

History, Medicine through time

Lesson 8 of 30

## **Worksheet:**

**How did individuals change medical understanding between 1500-1700?**

Miss Holland



# Andreas Vesalius

Andreas Vesalius was a famous anatomist of the Renaissance. He studied in France before becoming a lecturer in surgery at Padua in 1537 and was influenced by **humanism**.

In 1540, Vesalius conducted a series of public dissections in Bologna (usually on the bodies of executed criminals) where he aimed to show his expertise on anatomy and his key discoveries on the workings of the human body. He also performed a **vivisection** on a live dog to show other **contemporaries** the workings of the heart and arteries. Vesalius was revolutionary for his time but was often criticised for not sticking to Galen's works and for encouraging his students to perform dissections themselves.

In 1543, Vesalius published his greatest work, ***On the Fabric of the Human Body***, which contained detailed illustrations of human anatomy. Within this publication he described the workings of muscles, veins, arteries and the nervous system. This transformed the study of anatomy.

Galen's books highlighted the mistakes that he made, due to his dissections on animals like pigs and apes. In his work, Vesalius pointed out around 300 mistakes Galen had made. For example, Galen has said that the human jaw bone was in two parts, but Vesalius discovered it was in one part. Galen also said that the human breastbone was in seven parts, but Vesalius found it was in three parts.



# Andreas Vesalius - Importance and impact

Vesalius helped to make anatomy fashionable and his lectures were always full with students eager to learn from him. His work was also illustrated by famous artists which helped his books to be popular.

Although Vesalius did face some criticism, other individuals were quick to take up Vesalius' work. For example, a surgeon named **Ambroise Pare** used the texts of Vesalius within his own publication of surgery in the mid 1500s. A student of Vesalius, **Fallopio**, developed the work of Vesalius and corrected some aspects of it. William Harvey also read the work of Vesalius and developed his findings to do with the circulation of the blood and the idea that valves existed within the veins which had been discovered shortly after Vesalius died.

Vesalius contributed to the change seen in the training of doctors. His emphasis on human dissection encouraged others to perform experiments themselves.

Whilst Vesalius may not have changed the treatment of disease, it could be argued his work did aide the development of surgery as surgeons would have had a deeper understanding of the human body whilst carrying out operations.



# William Harvey

William Harvey was an English physician who, like Vesalius, studied in Padua and had a very scientific approach to his work. Harvey was very successful as a physician and was even a doctor for **King James I** and **Charles I** which would have helped his research to progress.

Harvey was interested in human anatomy and, again like Vesalius, conducted many dissections of human bodies to improve his knowledge and stressed the importance of observation rather than relying on ancient texts. However, he focussed on the **circulation of the blood**.

Harvey also carried out **vivisections** on animals, specifically **amphibians** like frogs. Amphibians are cold-blooded which means their hearts beat slower. This meant Harvey was able to study the way that their hearts worked whilst they were alive. This could then be applied to his study of how blood moved around the body.

Other technological developments also helped Harvey's ideas. For examples mechanical firefighter pumps encouraged him to think about the way that blood reached the heart.



# William Harvey's discoveries

Through Harvey's careful observation and experimentation, he formed new ideas about the circulation of the blood. For example, he discovered that the heart acts as a pump, moving blood around the body in one direction and this blood was the same blood. This proved Galen's idea that blood was burnt up and that the liver produced new blood wrong. To prove this he actually calculated the exact amount of blood in the human body and how much blood was moved in every heartbeat. The liver would have to produce 1,800 litres of blood a day if it was burnt up as Galen had thought (the human body only holds around 5 litres!).

Harvey also continued to develop the idea of **valves**. He suggested that blood in the **veins** flowed towards the heart through the valves and then was pumped to the rest of the body through **arteries**. He conducted an experiment where the blood flow would be cut off on a patient's forearm. Using a finger, blood would be pushed along a vein away from the heart. The vein would be emptied of blood and stayed that way because the valves prevent blood from flowing back. This challenged Galen's idea that blood moved from one side of the heart to the other through invisible holes in the **ventricles**.



# William Harvey - Importance

Harvey published his ideas in his book in 1628 called, *An Anatomical Account of the Motion of the Heart and Blood in Animals*. The ideas within this book were the foundations for modern day **physiology**. Harvey had proved some of Galen's ideas wrong and this would help and encourage other scientists to do the same.

Harvey, again like Vesalius, showed the importance of dissection in developing knowledge of the human body.

It could be argued that Harvey's work made **phlebotomy** less significant as there was no need to bleed a patient if the liver wasn't continuously producing blood.



# Limitations of both individuals

Both individuals faced opposition to their work. For example, the Church heavily criticised Vesalius arguably causing him to leave Padua. Vesalius had said that men had the same number of ribs to women which caused an outrage because the Church taught that God took a rib from Adam to create Eve. Other physicians didn't like the idea that they were using incorrect theories and so were reluctant to support new ideas by Vesalius and Harvey. For example, Harvey's work didn't appear in medical training at universities until 1673.

The work of both Vesalius and Harvey lacked practical application. The work on anatomy in the Renaissance greatly improved knowledge in the structure of the body but didn't necessarily revolutionise knowledge in the functions of different parts of the human body. Without this knowledge, the discoveries did little to bring change to the way that disease was treated or even the understanding about the cause of disease.

Some of the ideas of Vesalius and Harvey were also incomplete. They made new discoveries but were not able to fully explain them. For example, Harvey suggested that arteries were connected to the veins through tiny **capillaries** which allowed the blood to move through the one-way system. But wasn't able to see them with the naked eye so therefore lacked proof for his theory. Microscopes were not developed until the 1660s which was when this idea was proved.



# Glossary

- **Amphibians** - Small cold-blooded animals
- **Arteries** - Blood vessels that deliver blood from the heart to the body
- **Capillaries** - Tiny blood vessels that help connect arteries to veins and help blood to transfer to the tissue in the body
- **Contemporaries** - People living at the same time as each other
- **Physiology** - The study of the functions of the different parts of the body



# Glossary

- **Valves (Medical valve)** - A structure that only allows a fluid to flow in one direction
- **Vivisection** - Performing dissections on live animals
- **Veins** - Blood vessels that carry blood towards the heart
- **Ventricles** - Chambers at the bottom of the heart



# Comprehension Questions

1. In what ways were the methods used by Vesalius and Harvey similar?
2. Describe 2 mistakes made by Galen that were discovered by individuals in the Renaissance.
3. Can you think of any factors that helped Vesalius and Harvey to make their discoveries?
4. Why were Harvey's ideas not accepted when they were first published?
5. Challenge question: How far do you agree that the work of Renaissance individuals changed medical understanding between 1500-1700?

## You may want to use the following sentence starters:

- *To some extent I agree that the work of Renaissance individuals changed medical understanding because...*
- *However to some extent I disagree that the work of Renaissance individuals was significant because...*

