MEDICINE IN MODERN BRITAIN

1900-Present

Science & Tech

Government

Attitudes

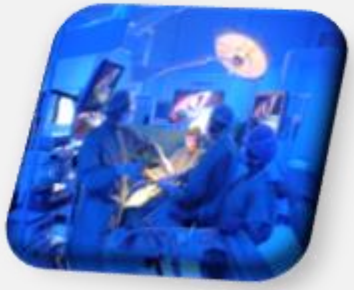
Individuals

FACTORS

War

St Clement's History Department
www.stchistory.com

CHECK POINT



20TH CENTURY CONTEXT

- **By 1900, everything was in place to assess and manage human health. We understood:**
  Microbes and Germs
  Scientists were experimenting – particularly causes of disease that were not related to microbes (Genetics and Lifestyle).
- **Chemical treatments were being discovered**
- **Surgery was now far more advanced, and improving all the time**
- **The British Government had a new attitude towards its role in the nation's health.**
- **We're still unable to fight all diseases eg cancer,**
- **New lifestyles have brought about new illnesses eg obesity**

Life expectancy in 1900- 47years | **Life expectancy in 2000- 77 years old**

20TH CENTURY DIAGNOSIS

What does Diagnosis mean?

How did they diagnose illness by 1900?

How is sickness diagnosed today? Make a list of ideas you might have

During the 20th century, laboratories* were used to get a more accurate diagnosis, through medical testing:

- **Samples** of skin and blood were studied in the laboratory using microscopes.

- **Biopsies*** were used to gather samples of flesh and unusual tissue* in the body.

- **X-rays** were used to see what was going on inside the body.

Summarise what a Biopsy is in 1-2 sentences

20TH CENTURY DIAGNOSIS

During the 20th century there was a move towards laboratory medicine with examinations of samples eg SKIN, BLOOD, FLESH, URINE etc this was called a Biopsy. The samples would be analysed in a lab using super microscopes and technology.

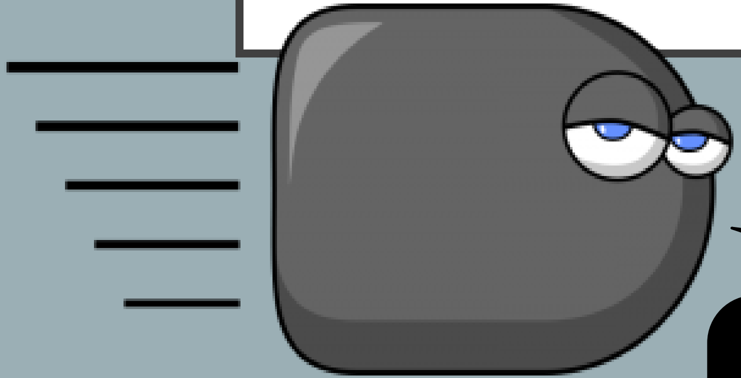
The patient would now also be x-rayed to allow doctors to see what was happening inside the body. This meant that diagnosis in 20th Century was and is more reliable and accurate.

So… the biggest change to diagnosis in 20th Century was instead of being based on symptoms and experience / knowledge of the doctor, it was now based on medical testing.

Learning outcomes

- Understand the impact of the development of magic bullets, including antibiotics.
- Understand the impact of the NHS on public health.
- Understand how the government tried to prevent certain diseases.

MAGIC BULLETS & ANTIBIOTICS



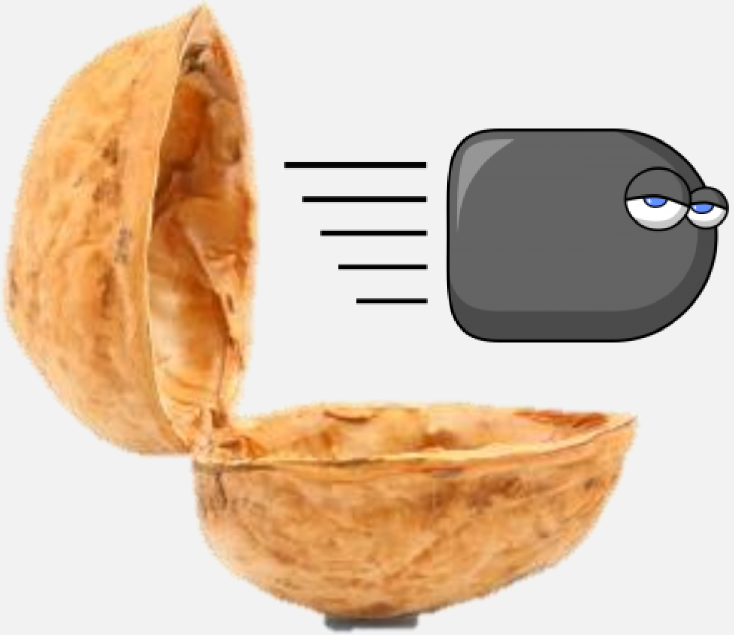
Prevention & Treatment

To avoid any confusion, there are no actual bullets involved, this is what they called antibiotics as they attacked the specific microbes with a 'shot' but left the body unharmed.

