the increase in life expectancy

Improvements in medicine

X-rays were invented before the war. During the war their use became routine to find bullets and shrapnel lodged in the he body.

The *low standard of health* among *recruits* to the *army* made the **government** very worried about the health of the population generally. It made them more eager to improve health care at home. The soldiers who fought in the war were promised good housing when they returned – '*homes for heroes'*. This *speeded up* the process of *getting rid of unhealthy slum housing* in Britain.

Magic bullets – Salvarsen 606

Paul Ehrlich made an important breakthrough in drugs. He called the antibodies produced naturally by the body '*magic bullets'* as they fought specific germs *without harming the rest of the body*.

At first, he tried to extract them to cure ill patients, but they did not always work. So he began to look for *synthetic chemical 'magic bullets'* to cure disease.

As part of *Koch's* team, he had used *dyes to stain microbes*. After **1899**, he tried to see if the dyes would kill the germs. In this, he was **helped by advances in the German chemical industry**, which was producing *synthetic dyes*.

Although he found dyes that attacked *malaria and sleeping sickness* germs, he had only limited success at first.

In **1906**, Ehrlich began to search for a chemical 'magical bullet' to cure *syphilis*. In **1909**, after Ehlich's team had tested over 600 dyes, *Sahachiro Hata* joined the team. He retested the dyes and found that dye 606 worked – this became known as *Salvarsan 606*. After testing it on hundreds of animals deliberately infected with syphilis, it was *first tried on a human in **1911***. However, there was much *opposition* to this discovery – it was difficult and painful to inject and some feared it would encourage promiscuity. It was over 20 years before a second 'magic bullet' was found by *Domagk* in **1932**.

Gerhard *Domagk* worked for a large chemical firm in Germany. in 1935 his daughter had blood poisoning. There was little hope of the surviving so Damagk gave her a large dose of *prontosil* (a *red dye*). She recovered, although her skin went bright red. French scientists identified the active ingredient in *prontosil* as a sulphonamide, a chemical derived from coal tar. This led to a *range of new drugs based on sulphonamides*, including drugs for *tonsillitis* and *scarlet fever*. These sulphonamides were *ineffective against the stronger microbes*.

Alexander Fleming and Penicillin

Fleming had become interested in how to deal with wounds that became infected. He noted that the antiseptics used were not very effective. In **1928**, he began work on *staphylococci*. One day, by **chance**, he noticed that *mould* was growing on some *Petri dishes*. He noticed *no germs were growing near the mould*. He grew more of it and found it killed many deadly germs. A colleague identified the mould as belonging to the *penicillium family*. Although he tried to purify the 'mould juice', the necessary chemical skills were unavailable. After Fleming had *tested the mould on animals*, and showed it did no harm, he *tried it on a colleague's eye infection*. Again, *it worked*, and did not harm body tissues. This was a big improvement on chemical 'magic bullets'. Fleming wrote up his research and called the 'mould juice' *penicillin*. He did not try to make pure penicillin.

Florey and Chain and Penicillin

Howard Florey and Ernst Chain took the next important steps with penicillin. In **1938** they decided to study germ-killing substances. They came across Fleming's article and tried to produce pure penicillin. Penicillin was successfully tested on a human for the first time in **1940**. At first, the patient improved but, when the supplies were used up, he died. Florey and Chain did not have the resources to manufacture large quantities of the drug. When **war** broke out in **1939**, Florey pointed out to the **British government** how the drug could cure infections in deep wounds. The government were too involved in making explosives to provide resources. Florey approached **US chemical firms** and after Pearl Harbour in **1941** he was given financial help. Mass production of penicillin began in Britain in **1943**. By **1944**, there was *enough penicillin to treat all wounded Allied forces in Europe*. After the war,

even better methods of *mass production led to reduced costs*. Soon penicillin was used to treat a whole range of diseases.

The failure of antibiotics – The *overuse of antibiotics* has resulted in some bacteria being immune – the so-called '*super bugs*. *Many disease in developed countries are not infections*, such as heart disease and cancer. , and is making a come-back in both the developing and developed worlds. *TB has not been wiped out*

INDIVIDUALS

Individual	Dates	Period	Main discovery or advance.	Effects
Hippocrates	460 - 377 BC	Ancient Greece	Put forward natural ideas e.g. 4 humours. Used the method of clinical observation. Stressed importance of diet & exercise.	Hippocratic Oath stresses that doctors should be professional. He separated medicine from magic
Galen	129 - 216	Ancient Rome	Developed the idea of treatment of opposites. Found that the brain controlled body.	The Church approved of his ideas so they were used for over 1000 years. Even though he made mistakes!
Vesalius	1514 - 1564	Renaissance	He dissected bodies and proved Galen was wrong about the heart and the human jaw bone.	He wrote 'Fabric of the Human Body'. One of the first to challenge the power of church.
Paré	1510- 1590	Renaissance	Developed new ideas to seal wounds & stop bleeding. Proved Bezoar was not a panacea.	His ideas were published but not widely used at the time.
Harvey	1578 - 1657	Renaissance	Proved, by careful scientific experimentation, that the heart was a pump and that blood circulated around body.	Proved right after his death when better quality microscopes were used to prove capillaries existed.
Jenner	1749 - 1823	1750 - 1900	Used cowpox to vaccinate patients against smallpox.	Opposed at first but vaccination became popular later.
Simpson	1811-1870	1750 - 1900	Experimented with chloroform as an anaesthetic.	Chloroform unpopular at first but Queen Victoria used it when giving birth and its use became widespread

