

Blood Types

by Sophia



WHAT'S COVERED

In this lesson, you will learn about the four main blood types, and what types are compatible with each other. Specifically, this lesson will cover:

1. Different Blood Types

Blood type is determined by the **antigens** that are present on the plasma membrane of red blood cells.

There are four main blood types, referred to as ABO blood typing:

- Type A
- Type B
- Type AB
- Type O

The antigens that can be on a blood cell and determine blood type are:

- A antigen
- B antigen
- Both A and B antigens.

There are different **antibodies** associated with some of the blood types as well that limit which blood types can be donated to each other.



TERMS TO KNOW

Antigen

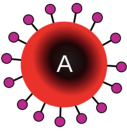
A unique marker on the surface of a cell that can stimulate an immune response.

Antibody

Specific protein markers that are created by the immune system for binding and reacting to specific antigens.

2. Type A

Type A blood has A antigens on the red blood cell and has anti-B antibodies.

Blood Type	Red Blood Cell Type	Antigens in Red Blood Cells	Antibodies in Plasma	Can Donate To:	Can Receive From:
A		 A antigen	 Anti-B	A, AB	A, O

Someone with type A blood can donate to somebody else with type A blood. They can donate to somebody who has type AB blood because a person who has AB blood has these A antigens on their red blood cell as well. They can't have anti-A antibodies because their immune system would attack their own blood cells.

Somebody with type A blood can receive from somebody else with type A blood. They can also receive from somebody who has type O blood because type O blood doesn't have any antigens on it.



THINK ABOUT IT

Question: What happens if someone with type A blood receives a transfusion from someone with type B blood?

Answer: If somebody with type A blood was transfused (became the recipient) with type B blood (the donor), the anti-B antibodies in the type A recipient's plasma would identify those type B blood cells and attach to them, rendering them ineffective. What would happen would be something called **agglutination**. Agglutination occurs when incompatible blood types mix. Type B red blood cells will clump, and can even burst because they're incompatible.



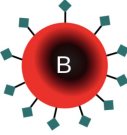
TERM TO KNOW

Agglutination

The high class term for clumping.

3. Type B

Somebody who has type B blood has B antigens and anti-A antibodies.

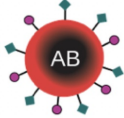
Blood Type	Red Blood Cell Type	Antigens in Red Blood Cells	Antibodies in Plasma	Can Donate To:	Can Receive From:
B		 B antigen	 Anti-A	B, AB	B, O

As with type A, someone with type B blood can donate to the same type or to type AB.

Someone who has type B blood can receive blood from the same type, because the antigens are going to be the same, or they can receive from type O.

4. Type AB

Somebody who has type AB blood is going to have both A and B antigens. Somebody who has type AB blood doesn't have any antibodies in the blood.

Blood Type	Red Blood Cell Type	Antigens in Red Blood Cells	Antibodies in Plasma	Can Donate To:	Can Receive From:
AB (universal recipient)		 A and B antigens	None	AB	A, B, AB, O

Somebody with type AB blood can only donate to somebody else who has type AB blood.

→ EXAMPLE Suppose somebody has type A blood, and they are transfused with AB blood. The recipient's anti-B antibodies would attack the B antigens on this blood cell. Same goes for someone who is type B.

Type AB can receive blood from any type. This makes them the **universal recipient**.



TERM TO KNOW

Universal Recipient

The blood type AB; type AB blood contains both A & B surface antigens which means that a person with this blood type won't have any anti-A or anti-B antibodies in their blood.

5. Type O

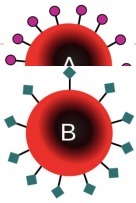
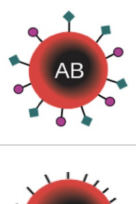
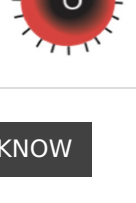
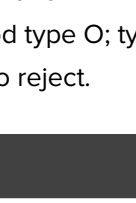
Type O blood doesn't have any antigens on the red blood cell, but they do have antibodies for type A and type B.

Blood Type	Red Blood Cell Type	Antigens in Red Blood Cells	Antibodies in Plasma	Can Donate To:	Can Receive From:
O (universal donor)		None	 Anti-A and Anti-B	A, B, AB, O	O

If a person with type O blood was transfused with either type A, Type B, or type AB blood, these antibodies would cause agglutination. Type O blood can only receive blood from a type O donor.

Type O blood, on the other hand, can donate to all blood types because the antibodies in these other types of red blood cells have nothing to attack. Type O is referred to as the **universal donor**.

Blood Type	Red Blood Cell Type	Antigens in Red Blood Cells	Antibodies in Plasma	Can Donate To:	Can Receive From:
A		 A antigen		A, AB	A, O

			Anti-B		
B		 B antigen	 Anti-A	B, AB	B, O
AB (universal recipient)		 A and B antigens	None	AB	A, B, AB, O
O (universal donor)		None	 Anti-A and Anti-B	A, B, AB, O	O



TERM TO KNOW

Universal Donor

The blood type O; type O blood contains no surface antigens, so there is nothing for the immune system to reject.



SUMMARY

There are four **different types of blood**: A, B, AB, and O. Blood type is determined by the antigen on the red blood cell. Three different types of antigens can be on a cell: A, B, and both A and B. If incompatible blood is transfused into someone, agglutination occurs. **Type A** blood has A antigens and contains anti-B antibodies. It can only donate blood to another type A or to type AB. A person with type A blood can receive from another type A person or someone with type O blood. **Type B** blood is the same. A person with this blood type can only give to someone with the same blood type or type AB. They could only receive from someone who is the same or type O. **Type AB** blood is the universal recipient, but can only donate to the same blood type. Someone with **Type O** blood can only receive from the same blood type but is a universal donor.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND



ATTRIBUTIONS

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TERMS TO KNOW

Agglutination

The high class term for clumping.

Antibody

Specific protein markers that are created by the immune system for binding and reacting to specific antigens.

Antigen

A unique marker on the surface of a cell that can stimulate an immune response.

Universal Donor

The blood type O; type O blood contains no surface antigens, so there is nothing for the immune system to reject.

Universal Recipient

The blood type AB; type AB blood contains both A & B surface antigens which means that a person with this blood type won't have any A or B antibodies in their blood.