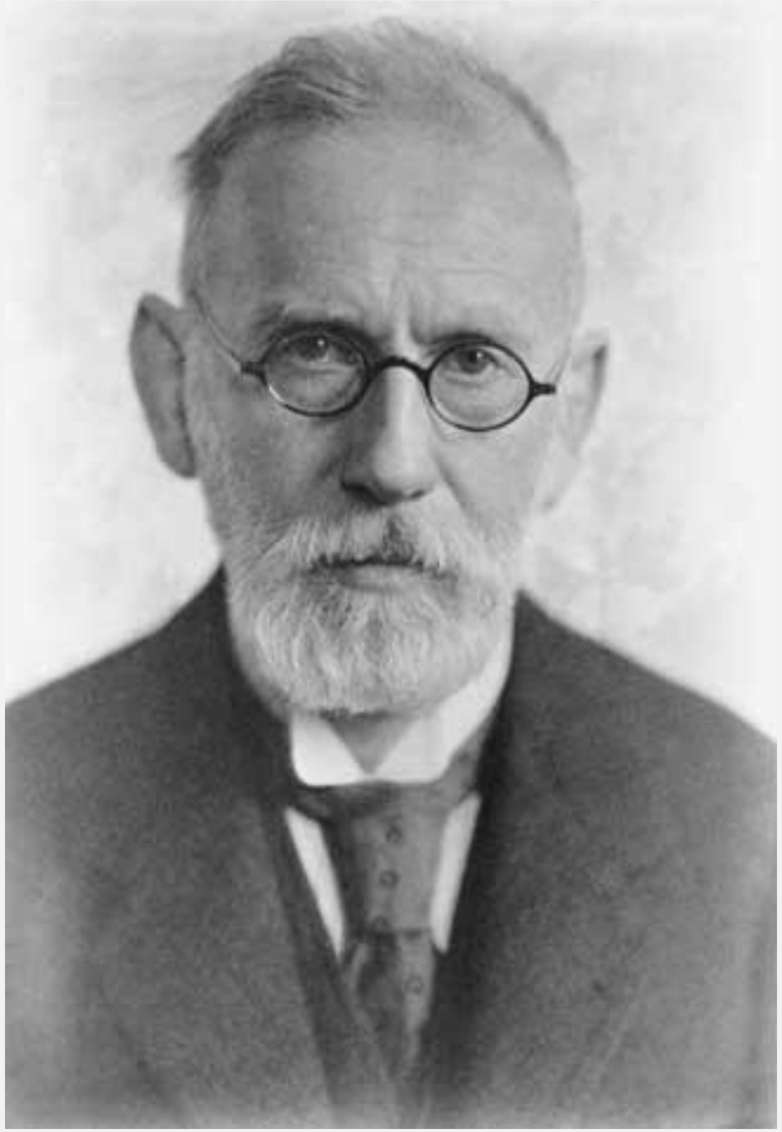
EXAM CRITICAL

MAGIC BULLETS IN A NUTSHELL

A Magic Bullet (Chemical compound) was a TREATMENT that attacked the bacteria causing the illness NOT the body therefore FINALLY allowing us to treat specific illnesses.



BIG PICTURE / LINKING KNOWLEDGE



- **Robert Koch** found a way of **staining bacteria** to identify them In 1880. Paul Ehrlich, a member of his team, decided to take this idea further.
- Ehrlich thought that a chemical compound could be used not just to stain the bacteria causing an infection, but which would kill them (and only them) as well.
- Ehrlich said this would be like a **Magic Bullet**. The chemical would 'shoot' the infection, not the patient.

606 **Salvarsan606**

MAGIC BULLET #1 (1909): SALVARSAN 606

The first breakthrough came in the treatment of syphilis, an STD that had been treated by mercury since the 16th century, which was poison!

There had been some success with arsenic compounds (a mixture of 2 of more elements), but this attacked the body as well as the disease as arsenic is poisonous.