Pasteur	1822 - 1895	1750 - 1900	Developed germ theory and vaccinations against cholera. Told Drs to boil equipment to sterilise it.	Made the revolutionary link between germs and disease.
Chadwick	1800 - 1890	1750 - 1900	His 1842 report linked conditions in towns to disease.	First major figure to be concerned with public health. His report led to 1848 Public Health Act.
Nightingale	1820 - 1910	1750 - 1900	Improved hospitals. Turned nursing into a profession.	She campaigned successfully for government reform of hospitals.
Lister	1827 - 1912	1750 - 1900	Experimented with antiseptics and carbolic sprays for surgery.	Deaths from blood poisoning and gangrene were reduced.
Koch	1843 - 1920	Modern World	Used dyes to stain germs so they could be seen by microscopes. Proved each disease was caused by different germs.	His research led to the first antitoxins being produced.
Ehrlich	1854 - 1915	Modern World	Developed 'Magic Bullets' - chemicals which killed germs without harming the body.	Led to other research with chemicals e.g. Sulphonamides.
Flemming	1881 - 1955	Modern World	Discovered that penicillin mould could stop germs developing.	His discovery led to antibiotics being developed.
Florey & Chain	1940s	Modern World	Developed Flemming's discovery to produce pure penicillin.	Their work meant that penicillin could be mass produced.
Crick & Watson	1,953	Modern World	Discovered that DNA is the basic building material of all living things.	Has led to greater understanding of inherited disorders. Genetic Engineering.
Barnard	1922 - 2001	Modern World	A surgeon who performed the first heart transplant operation in 1967.	Barnard's first patients died but transplant surgery is effective today.

Revision Task

There are several key individuals from the development of medicine from a British perspective that are not in the above list. Recap your booklets and make notes on the following:

1) **John Hunter (surgery)**

2) **Charlton Bastion (spontaneous generation)**
3) **John Tyndall (germ theory)**
4) **William Roberts (germ theory)**
5) **William Cheyne (germ theory)**
6) **Joseph Bazalgette (sewers)**
7) **John Snow (cholera)**

Extension - Create Medical 'Megastars' cards that detail:

- Name
- Period (for example Ancient World, Medieval, Renaissance etc.)
- Work
- Big idea
- Factors (that helped and hindered them)
- Short-term impact (in their life time)
- Long-term impact (after their deaths)

Public Health in Britain

There will definitely be a question on Public Health so you should make sure you revise this topic thoroughly. You will have a choice of two periods: Roman to 1350 or 1350 to present day.

Roman Britain

The Romans had a huge empire that, at its height, covered most of Europe and parts of Africa. The Romans were practical, well organised and had strong **centralised government**. Wherever they went the Romans built roads so that they could move their army quickly and **communicate** easily with other parts of the Empire. They also built towns, carefully choosing to build near fresh water supplies away from marshes. Romans followed the teachings of *Hippocrates and Galen* and understood the importance of keeping clean and healthy **BUT** they did not understand about germs and how disease was spread. They had several explanations for the cause of disease: supernatural eg sent by the gods or was a curse, bad air from swaps or where there were bad smells or that is was caused by an imbalance in a person's humours.

Roman towns would have *baths, latrines, sewers and aqueducts.* *The Roman **army** was well looked after* as the army was important in controlling the empire and each legion would have several doctors. Keeping a strong army meant concentrating on treating wounds rather than developing new ideas about disease. Towns and forts would have army hospitals. Ordinary people living in towns would have benefited from these public health measures. Most British people lived in the countryside, away from the Romans, and therefore would not have benefited from the public health measures the Romans introduced.

Britain in the Middle Ages and the Renaissance

When the Roman Empire collapsed in about **500AD**, practical measures for public health disappeared. This became known as the '*Dark Ages*'. There was no one to repair the baths and aqueducts, and medieval **governments** did not have the power or money to do anything about public health. Medieval towns were left to sort things out for themselves. Town corporations (councils) did not like to spend money and felt it was not their responsibility. As towns grew, *rubbish and sewage piled up in the streets*. People often got their water from the same river they emptied their latrine into. *Medieval monasteries* and church hospitals were the *exception* to this rule. They were often clean, had a fresh water supply and were built of stone rather than wattle and daub, which could easily become infested with rats.

Doctors continued to be trained according to Galen's ideas as these fitted in with **Christian** teachings. Traditional cures and remedies continued to be important. Magic as well as herbal treatments, including charms and prayers. The **Church** resisted new ideas.

Treatment consisted of *care not cure*. Hospitals were usually run by monks and nuns as part of their Christian duties. Care for the soul combined with rest, warmth, food and care meant that some people did get better. The *beds* would be *positioned* so that the patients could see the *altar, religious statues and images* in stained glass windows to help them focus on religion and *be healed*.

Leper houses or lazars were places for lepers to live. Leprosy is an unpleasant disease and can leave sufferers deformed. In the Middle Ages it was incurable. Lepers were expected to keep themselves apart from other people because they were *infectious*. *No treatment* was available in leper houses, these provided *care*.

During the *Black Death in the **1340s***, people who lived in the monasteries were less likely to get ill and more likely to survive if they did become poorly. The government did very little to stop the plague spreading, partly because they blamed *superstitious causes* for the disease and partly because they were not rich or powerful enough to make the towns healthier.

During the *Great Plague **1665***, when bubonic plague came back to London, there was more of an understanding that poor hygiene caused poor health. The Lord Mayor ordered the streets to be cleaned and although it made London a healthier place, it did little to stop the Great Plague spreading.

The **government** did make law eg in **1750** it passed laws that *made gin more expensive* to try *and improve the standard of health* among the poor and because the government was *worried about the effect on the economy* if workers were too drunk to work properly.

Industrial Revolution 1750 – 1900

From 1750, Britain industrialised and population increased rapidly. Towns became overcrowded, housing was poor and there were inadequate water supplies. There were few proper sewers and no system for collecting rubbish. There were no planning and building regulations as the **government** believed in *laissez-faire*. There was little understanding of the true causes of disease. As a result there were real problems with diseases such as typhoid and TB. In **1831** a new disease hit Britain and forced

the government to take action – **cholera.** The government asked Edwin Chadwick to look into the links between poverty and bad health. His report, 'The Sanitary Conditions of the Labouring Population of Great Britain', proved the links between poor living conditions and bad health and recommended that government action should be taken. This resulted in the **Public Health Act of 1848**. The 1848 law allowed towns to set up a Local Board of Health but these boards could not force towns to take any action.

