UNIVERSITY OF CAMBRIDGE

TAKE YOUR PLACE

Activity 1: Transfusion Medicine

Even in ancient times, blood was seen as some sort of "life force", something that almost every living creature has and cannot live without. For over a thousand years until only a few centuries ago, the main way to treat diseases was "bloodletting", where doctors would bleed people until they got better, thinking that this would remove "bad blood". It was rarely successful. In this context, the act of taking one person's "good blood" and putting it into someone ill might have made sense. However, almost all these attempts also ended in death. This made people think that somehow, each person's blood is unique to them in some way and the practice of **transfusion** was banned by the religious leaders of the day, a tradition that continues today with Jehovah's witnesses.

Modern medicine has discovered that everyone's blood is indeed unique to them, and that it attacks blood from other people as a defence in the same way it protects us against infections. We have also discovered that our bodies can be tricked into accepting blood from certain other people, and the development of the science transfusion medicine has made this a safe and effective procedure for certain ailments.

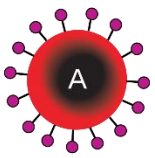
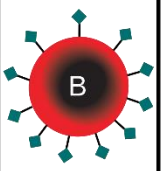
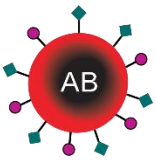
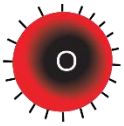
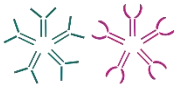
	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in Red Blood Cell	A antigen	B antigen	 A and B antigens	None

Figure 1: Summary of blood groups

When someone receives blood from a person who they are incompatible with, **hyperacute rejection** *(really really fast rejection)* takes place. In the early 20th century, scientists discovered that if we mix blood from two people in a petri dish, most of the time, something really bad happens. But, when blood from some combinations of people get mixed, nothing happens. To explain this, he grouped people into three types of blood, or as we call them today **blood types**. The most important blood type system is the **ABO system**. We have proteins on the surface of our blood cells that can be of one of two types - A and B. Some people have both, and are type AB, while some people have neither, and are type O. We also have antibodies that attack the protein that is not on our blood cells. When two people from the same type get mixed together or where they don't have antibodies against the incoming blood, nothing happens. However, when one person's blood contains antibodies against the other blood type, then all of the incoming blood gets destroyed (**haemolysed**).

This knowledge saved many lives during World War II, when people had lost a lot of blood from bullet wounds, and this allowed doctors to replace their blood safely.

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Task

1. Watch this brief video: Why do we have different blood types?
2. Read this webpage about blood types: Blood Types
3. Refer to this web page about different blood typing systems: Blood group systems
4. Draw a diagram to show the compatibility for another blood group system we have:

5. How are blood groups in this system inherited? What can it tell us about paternity?

6. There are hundreds of different blood type systems discovered to date, and we have all of them on our blood. However, some are more important than others. Choose two blood types (e.g. ABO and Rhesus [+ or -]) and find out a bit more about how they work. Think about the following when writing your answers:

- How many blood types are there within the system?
- Is it rare or common to match for this system? Why does it matter or not matter so often?
- Are there any diseases or issues specifically associated with this blood type system?

Explore More...

If you want to expand your knowledge about how transfusions work and which situations they are useful in, take a look at this video: How Do Blood Transfusions Work?