

History, Medicine through time

Lesson 23 of 30

Worksheet:

How important was the role of chance in the discovery and development of penicillin?

Mr Prudden



What is penicillin?

Penicillin was the first **antibiotic** drug produced.

It is effective in treating disease caused by a certain family of **bacteria**.

It is also used to prevent infection, for example when patients have teeth removed.



Fleming's discovery

Alexander Fleming was a British doctor working in St Mary's Hospital in London. He had a particular interest in **bacteriology** and had been one of the first doctors to use the first **magic bullet** to treat **syphilis**.

Working on wounded soldiers in **World War One**, Fleming was worried at the number of men who died from simple infections.

During the 1920s he started researching substances that might treat simple infections.



Fleming's discovery

In 1928, while on a holiday **Fleming** left a pile of **petri dishes** on his lab bench. When he returned, he noticed a mould developing in one of his dirty **petri dishes**. The mould had killed off the harmful **staphylococcus bacteria** that had been growing in the dish.

Fleming tested the mould and called it **penicillin** and wrote about **penicillin** in a medical journal in 1929. But it was overlooked at the time because scientists were more interested in research into chemical cures – **magic bullets**.

Fleming didn't believe that **penicillin** could kill **bacteria** in a living person because his first experiments showed it didn't work when mixed with blood. This meant he did not carry out any further tests on it.



Florey and Chain's research and experiments

Howard Florey was an Australian **pathologist**, and **Ernst Chain** was a German **biochemist**. In 1938 they came across **Fleming's** findings and decided to test the mould further.

Chain grew the mould in his laboratory and used extracts of it in tests for treatment.

Experiment 1: They first tested **penicillin** on infected mice. The mice recovered. But they discovered that to treat one person they needed 3000 times as much **penicillin**. Large drug companies could not afford to fund this quantity of work, so **Florey & Chain** began growing as much **penicillin** as they could, even in hundreds of hospital bed pans and even a bathtub.



Florey and Chain's research and experiments

Experiment 2: In 1941 they tested **penicillin** on a policeman called **Albert Alexander**, he had developed **septicaemia** from a tiny cut off the thorn of a rose bush. He was dying so he gave **Florey & Chain** permission to test **penicillin** on him. It worked and **Albert Alexander** began to recover.

However, **Florey & Chain** ran out of **penicillin** after five days and he died. But the experiment had proven that penicillin treated infection.



War and mass production

Due to **World War Two**, English factories were working tirelessly on the war effort and couldn't be used to **mass-produce penicillin**. **Florey** went to America – at just the right time. In 1941 America was attacked by the Japanese at Pearl Harbour and entered the war. The American government realised the potential of **penicillin** for treating wounded soldiers and made interest-free loans to US companies to buy the expensive equipment needed for making it. In total, 21 **pharmaceutical companies** began **mass producing** it.

In 1943 British firms were also **mass-producing penicillin**, enough to treat the allied wounded on D-Day in 1944 – over 2.3 million doses.

After the war ended in 1945 **penicillin** began to be manufactured by everyone, not just the armed forces. This meant **penicillin** became more common in the 1950s and 1960s.



Nobel Prize

The **Nobel Prize** is a set of annual international awards bestowed in several categories in recognition of academic, cultural, or scientific advances.

The **Nobel Prize** in Physiology or Medicine in 1945 was awarded jointly to **Fleming, Florey & Chain** "for the discovery of penicillin and its curative effect in various infectious diseases."



Glossary

- **Antibiotic** A treatment that destroys or limits the growth of bacteria in the body.
- **Bacteria** A tiny living organism, too small to be seen by the naked eye, which causes disease.
- **Bacteriology** The study of bacteria.
- **Biochemist** A scientist who studies chemical processes that occur in living things.
- **Magic bullet** A chemical cure that attacks germs in the body causing disease with no after effects.
- **Mass-produce** To produce large quantities by an automated mechanical process.



Glossary

- **Pathologist** A scientist who studies the causes and effects of disease.
- **Petri dish** A shallow, circular, transparent dish with a flat lid, used for growing microorganisms like **bacteria**.
- **Pharmaceutical company** These test substances and develop new antibiotics.
- **Septicaemia** Another word used to describe a potentially life-threatening blood poisoning.
- **Syphilis** A sexually transmitted disease.



Comprehension Questions

1. Describe the process by which Fleming discovered penicillin.
2. How did Florey and Chain test penicillin?
3. How did Florey and Chain overcome the problem of the mass production of penicillin?
4. Explain three factors that contributed to the development of penicillin. **You may want to use the following sentence starters to help you.**

*One reason was... (**Hint**: Identify a reason)*

*This was when... (**Hint**: Describe what this reason entailed)*

*This made a difference because... (**Hint**: Explain why this made a difference using phrases like “as a result”, “consequently”, “this meant that”)*

5. Challenge Q: Do you think it was the right decision to award Fleming, Florey & Chain the Nobel Prize jointly? Explain your answer.