Further developments took place

- 1848 & 1854 = Further cholera epidemics
- 1852 = Free compulsory vaccination for smallpox
- 1854 = John Snow proved a link between cholera and poor water supply.
- 1861 = Pasteur published his work on 'Germ Theory'
- 1867 = Working men got the right to vote.
- 1871 = Compulsory vaccination for smallpox enforced – deaths drop dramatically.

1842 – *Edwin Chadwick* published the results of his survey of housing conditions in towns call *The Sanitary Conditions of the Labouring Population*. He made suggestions about improving access to clean water and the removal of sewage and rubbish. How some *criticised* the report because middle class people did not want to pay taxes for these reforms, the government still had a laissez-faire attitude and water companies thought changes might reduce their profits. In **1848** the Government passed the first *Public Health Act* to try out Chadiwck's ideas. Towns were to: set up their own local Board of Health, appoint a medical officer, organise the removal of rubbish and build a sewer system. They did not work because the Government did not make them compulsory. The outbreak of Cholera in 1854 and the Great Stink of 1858 put pressure on the government to do something about public health and the *1875 Public Health Act* was passed. *This act forced local councils to take responsibility for public health.* Streets, sewers and water supplies had to be kept clean and healthy and all councils had to employ inspectors to enforce the laws.

The 20th Century

By 1900 most governments in rich countries like Britain accepted that it was part of their job to organise a good public health system with pure water and effective sewers. However, living conditions were still poor and between *1886 and 1903 philanthropists like Rowntree and Booth* carried out surveys which linked poor health directly to poverty. In *1902* the nation was shocked to find that 40% of the men who volunteered for the Boer War were suffering from malnutrition and other diseases linked to poverty. The **Liberal government** and Lloyd George, brought in a series of reform to help poor people that became known as *the Liberal Social Reforms;*

- 1906 - Local authorities given the right to provide free school meals for poor children
- 1907 - School medical inspections
- 1908 - Old Age Pensions Act
- 1911 - National Insurance Act gives sickness & unemployment benefit to some.
- 1919 - Housing and Town Planning Acts.

The **First and Second World Wars** showed the **government** how important it was to keep the working classes healthy and 'fighting fit'. Evacuation brought many social problems to the attention of the authorities. After the Second World War ended in 1945 the new Labour government and *Nye Bevan* introduced the National Health Service of *NHS* in **1948**, this meant;

- Free hospitals
- Free doctors
- Free dental services
- Social Services – care of the elderly and children

Many people were against the idea of the NHS because it would cost a lot of money in taxes. Many doctors were against it because they thought they would lose money as they could no longer charge what they wanted but would be paid by the government. Although it was a success, it proved to be very expensive and not long after the NHS began, charges had to be introduced for adult dental services and prescriptions.

The *preventative* aspect of public health has expanded since the Second World War. For example: developments in vaccinations such as the polio vaccine in 1952, **government** campaigns and laws on health issues such as smoking, government promotion of healthy eating, better disposal of rubbish and

treatment of sewage, laws to reduce air and water pollution (Clean Air Act 1956), laws to improve people's working conditions (eg regulations about asbestos), strict laws on food safety.

	Prehistoric	Ancient Egypt	Ancient Greece	Ancient Rome	Middle Ages	Medical Renaissance	1750-1900	Twentieth Century
Government				Govt. responsible for public health e.g. Latrines & aqueducts.	Limited attempts to sort out poor hygiene in towns.	Limited attempts to sort out poor hygiene in towns.	Up to 1850 = laissez-faire = no govt. action. After 1850 = laws on public health e.g. 1875 Public Health Act.	Govt. fully involved. Loads of laws. NHS = cradle to grave healthcare. Govt. Fund research.
Religion	Thought evil spirits caused illness.	Embalming bodies →better knowledge of body. Dissection forbidden. Belief in spirits.	Dissection forbidden except in Alexandria. Belief in gods to cure i.e. Asclepios.	Still prayed to gods to cure illnesses.	Church VERY powerful. □and □ = no dissection or criticism. □=study & hospitals.	Reformation = power of Church declined. Some dissections allowed. Criticism still discouraged.	Religious individuals and organisations = duty to help poor & sick →pressure on govt.	Religious individuals and organisations = duty to help poor & sick →pressure on govt.
Science & Technology	Few tools	Some metal tools.	Improved iron & steel stronger instruments	Improved engineering better public	Improved surgical instruments.	Printing press. Pumps, watches & clocks.	Microscope improved → germs found.	X-rays. Electron microscopes.

			and better surgery.	health e.g. baths		Increased interest in science. 'Royal Society' founded.	Chemistry →anaesthetics etc. Syringes, thermometers.	Dialysis machines. Lots of new inventions.
Individuals			Hippocrates	Galen	Avicenna. Rhazes.	Vesalius. Paré. Harvey.	Nightingale. Pasteur. Koch. Jenner. Simpson. Chadwick.	Ehrlich. Flemming. Barnard. Crick & Watson (DNA)
War			Wounds → surgical improvements.	Roman army had doctors & surgeons.	Wars → practise in surgery.BUT time & money spent on weapons etc. not medicine.	Wars → continuing practise in surgery. Opportunity for Paré.	Crimean war = Nightingale → better nursing. BUT wars meant money diverted from research.	WW1→govt.action. X-rays & blood transfusions. WW2→govt.action. Social care, NHS & penicillin.
Communications	Limited writing and travel. Ideas not spread or recorded	Writing & papyrus→ spread of knowledge.	University & library at Alexandria → spread of ideas.	Centralised govt.&roads → spread of ideas & trade. Herbs etc.	Fall of Roman Empire → breakdown in communicatio	Printing press → spread of ideas. Travel to new world → more	Better roads & rail = better education & travel →	Cheap flight, TV, radio, telephones & Internet ideas

		Trading links = herbs etc.			**n & loss of ideas.**	**trade, herbs etc.**	**increased knowledge.**	**→ shared & spread easily.**
Chance						**Paré ran out of oil & found better treatment.**	**Pasteur's chicken cholera vaccine.**	**Flemming and penicillin.**

