

## **7. Summary**

### **Feline blood transfusion: indications, transfusion reactions and results**

Due to increased availability and improved transfusion skills, blood transfusions have become more important in the management of anemic and bleeding cats. Until now there have been only few studies concerning feline blood transfusion practice. The purpose of this study was to evaluate feline blood transfusions during a 3-year study period (15 months retro-/21 months prospectively) at the Small Animal Clinic, University of Berlin. The following parameters were evaluated: donor data, side effects of donation, distribution of blood groups in donors and patients, indications for transfusion, transfusion frequency and volume, hematocrit change after transfusion, cross match results prior and after transfusion, incidence of transfusion reactions and efficacy or survival rate, respectively. In some cases coombs tests were performed before and after transfusion.

Besides clinic-owned cats, staff- or client owned cats were used as blood donors. Cats had to be healthy, large, vaccinated, screened for viral infections and kept indoors. After physical examination and obtaining a complete blood count and serum chemistry profile the donors were sedated and the blood was drawn into syringes containing sodium citrate (1 ml sodium citrate 3.13% per 9 ml blood) through a butterfly catheter placed in the jugular vein. The blood was transferred into transfer bags and transfused immediately. In some cases blood storage was performed collecting the blood with CPDA-1 (1.2 ml CPDA-1 per 8.8 ml blood). The blood type was determined in donors and recipients. Before and 16-24 hours after transfusion the hematocrit was measured. The patients were controlled during and after transfusion for the occurrence of adverse reactions.

Over a 3 year period 91 patients received 163 blood transfusions. 134 cats donated blood. 127 staff- or client owned cats donated usually only once. Seven clinic-owned cats served as donors for 45 blood transfusions (28% of all transfusions). The age of the donors ranged from 0.5-15 years (median 4), they weighed between 2.7-9 kg (median 5). Per donation 10-50 ml of blood was removed (1.8-9.5 ml/kg, median 5.9 ml/kg). One cat died two days after donation due to occult dilated cardiomyopathy.

95.6% of the donors and recipients were blood type A, 4.0% were blood type B and 0.4% had type AB. Only AB compatible transfusions were performed with the exception of an AB-cat which was transfused with type A blood of three different donors.

In 159 of the 163 blood transfusions the major indication was anemia. The other 4 blood transfusions were given due to hypoproteinemia (2) and coagulopathy (2).

Of the 91 anemic cats 40 suffered from blood loss anemia. The cats received 62 transfusions (median 1/cat) and 1.7-16.3 ml blood/kg body weight (median 6). Hematocrits prior to transfusion ranged from 8-20% (median 14) and after 16-24 hours from 11-28% (median 18.5) with a hematocrit change of -5-12% (median 4.7).

Thirteen cats with hemolytic anemia received 21 blood transfusions (median 1/cat). The transfusion volume ranged from 16-50 ml per blood transfusion (3.5-12.5 ml blood/kg (median 7) body weight). The hematocrit increased from 6-17% (median 13) to 8-22% (median 16). The hematocrit rise was 1-9% (median 3).

35 cats with ineffective erythropoiesis received 76 blood transfusions (median 2/cat). The cats' hematocrits prior to transfusion were 5-20% (median 12). With a transfusion volume of 10-70 ml per blood transfusion (3.3-16 ml/kg body weight) the hematocrit change ranged from -4 to 19% (median 4). After transfusion the hematocrit ranged from 9-27 % (median 14). Transfusion reactions including pyrexia, tachypnea and hyperbilirubinemia were noted in only 2 of 163 blood transfusions (1.2%). In both cases crossmatch results and blood type were compatible.

14 cats with blood loss anemia (4), hemolysis (3) and ineffective erythropoiesis (7) died or were euthanized during the first 24 hours after transfusion. During the following 9 days 19 cats died due to blood loss anemia (7) and ineffective erythropoiesis (12).

For the first 24 hours after transfusion the survival rate was 84.1% and for the following 9 days 63.7%. Only one of the cats which was not transfused because of anemia survived.

In the prospective part of the study crossmatching preceded 117 of the transfusions in 60 cats. The major resp. minor reaction was positive in 7 cases each, all except for one had previously received blood. A second and third crossmatch was performed 3-21 days and 20-71 days after 57 and 4 transfusions, respectively. The crossmatch (2 major, 4 minor reactions) was positive in a type AB cat, which had been transfused with type A blood. The major reaction of the second or third crossmatch was incompatible in 9 cases suggesting sensitization against transfused erythrocytes. In one cat, which received multiple transfusions, the major reaction and the coombs test were positive suggesting antibody production against transfused or owned erythrocytes.

With appropriate donor selection, initial blood typing and subsequent crossmatching as well as appropriate blood collection and administration techniques blood transfusions are safe and efficient, but do not always result in the expected rise in hematocrit.