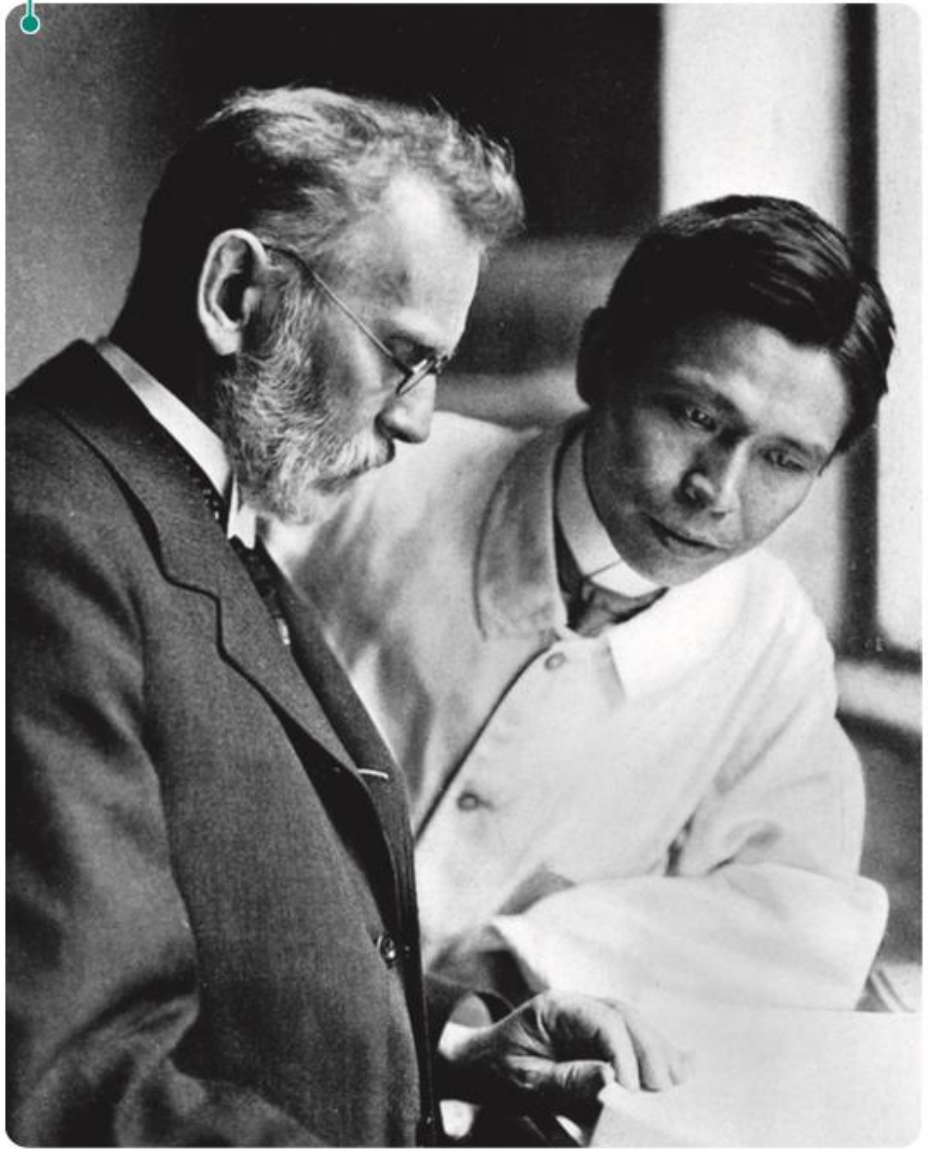
Even with the deaths, Erlich had proven that chemicals could kill bacteria… this encouraged other scientists.

HOW IMPORTANT WAS SALVARSAN 606?

- This was a major step in the progress of medicine as it was the first chemical that could be used to kill infection inside the body.
- How did it work?
- Salvarsan 606 needed to be improved upon, it was made from arsenic. What problem could this have?
- Arsenic is poisonous therefore Salvarsan 606 could sometimes kill the patient as well as the infection.