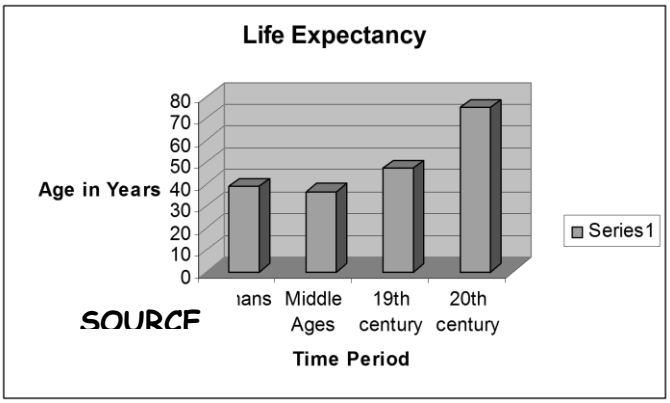
	Prehistoric	**Ancient Egypt**	**Ancient Greece**	**Ancient Rome**	**Middle Ages**	**Medical Renaissance**	**1750-1900**	**Twentieth Century**
Natural Causes		•Theory of blocked channels.	•Theory of Four Humours.	•Theory of Four Humours. •Common sense.	•Theory of Four Humours. •Miasma or bad air. •Worms.	•Theory of Four Humours. •Miasma or bad air.	•Miasma •'Spontaneous Generation' •Germs found by Pasteur in 1860s.	•Germ theory firmly established.
Supernatural Causes	Illnesses caused by evil spirits.	Illnesses caused by evil spirits.	Illnesses caused by evil spirits or gods.	Illnesses caused by evil spirits or gods.	Illnesses caused by devil, sin or punishment from God. Astrology.	Illnesses caused by devil, sin or punishment from God.	Some superstitions still alive.	Some superstitions still alive.
Treatments	Herbs & Trepanning	•Spells. •Herbs.	•Asclepion. •Prayer.	•Prayer. •Herbs.	•Prayer & penance e.g. flagellation.	•Prayer. •Treatments based on humours esp.	•Herbs. •Tonics & 'quack' remedies	•Sulphonamides. •Magic bullets.

		•Laxatives to 'unblock channels.'	•Herbs. •Treatments based on humours e.g. purging	•Humours Treatments e.g. Purging. •Galen = treatment of opposites.	•Humours Treatments. •Things to break up miasma. •Herbs.	Bleeding using cups & leeches. •Herbs.	•Some chemical medicines e.g. 1890s = Asprin. •Still use of herbs.	•Penicillin & other antibiotics. •Still use of herbs.
Surgery	•Few tools, only flints. •Trepanning	•Some metal tools. •External or 'easy' surgery.	•Improved tools. •External or 'easy' surgery.	•Improved tools External or 'easy' surgery. •Amputations. •Caesarian births.	•Improved tools External or 'easy' surgery. •Amputations. •Caesarian births.	Knowledge of anatomy & physiology from Vesalius & Harvey **BUT** probs of <u>pain</u>, <u>bleeding</u> & <u>infection</u> remain.	•1847 - Simpson = chloroform anaesthetic. •1865 - Lister = antiseptic surgery.	Discovery of blood groups (1901) & WW1 (1914-1918) → blood transfusions & safer surgery.
Anatomy & Physiology	Hunting & killing animals → basic knowledge of anatomy.	Mummification →some knowledge of anatomy. Dissection forbidden	Some knowledge of body but dissection forbidden.	Galen dissected pigs & wrote books on anatomy but made mistakes.	Dissection forbidden. Greek & Roman ideas followed.	Vesalius & others → Galen wrong about heart & jawbone. Harvey explained circulation.	Detailed knowledge of anatomy & physiology.	Detailed knowledge of anatomy & physiology.
Healers	•Women. •Medicine Men.	•Trained physicians /priests.	•Trained physicians.	•Trained doctors &	•Doctors for rich.	•Doctors for rich. •Church.	•Rich = Doctors. •Poor = 'Quacks'	•NHS

		•Women.	•Priests & Asclepius. •Women.	Army surgeons. •Priests. •Women.	•Monasteries & church hospitals. •Women.	•Barber surgeons. •Women.	•Medical profession closed to women.	•Trained nurses, doctors & surgeons. •Women doctors.
Hygiene & prevention	No public health or Hygiene.	Importance of cleanliness stressed.	Importance of cleanliness, diet & exercise stressed.	Cleanliness, diet & exercise. Public Health →baths, sewers, settlements.	Some attempts made to keep towns clean. Monks had healthy lifestyle.	Inoculation in some places e.g. Turkey & China.	Germ theory → prevention. Inoculation, vaccination, antiseptics & public health.	•NHS •Disease prevention campaigns e.g. AIDS, smoking.

