

Dear Cat Breeder,

we would like to start off our series of newsletters in 2010 with the important topic of „Blood Groups in Cats“. In this newsletter we will provide you with important background information about the different blood groups in cats, including the difference between serological and genetic blood group and why it is so important to know your cat's blood group before starting to breed. Furthermore, this newsletter contains the latest information about progressive retinal atrophy (PRA) in cats and how the genetic defect can be detected with our test. We hope you will enjoy reading



Dr. Elisabeth Müller

Blood groups in Cats

Why determination of blood type?

Determination of the blood type

rdAc-PRA mutation

Blood groups in Cats

The most important system to characterize blood groups in cats is the A, B system with its 3 variants A, B, and AB. The determining factor for the respective blood group is the occurrence of certain neuraminic acids on the surface of the erythrocytes. N-glycolylneuraminic acid (NeuGc) is associated with type A and N-acetylneuraminic acid (NeuAc) with type B. AB cats carry both neuraminic acids on the surface of their erythrocytes. Type AB is very rare (0.7% in Germany). Recently, Mik a new erythrocyte antigen has been acknowledged. Several studies have shown familial segregation for cat blood types A and B.

The majority of random bred cats throughout the world have blood type A. However, some cat breeds have a high frequency (60%) of type B individuals. Blood type A is the predominant blood type in European shorthair (ESK) and American Short- and Longhair cats and can vary between 75-100% depending on the country of origin.

The prevalence of the B type varies considerably between cats of different breeds. So far no type B cat could be detected among pure bred Siamese, Burma, Russian Blue or Tonkinese cats. About 1-10% of Maine Coon and Norwegian Forrest Cats, 11-20% of Abyssinian, Somalian, Burma, Persian, Scottish Folds and 20-45% of Exotic Shorthair, British Shorthair, Cornish Rex and Devon Rex had blood type B. Among cats of the breed Turkish Van as many as 60% of all cats were blood type B.

Similar to the unrelated ABO system of humans, cats often possess alloantibodies against their opposite blood type. Blood type B cats possess strong agglutinins and hemolysins to type A red cells. Type A cats possess alloantibodies that are less strongly reactive for type B red cells, blood type AB cats do neither produce alloantibodies against type A nor alloantibodies against type B red cells. Alloantibodies in a cat are formed about 12 weeks after birth.

Why should you care about the blood group of your cat?

Blood transfusion: The above mentioned alloantibodies are responsible for adverse reactions during blood transfusions. Cats of blood group A or B should only receive the same type of blood group, cats of blood group AB only type A blood or type AB blood. Therefore, a blood transfusion of a type B cat with type A blood can cause a severe reaction that may be deadly. Milder reactions, such as nausea, vomiting or restlessness can occur if type B blood is transfused into a type A cat.

Breeding: Especially interesting for cat breeders is the presence of strong, naturally occurring alloantibodies in the type B cat against the A antigens that can lead to neonatal isoerythrolysis in type A kittens born to a type B queen and type A tom. The kitten ingests alloantibodies against type A erythrocytes with the milk from its type B mother, which react with the type A erythrocytes of the kitten and lead to the fatal neonatal isoerythrolysis.

The prevention of transfusion reactions and neonatal isoerythrolysis requires knowledge of the blood types of donor and recipient, and toms and queens.





Blood groups in Cats

Warum Blutgruppenbestimmung?

Determination of the blood type

rdAc-PRA mutation



Genetic determination of the blood type

The mode of inheritance of blood types in cats is autosomal dominant. The allele A for blood type A is dominant to allele b for blood type B. It has been suggested that there is probably a factor suppressing the dominant allele A in the rare type AB cats.

The genetic determination identifies the alleles present in a cat with a certain serological blood type. A type A cat can have two A alleles or one A and one b allele. In order for a cat to have blood type B both alleles have to be b. This is important to know because if a blood type B cat is bred to a type A Tom that has the A and b allele, type A kitten can result.

Studies in our laboratory show that about 65% of British Shorthair Cats, 60% of British Longhair, 45% of Burma, and 40% of Somalian Cats with blood type A have the recessive allele b. The genetic test in type A and AB cats is the only way to detect the recessive allele b.

Please note that the DNA test for blood group factors has not been fully validated in the Ragdoll, Turkish Angora and some other breeds.

rdAc-PRA mutation in more cat breeds

Progressive retinal atrophy in cats is a disease of the retina with progressive loss of vision culminating in blindness. The photoreceptors in the eye are destroyed. Rod cells (light-dark receptors) lose their function first, followed by a loss of function of the cone photoreceptors (colour receptors).

Affected cats are born with normal vision. Clinical signs appear at about 1,5 to 2 years of age. At the age of 3-5 years all photoreceptors are destroyed and affected cats are blind.

The mutation in the gene CEP290 responsible for rdAC-PRA in cats was detected in Abyssinian and Somali cats in 2007 by Kristina Narfström and colleagues (University of Missouri-Columbia, Columbia). This mutation could be detected in about 1/3rd of all cat breeds analysed. Especially Siamese and Siamese like cats seem to be affected.

Laboklin has permission to perform the genetic test for rdAC-PRA in cats and is able to identify homozygous healthy, homozygous diseased and heterozygous carrier cats.

The mode of inheritance of rdAC-PRA is autosomal-recessive. A cat can only develop the disease if it is homozygous for the mutation. This means that this cat has received a mutated form of the gene from both parents that might not have been affected but were heterozygous carriers. Therefore it is important to assure that no two carrier animals are being bred because this can result not only in more carrier cats but also in diseased cats.