SOURCE A

Paul Ehrlich with the key member of his research team, Sahachiro Hata, in 1910



WHAT WERE THE MAGIC BULLETS

Paul Erlich 1909

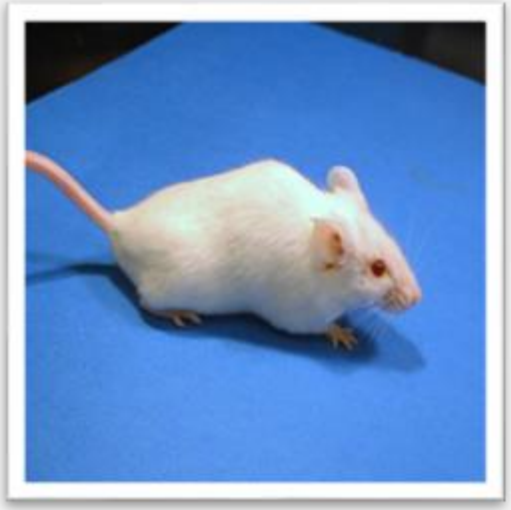
Salvarsan606

Treated Syphilis

- Attacked the bacteria not the body, unlike mercury that had been used for centuries
- 1st Chemical that could kill infection INSIDE the body
- Included Arsenic which was poison, so needed to be improved

GERHARDT DOMAGK: MAGIC BULLET #2

- In 1932 Gerhardt Domagk found the second magic bullet after years of methodical research. This was a red dye called Prontosil and killed the bacteria causing BLOOD POISONING.
- He injected mice with a lethal dose of a streptococcal infection. He then injected them with Prontosil, which cured them.



SUCCESS IN HUMANS?

- Soon he had the chance to try it out on a human, his own daughter, who was seriously ill with the same streptococcal infection. Having no other cure, he injected her with Prontosil and she recovered.
- With the aid of the new, powerful electron microscopes which had been in use since the early 1930s, scientists found that the active ingredient was a sulphonamide which came from coal tar.
- The discovery of sulphonamides led to the development of drugs which cured gonorrhoea, pneumonia, and scarlet fever. They led to the number of mothers dying following postnatal infection being slashed from 20% to 4.7%.

SOURCE C

Gerhard Domagk, shown here in 1949, discovered the second magic bullet: Prontosil.

WHAT WERE THE MAGIC BULLETS

Domagk 1932 (won a Nobel peace prize but Hitler told him to reject it and was arrested by the Gestapo)

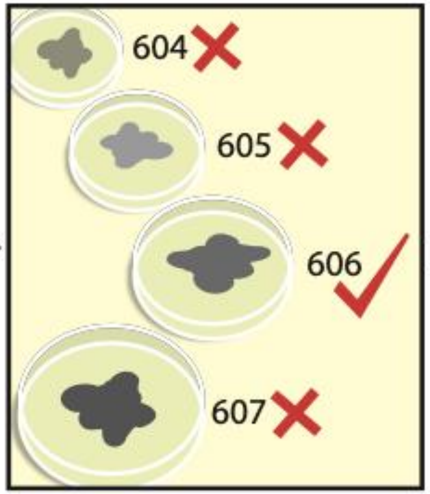
Prontosil

Blood Poisoning, gonorrhoea (see below), pneumonia, and scarlet fever (see below)

- Used the new Electron Microscopes to identify the key ingredient (Sulphonamide)

THE FIRST 2 MAGIC BULLETS:

In the early 20th century, a scientist named Paul Ehrlich tested as many arsenic compounds as he could, to find a cure for syphilis. By 1907, he had tested over 600 compounds, but had not found a cure.



In 1909, a Japanese scientist named Sahachiro Hata retested all of the compounds and found that compound number 606 cured syphilis. The drug, named **Salvarsan 606**, was the first 'magic bullet'.

In 1932, scientist Gerhard Domagk discovered that a bright red dye called **Prontosil** killed bacterial infections in mice. Domagk tested Prontosil on his own daughter, who had developed blood poisoning: it cured her.

Scientists at the Pasteur Institute in Paris discovered that Prontosil worked by preventing the bacteria from multiplying. This made it possible for the body's own immune system* to kill the bacteria. These drugs are called antibiotics.

Scientists began to look for other drugs that worked in the same way. In 1938, British scientists developed **M&B 693**. This was another antibiotic. It was successfully used to treat Winston Churchill for an infection during the Second World War.

ANTIBIOTICS

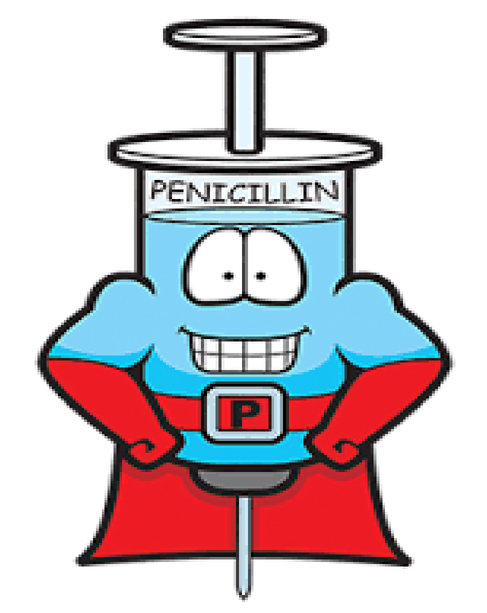
Definition reminder:
Any treatment that destroys or limits the growth of bacteria in the human body

TREATS INFECTIONS

– The most important of all?.... **PENICILLIN**

Penicillin was different to the first 2 magic bullets as they were **artificially / chemically** made, penicillin was created using micro-organisms, it was isolated (taken) from mould.