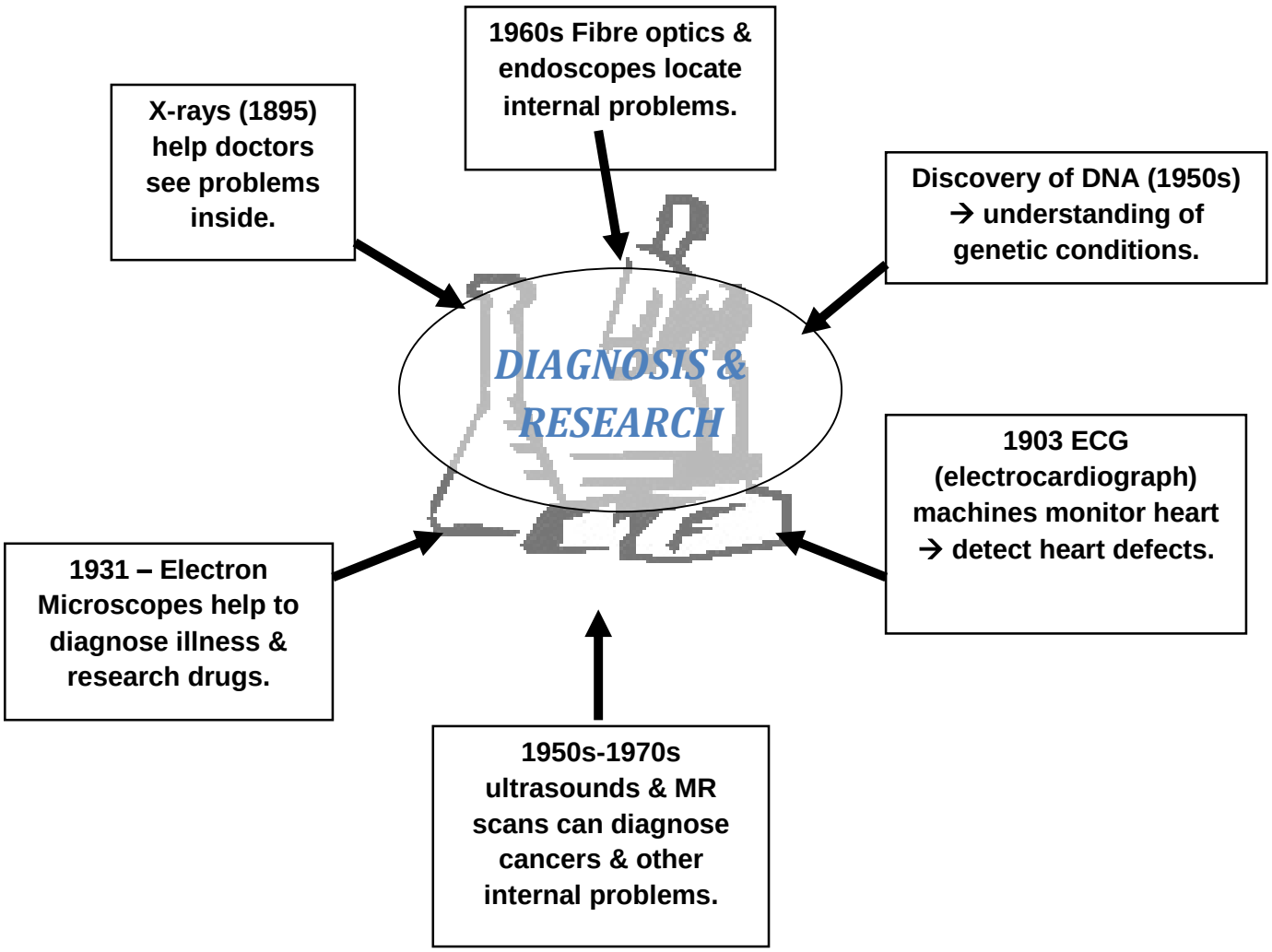
Science and Technology in the 20th Century

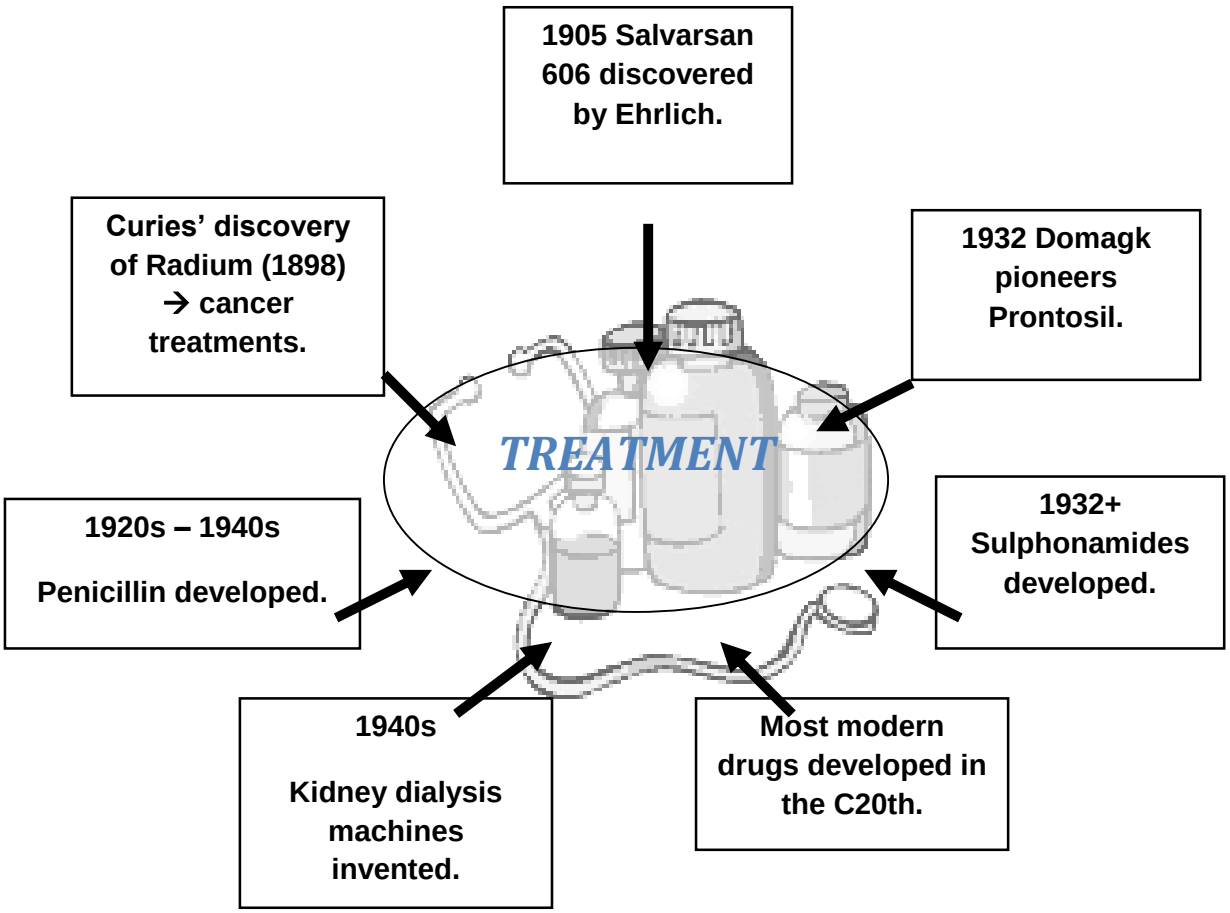
The 20th Century has seen dramatic changes in every day people's lives. These changes have had a major, direct impact on people's health. Source A shows how the average age that people reach has soared since the turn of the century. This is due to a number of factors but most have a direct link to science and technology.



