The history of blood types

Kirsty Strawbridge finds out what blood types are and why they’re important

Do you know your blood type? Blood typing is necessary for safe blood transfusions, where donor blood is given to a patient in need. If the recipient gets blood that’s not compatible with theirs, it can cause a transfusion reaction, which can cause serious symptoms or even death.

Lower and animal transfusions

Early blood transfusion experiments frequently involved animals. In 1665, Richard Lower, a member of a prestigious scientists’ organisation called the Royal Society, bled a dog “of medium size”, then transfused blood from a mastiff into the first dog. He recorded that the recipient dog recovered “with no sign of discomfort or of displeasure”.

Your chance of receiving compatible blood without pre-transfusion testing ranges from 7 per cent (if you’re type O negative) to 100 per cent (if you have the ‘universal’ recipient type, AB positive).
Lower’s experiment was followed by transfusions from animals into people, but animal and human blood aren’t compatible and the recipients survived only if they received a very small amount of blood. Blood transfusions remained unpredictable, and the Royal Society and the French government banned them in 1668.

Later, human transfusion experiments in the 19th century, performed by Dr James Blundell and Samuel Armstrong Lane, among others, showed some promise, but they couldn’t make the procedure more reliable.

Early blood transfusions weren’t guaranteed to fail. In some cases, the donor and recipient happened to have compatible blood. Your chance of receiving compatible blood without pre-transfusion testing varies according to your blood type, but it ranges from 7 per cent (if you’re type O negative) to 100 per cent (if you have the ‘universal’ recipient type, AB positive).

Landsteiner and blood types

The man who discovered some of the human blood types that we know today was an Austrian, Karl Landsteiner. His work was influenced by an article on blood typing in goats, which was written by Paul Ehrlich and appeared in the ‘Berliner klinische Wechenschrift’ in 1900.

Landsteiner discovered the common blood types A, B and O (which he referred to as A, B and C) in 1901, and Adriano Sturli and Alfred von Decastello – who were working under Landsteiner – discovered type AB a year later in 1902. Landsteiner was awarded the 1930 Nobel Prize in Physiology or Medicine for his work.

Ottenberg and others

Six years after Landsteiner’s discovery, in 1907, an American doctor named Reuben Ottenberg successfully transfused blood between two people at Mount Sinai Hospital in New York. He was the first person to record pre-transfusion testing for blood compatibility in a clinical setting, although he remarked later that the testing “was only brought in incidentally in a footnote”, and concluded that he probably “should have made a separate article”.

Ottenberg made several notable discoveries over the next 50 years. His work led to the knowledge that people with type O blood are ‘universal donors’, which means that their blood will be accepted by people with any of the four ABO system blood groups.

Testing blood types made transfusion much safer, and it got steadily more popular. Yet some recipients were still undergoing transfusion reactions, suggesting that an important part of the puzzle was missing. In 1940 this was revealed as Rh factor, which was discovered by Landsteiner and Alexander Weiner in tests on rhesus monkeys (hence the label ‘Rh’, for Rhesus). Whether you test positive or not for the Rh D antigen determines whether you have a positive (e.g. A+) or negative (e.g. AB-) blood type.

Five years later, in 1945, Robin Coombs, Arthur Mourant and Robert Race developed the ‘antiglobulin test’. It meant that non-agglutination antibodies could be discovered and studied. This quickly increased the number of blood group systems: today there are 35 recognised blood group systems, and there might be more that haven’t been found yet.

ABO and Rh are still the most recognised systems. The NHS website, for example, states that there are eight blood types (A+, A−, B+, B−, O+, O−, AB+ and AB−). This isn’t strictly true, but it’s all that most people will need to know.
Lead image:

Scanning electron micrograph of red blood cells, clearly showing their biconcave disc shape.

Annie Cavanagh/Wellcome Images

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References

- Nobelprize.org’s biography of Karl Landsteiner [4]
- PBS’s biography of Reuben Ottenberg [5]
- Guide to blood type compatibility [1]

Questions for discussion

- Some people refuse to donate or receive blood, even in life-or-death situations. Give examples of people who fit into these categories and explain their reasons.
- Imagine you’re a doctor treating an unconscious Jehovah’s Witness in the Accident and Emergency department. Your patient has lost so much blood that she can’t survive without a transfusion, but you know that this is against her beliefs. Would you go ahead with the transfusion without her consent? Why?
- Investigate why it’s not possible to transfuse animal blood into humans. If it were possible, do you think people would accept blood from a pig or dog? Why?

Further reading

- Mosaic: The man with the golden blood (article about rare blood) (2014) [6]
- Mosaic: Why do we have blood types? (2014) [7]
- See how the most common blood groups react with one another by playing the Blood Typing Game on Nobelprize.org [8]
- Nine facts about pregnancy and the immune system [9]

About this resource

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