Following from this discovery using living organisms, scientists all over the world **(just like with Koch's discoveries)** were inspired to research using fungi and moulds.



ANTIBIOTICS

Definition reminder:
Any treatment that destroys or limits the growth of bacteria in the human body

"As a result of us having antibiotics for everything and everywhere…An invisible army of super resistant bacteria has evolved claiming 25000 lives a year in Europe alone!…, This is a global catastrophe, the scourge of earlier centuries (TB & Scepticaemia) are killing us at frightening rates".

Joe Shute in The Telegraph, 2013

What is Joe Shute suggesting here?

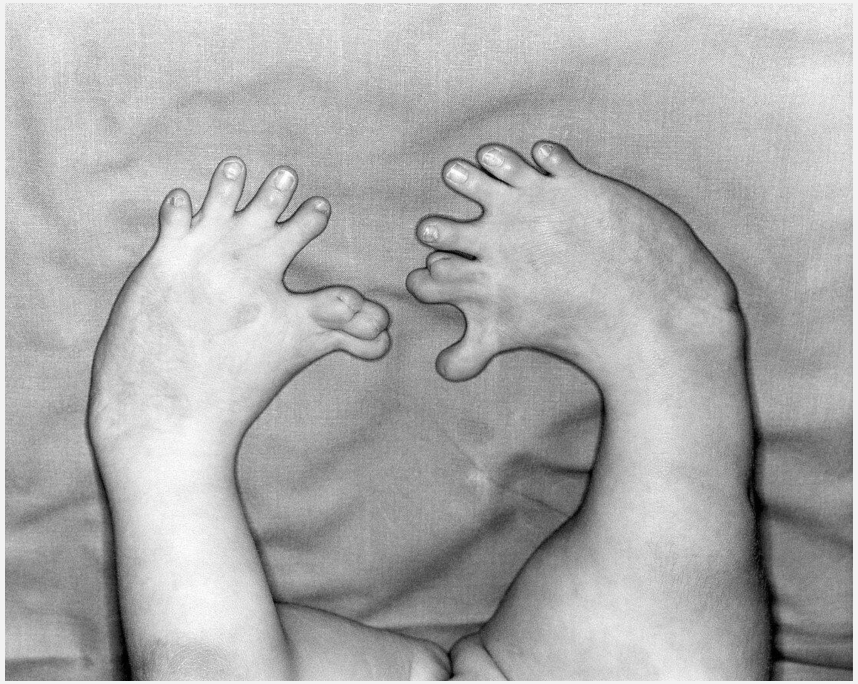
Scientists were inspired by Koch, Ehrlich and Domagk to further research microbes and find other bacteria to develop new treatments	Thalidomide was a drug given to pregnant women in the 1960s suffering from morning sickness. This drug caused severe birth defects
Scientists have now developed medicines that pinpoint and treat specific diseases	Mass production of pills has made the distribution of drugs much easier
Scientists can now identify the cause of disease in most cases because they know what they are looking for eg a tumour, unusual gene, a microbe	The development of capsules which dissolve in the stomach to release the drug means taking drugs to treat disease is easier
New drugs take several years to trial and test before bringing to market. Testing and clinical trials are much better. This slows down progress but is safer in the long run	Hypodermic needles allow the precise dose to be introduced directly into the bloodstream
Insulin pumps for young people suffering from diabetes deliver insulin without the need for injections.	Most developed countries invest large amounts of money into the pharmaceutical industry / bacteriology research

Look at the information cards on IMPACT OF SCIENCE & TECHNOLOGY on treatment and prevention, your job is to organise them into the following headings

Crucial

Important

Not important



THALIDOMIDE

IS THIS CRUCIAL TO THE DEVELOPMENT OF MEDICINE

FACTORS CHECK POINT:

Before we look at Penicillin in more detail, let's reflect on FACTORS.

Which factor is the most important in the treatment and **prevention** of illness in the 19th / 20th Century?

Science & Technology
Attitudes
Individuals
Institution (Government / Church)