SOURCE

MEDICAL IMPROVEMENTS





OTHER SCIENTIFIC IMPROVEMENTS

Although there have been many medical discoveries during the 20th Century, there have also been other scientific & technological developments that have led to a general improvement in health;

- **Electricity** – During the 20th Century, this powered many of the new medical inventions. It also became available in people's homes and factories. This improved working and living conditions which in turn led to higher life expectancy.
- **Transport** – As well as an improvement in communication (see below) the widespread use of cars, railways and air transport has led to better access to drugs and medical facilities for most people. As a result of the increasing availability of fresh food, diet has improved for many people.
- **Computers** – Computers and micro-technology are used widely in medicine. They assist medical research because they can process large amounts of data easily.
- **Chemicals** – Improvements in chemistry have led to cleaner water, and better pesticides and preservatives for food.

OTHER IMPORTANT 20TH CENTURY FACTORS

In the case of most improvements in health since 1900, **Science & Technology** has worked hand in hand with other factors. Although scientific breakthroughs are needed to improve medicine, other factors can often speed up discoveries.

WAR

War has been a **catalyst** for many medical improvements in the 20th Century. The First World War led to improvements in *blood transfusions* and *X-rays*. The Second World War brought about improvements in surgery (McIndoe & plastic surgery) and led to the funding and development of *penicillin*. War provides lots of casualties to practise new techniques on, and also makes the government look for ways to keep their army fighting fit. Although technological advances were also important, without the wars of the 20th Century these developments would have been delayed.

COMMUNICATION

Improvements in travel (railways, air travel etc) have led to a *sharing of medical knowledge* and improved access to medical facilities. For example, Howard Florey flew to Russia to share penicillin with the Russians during the Second World War. Improved *telecommunications* (TV, radio, phones, internet etc) has also led to knowledge being shared far more quickly. Improvements in communications are linked closely with improvements in science, and one would not have been possible without the other.

GOVERNMENT

World governments have *funded many scientific improvements* in the 20th Century. For example, government funding paid for the development of penicillin. In Britain, the government also provides the education and research facilities needed by scientists. Many of the scientific discoveries, therefore, would not have been made if it hadn't been for government involvement.

The government has also helped to improve health in Britain by *improving access to medicine and care for groups* such as children, mothers and the elderly. Public Health measures such as clean water, housing and the National Health Service are organised and paid for by the government. These relatively simple measures have made more of an impact on life expectancy than important scientific discoveries such as DNA. Most governments also introduced health and safety legislation in the 20th Century to keep workers safe.

Organisations such as the **World Health Organisation** are funded by governments, and work towards improving health through relatively simple procedures such as vaccination and clean water supplies.

Revision Task

Create a memory map of the ways in which DNA had had an impact on medicine. In the middle of the piece of paper, copy the memory map key points below – one on each leg.

1. The Human Genome Project.
2. Gene Therapy (DNA from healthy people is used to treat genetic disorders.)
3. Genetic screening

Has Science & Technology HINDERED medicine?

Sometimes new technologies lead to new problems. Here are some examples…

- Blood transfusions have led to cross infection - HIV and 'Mad Cow' disease.
- Drugs – Have led to side effects e.g. Thalidomide. Also overuse of antibiotics has led to resistant infections such as MRSA.

The Development of Germ Theory and its impact on the treatment of diseases in the 19th century

Beliefs in the Cause of Disease before Germ Theory

Spirits/Gods

For thousands of years people believed diseases were caused by evil spirits or the anger of God. During the Black Death (1348-1349) many people believed God was punishing the world and so Flagellants beat themselves to repent their sins. This is a belief in the ***supernatural*.**

Miasmas

Although this is a ***natural*** idea, it existed alongside supernatural ideas for many years. Until the mid-19th century, many people in Britain still believed in Miasmas. This is the idea that disease was caused by polluted or ***bad air***. This made sense to them because where the smell of rotten food, sewage etc. was evident so was disease. We know now that this is because germs cause bad smells but bad smells alone cannot cause disease.

Spontaneous Generation

In **1670s** *Van Leeuwenhoek*, a Dutch clock maker, made one of the earliest microscopes. He studied drops of water, food and his own bodily fluids and found that they contained tiny organisms that he called animalcules. Today we know these as germs.

As **microscopes** improved more and more scientists started to observe these tiny organisms and they started to put forward ideas about what they might be.

