

Blood Typing in Cats and Dogs

Blood types in dogs and cats are determined by the presence of specific antigens present on the surface of erythrocytes. Specific antibodies (isoantibodies/ alloantibodies) against these antigens are present in circulation and these can be naturally occurring (as in the cat) or acquired (e.g., following a blood transfusion and subsequent exposure to a blood group antigen). Some isoantibodies are highly pathogenic, in that they can cause agglutination and/or haemolysis of red cells. The determination of blood types in donor dogs and cats is therefore important prior to the administration of a blood transfusion to an anaemic patient.

In the dog, more than twelve blood types are present, most of which are based on the DEA (dog erythrocyte antigen) system. The most of important of these is DEA1.1, which is inherited as an autosomal dominant trait and is present in approximately 40% to 50% of dogs. Dogs do not have naturally occurring isoantibodies however a DEA1.1 negative dog will become sensitised if it is given DEA1.1 blood, resulting the production of isoantibodies against DEA1.1. As a result, a delayed transfusion reaction will occur leading to haemolysis and shortened life span of the donor blood. More serious reactions will occur if repeated transfusions with DEA 1.1 positive blood are given.

In the cat, only the AB system is recognised resulting in three blood types: A, AB, and B and unlike the dog, naturally occurring isoantibodies against A and B red cell antigens exist. Of these, anti-A antibodies produced by B type cats are the most pathogenic. Type A cats transfused with Type B blood will therefore succumb to a potentially fatal transfusion reaction. Anti-B antibodies produced by type A cats are less of a problem (anti-B antibodies are weak haemolysins). Type AB cats lack anti-A and anti-B antibodies and are therefore considered to be “universal” donors. Recipient AB type cats however should be transfused with type A blood to avoid inadvertently transfusing potent anti-A antibodies from a type B donor.

Naturally occurring anti-A antibodies in type B queens can be secreted in milk. When kittens are first born there is a window period of around 24-36 hours whereby large sized proteins (such as antibodies) in the milk can be absorbed directly across the gut. Large proteins are unable to cross the gut in any mammal older than 36h or so, but in the first 24-36 hours they can. In a type A or AB kitten suckling milk from a type B queen that produces anti-A antibodies, these antibodies will be absorbed. Anti-A antibodies are strong haemolysins and when they are absorbed, they bind to the kitten’s red blood cells and cause haemolysis (neonatal isoerythrolysis).

In contrast, type B kittens born to type A queens are not affected by neonatal isoerythrolysis since the anti-B antibodies secreted in the type A queen’s milk that are absorbed by type B kittens are weak haemolysins.

Blood typing of cats and dogs prior to a blood transfusion is therefore necessary to avoid adverse transfusion reactions and, in the cat, prevent neonatal isoerythrolysis in the first few days of life. At NovaVet Diagnostics, commercial blood typing kits using a card agglutination method are used. These methods can be used in the dog and cat; determining whether a dog is DEA 1.1 positive or negative or classify cats as type A, AB, or B individuals.