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ABO is one of many blood groups found in human beings. These blood group types are names given according to the proteins found near the blood cells, and how they react within the immune system. An antigen protein is one that stimulates a response, and is found on the red blood cell. An antibody is the protein that the immune system creates to respond to the foreign antigen, and is found in the serum. The basic blood types within the ABO system are O, A, B, and AB.

A person with type O blood has no antigen, but has antibodies to A and B. A person with type AB has no antibodies (within the ABO group) but has both the A and B antigen. Type A has the A antigen and anti-B antibody, type B has the B antigen and anti-A antibody. So type O is the universal donor, and type AB is the universal recipient.

The blood type that can be tested for is the phenotype. (The physical expression of a genetic trait). It is the genotype that determines what can actually be passed on to the next generation. Most genetic information (genes) is passed on in pairs, where one half comes from each parent. Some genetic information is considered recessive. This means the trait will only show up if it is matched with a like piece of genetic information. Other information is dominant. The traits expressed by dominant genes always show up, and suppress the recessive information, which is still there but not seen.

Type O is recessive. The only genotype for the O phenotype is OO. The other genes (A and B) are dominant, so the A phenotype can have either AA or AO genotypes, B can have BB or BO. AB phenotype also will have the AB genotype. Let's look at some examples of inheritance. (please note that these are statistical outcomes, indicating the chance that each offspring will have that trait)

One parent is type O, the other type A or B.

OO x AA = all offspring will be AO (type A)

OO x AO = half OO (type O), half BO (type B)

OO x BB = all offspring will be BO (type B)

OO x BO = half OO (type O), half BO (type B)

One parent type O, the other type AB

OO x AB = half AO (type A), half BO (type B)

Both parents AB

AB x AB = half AB, one fourth AA (type A), one fourth BB(type B)

One parent A, the other B

AA x BB = all AB

AO x BO = ¼ AB, ¼ OO, ¼ AO, ¼ BO

AA x BO = one half AB, one half AO

AO x BB = one half AB, one half BO

Both parents type A or Type B (the same)

AA x AA = all offspring AA

AO x AO = half AO, one fourth AA, one fourth OO

AA x AO = half AA, half AO

BB x BB = all offspring BB

BO x BO = half BO, one fourth BB, one fourth OO

BB x BO = half BB, half BO

Rh is a little simpler, because you either have it or you don't (well, actually there are some variants called Du types, but they don't matter to most situations). Rh positive is the dominant trait, and is represented by a (capitol) D, whereas the negative gene is represented by the (small) d. Someone who is Rh positive is either DD or Dd, but the negative is always dd.

DD x dd = always Dd (positive)

dd x dd = always dd (negative)

Dd x Dd = ¼ dd (negative), ¼ DD (positive), ½ Dd (positive)

DD x DD = always DD (positive)

Dd x DD = ½ Dd, ½ DD (all positive)

Reference: Rh: The intimate history of a disease and its conquest, by David Zimmerman. Macmillan publishers, 1973