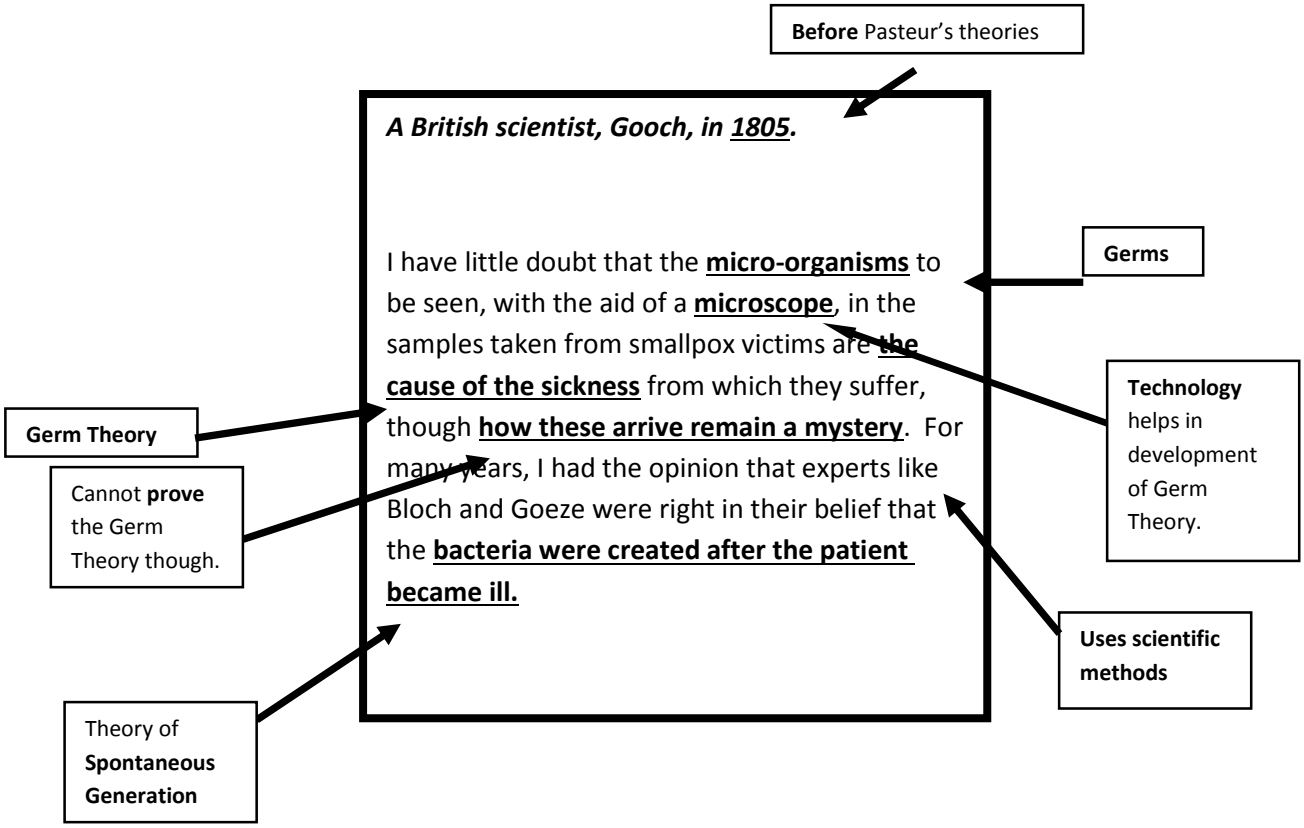
One of the explanations was the theory of *Spontaneous Generation*. This meant that the tiny germs that scientists could see were the RESULT of matter decaying rather than the CAUSE of it. Somehow decaying matter turned into the tiny organisms. Many people believed in this theory. In particular a French scientist called **Felix Pouchet** published a book supporting the idea of Spontaneous Generation in 1859. He also rubbished the idea that germs caused disease.

Early 'Germ Theories'

Even though Spontaneous Generation was the most popular theory, several doctors and scientists were making discoveries that seemed to suggest that germs caused disease.

In the **1840s** *Ignaz Semmelweis*, a doctor working in Austria, reduced the death rate of women in his hospital by insisting that medical students wash their hands before examining pregnant women. The students had been going straight from dissecting dead bodies to delivering babies! Semmelweis suggested the students had been carrying 'particles' on their hands that had caused the childbed fever. His ideas were ridiculed and did not spread, partly because he could not prove his ideas, as he had no accurate way of looking at the germs on medical student's hands.

Several other scientists also put forward the idea that germs caused disease. Look at the following source in which Gooch, a British scientist, explains how he believes in Germ Theory;

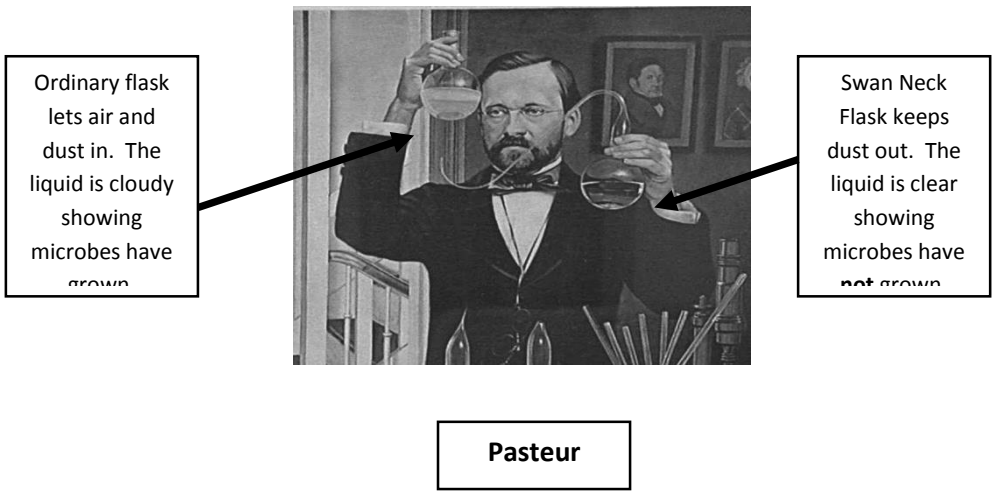

Before Pasteur's theories
A British scientist, Gooch, in 1805.
I have little doubt that the **micro-organisms** to be seen, with the aid of a **microscope**, in the samples taken from smallpox victims are **the cause of the sickness** from which they suffer, though **how these arrive remain a mystery**. For many years, I had the opinion that experts like Bloch and Goeze were right in their belief that the **bacteria were created after the patient became ill.**
Germs
Technology helps in development of Germ Theory.
Uses scientific methods
Germ Theory
Cannot **prove** the Germ Theory though.
Theory of **Spontaneous Generation**

Louis Pasteur

Louis Pasteur was a French chemist working as a teacher in a university. He was asked by a wine company to explain why some wine turned sour whilst it was being made. **Pasteur**'s research discovered that there were germs in the air that could cause liquids to go off.

Having discovered that 'bad' wine had germs in it which could be seen through a microscope, **Pasteur** developed a process for killing the germs by boiling the grape juice first and then cooling it down. He called this process 'pasteurisation'.

By 1864 **Pasteur** had proved that the air carried microbes, which caused contamination and decay. He used special swan neck flasks which allowed air in but no dust.



Pasteur

Pasteur was not the first scientist to think of Germ Theory, but he was the first scientist to prove it.

Robert Koch

Robert Koch was a German scientist, born in Hanover in 1843. **Koch** read **Louis Pasteur's** work and in 1872 began research into the microbes affecting diseased animals and people. He discovered that every disease was caused by different germs and identified the particular germ that caused anthrax. However, **Koch**'s big breakthrough came when he decided to **stain** microbes with dye, enabling him to photograph them under a microscope. Using this method he was able to study them more and he also identified the microbes that caused tuberculosis (TB) and cholera. He also invented a **solid medium** (like agar jelly) for growing microbes, which made them easier to study. Koch was famous for his careful, methodical and meticulous research.

The Impact of Germ Theory

TREATMENT OF DISEASE & VACCINES	SURGERY	PUBLIC HEALTH
• Germs identified as causing disease. • Koch links particular germs to particular diseases. • 'Microbe hunters' began searching for particular germs e.g. leprosy. • Knowledge used to spark research into vaccines. • Pasteur & Koch develop vaccines for Chicken Cholera, Anthrax, Rabies & Diphtheria. • These vaccines gradually began to wipe out these killer diseases, especially in the 20th Century when government enacted mass vaccination programs. • The French and German governments set up institutes for medical research.	• Germ Theory dealt with infection in surgery – before Germ Theory the 'Black period' of surgery saw many patients die from infection. • Joseph Lister read Pasteur's work and realised that germs caused infections that killed his patients after surgery. • He used carbolic acid as an antiseptic to soak bandages and then developed a spray to soak the air, surgeons hands and instruments. • Death rates from infection fell massively. Used alongside anaesthetics these antiseptics made surgery much safer. • This then led to aseptic surgery, which is where surgeons keep germs away from the operating theatre/patient by using rubber gloves etc. • Without Pasteur's discovery of germs this may have taken a lot longer to develop and many more may have died in surgery.	• John Snow had shown Cholera spread through water in 1854 but not how or why. • Germ Theory explained how diseases spread and showed how massive epidemics could be stopped. • Germ Theory was a massive reason for the 1875 Second Public Health Act as it was clear that poor housing, dirty water encourage germs and spread diseases. • Ever since this a clear understanding of germs has had a big impact on keeping streets clean from sewage, rubbish etc…

The importance of research teams in the development of Germ Theory and the discovery of the first microbes.

- It was easier for research teams to get funding for expensive new technology like microscopes. This enabled Pasteur to observe the germs using the very latest technology: a microscope that magnified 1000 times.

- Research teams made it easier for scientists to keep an eye on each other's progress and methods to ensure everybody was working to the same high standard.
- Different members could bring different skills to the research, for example biologists, chemists and doctors all had different knowledge and points of view.
- Younger scientists could work very closely with their bosses. This meant that when these more experienced scientists moved on or retired, their juniors were able to continue their work without interruption. For example, Paul Ehrlich was part of Koch's research team and went on to develop the first magic bullet.

Practice Question

How much did the understanding of the causes of disease change between c1350 and c1900?

*Tip for this question:*To answer the pratice question, you will need to look back and see what people believed caused disease from 1350 to 1750.

1. Begin by making a list of what people thought caused disease in 1350. (Tip: Look at what people thought caused the Black Death.)
2. Then make a list of what people thought caused diease in 1900.
3. Compare your two lists to see if anything on them is the same.

Chance

Charles Chamberland, Pasteur & chicken cholera.

Industry

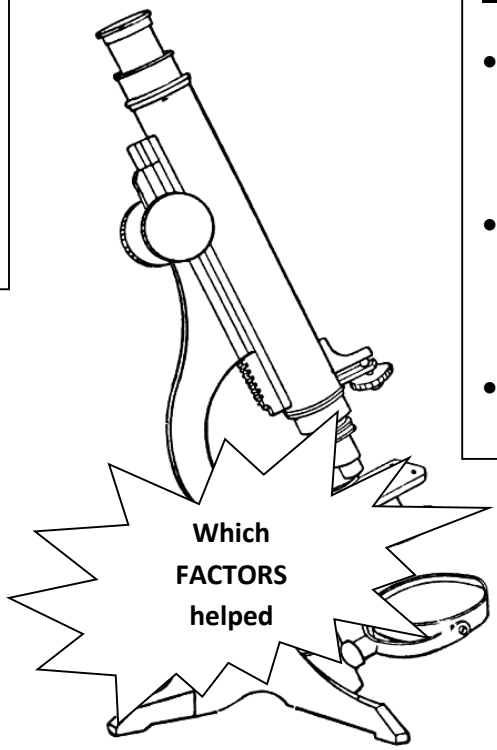
- Pasteur's original work was done in the food industry – it funded his research.

Communications

- The telegraph & newspapers spread ideas
- Railways allowed scientists to travel and meet regularly.

Government

- French government founded the *Institut Pasteur* to further Pasteur's work.
- British government acted on the information to pass Public Health Act of 1875.
- German government funded Koch's research.



War

- The Franco-Prussian war (between France & Germany) made Pasteur and Koch compete as great rivals.

Individuals

- Pasteur was massively determined – carried on working after a stroke.
- Pasteur was prepared to show his experiments in public despite doubters.
- Koch was very methodical and careful.

Science and Technology

- Continually improving microscopes allowed researchers to see germs.
- Koch used industrial dyes & solid mediums so microbes could be seen under microscope.
- Scientific Method – observing, experimenting, repeating – meant Pasteur could prove Germ theory.

Teamwork

- **Pasteur and Koch had large teams of research scientists.**

Exam Practice Questions

Q1. Study Source A. How useful is Source A to a historian studying the role of religion in the development of medicine? **(8 marks)**

Source A

Q2. Explain the significance of vaccination in the development of medicine. **(8 marks)**

Q3. Compare the treatment received by ordinary people in Medieval England with 17th and 18th century treatments. In what ways were they similar? **(8 marks)**

Q4. Has war been the main factor in the development of surgery in Britain since Medieval times? **(16 marks +4 SPAG)**