# DONOR PROFILE

## Criteria to be a blood donor

| | |
|---|---|
| AGE | Between 1 and 8 years old. |
| WEIGHT | At least 4 kg (10 pounds). |
| GENERAL HEALTH CONDITION | No sign of a potential disease (vomiting, diarrhea). |
| DIET | Balanced diet. |
| SEX | • male is recommanded<br>• spayed nulliparous female. |
| CHARACTER | Calm and docile. |
| HISTORY OF TRANSFUSION | No history of previous blood transfusion. |
| MEDICAL TREATMENT | No current treatment.<br>No antiparasitic preventative just before blood collection. |
| MEDICAL FOLLOW-UP | Clinical examination before each donation.<br>Annual check-up. |
| BLOOD TYPING | Determination of donor's blood group is compulsory, (cf. compatibility). |
| INFECTIOUS DISEASE | To minimize exposure to feline infectious diseases, feline blood donors should be strictly indoor cats, with no exposure to outdoor cats.<br>Depending on geographical area and age of animal, additional laboratory testing may be required for feline leukemia virus, feline immunodeficiency virus, dirofilariasis ans hemobartonellosis. |



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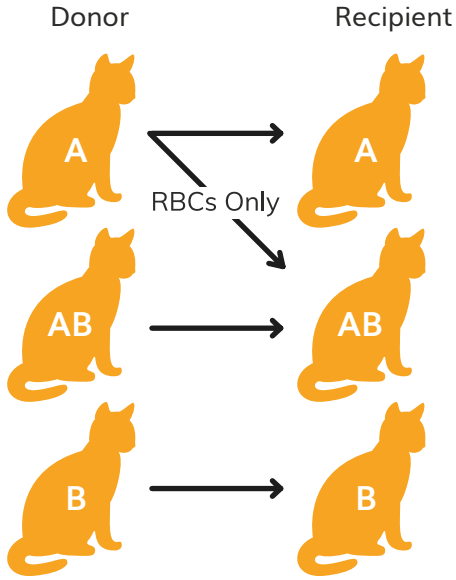
# COMPATIBILITY

## I. Blood group in cats

The only blood group system recognized is the AB system with the alleles A, B or AB. These alleles are highly immunogenic. The most common is the A group. There are  breeds in which the pourcentage of B and AB groups are more represented. Few years ago, a new antigen has been descripted: the Mik antigen.

The presence of naturally occurring allo antibodies in type A and in type B cats requires that blood typing be performed prior to blood transfusion to avoid acute haemolytic transfusion reaction, and in breedings to prevent neonatal isoerythrolysis. Blood can be taken directly from the umbilical cord.




*Blood group compatibility in cats*

## NEONATAL ISOERYTHROLYSIS (HAEMOLYTIC DISEASE) OF THE KITTEN

As type B cats have very strong naturally occurring anti-A alloantibodies, if a kitten of the A group receives alloantibodies through the colostrum from a B queen, these alloantibodies will provoke a serious life threatening reaction called "haemolytic disease".

# COMPATIBILITY

## 2. Blood typing

Due to the presence of strong naturally alloantibodies, blood typing is mendatory prior to any blood transfusion.
The Alvedia blood typing test will allow you to perform blood typing in 2 minutes without material.
The system is based on the migration of red blood cells on a membrane under the influence of a buffer flux moving along due to capillary action. Two monoclonal antibodies specific to A and B antigens has been incorporated into the membrane. These antibodies will retain positive A and/or B red blood cells, showing one or two red lines on the membrane.


*Quick Test A+B for blood typing in cats*

## 3. Crossmatching

Feline crossmatching is recommanded to avoid all incompatibilities (for example the Mik antigen) or if previous transfusions have been given.
Two types of crossmatching can be perform depending if you wish to transfused PRBC or whole blood.

- **The major crossmatch** : recipient's serum, donor's erythrocytes. It is performed to detect antibodies in the recipient's serum that may agglutinate or hemolyse the donor's erythrocyte. In case of a positive result, there is a risk of transfusion reaction : the donor has to be changed.
- **The minor crossmatch** : recipient's erythrocytes, donor's serum. It is performed to detect antibodies in the donor's plasma directed against recipient erythrocytes. In case of a positive result it is recommended to change donor.

Our feline crossmatch test will allow you to pick-up incompatibilities across all feline blood groups (A, B, AB, Mik and others).


*Lab Test for crossmatching in cats*

A crossmatch test will NEVER replace the blood typing determination. Blood typing is mandatory before any transfusion even the first transfusion due to strong naturally allo antibodies.



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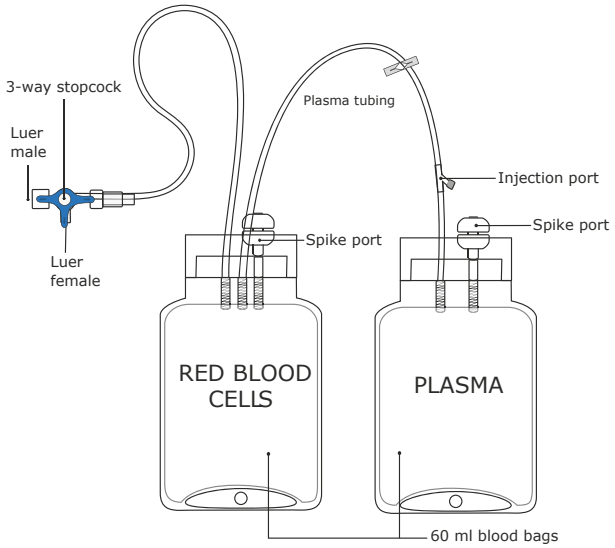
# BLOOD COLLECTION

## 1. For a feline donor

Volume : A typical feline donation is between 50 to 60 ml. The maximum donation volume is approximately 11-13 ml/Kg.
Frequency : Blood may be donated once every 3-4 weeks.

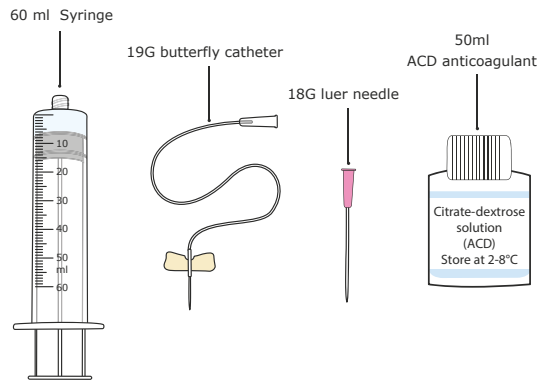
## 2. Feline blood collection bags (60ml)

Alvedia double feline blood collection bag

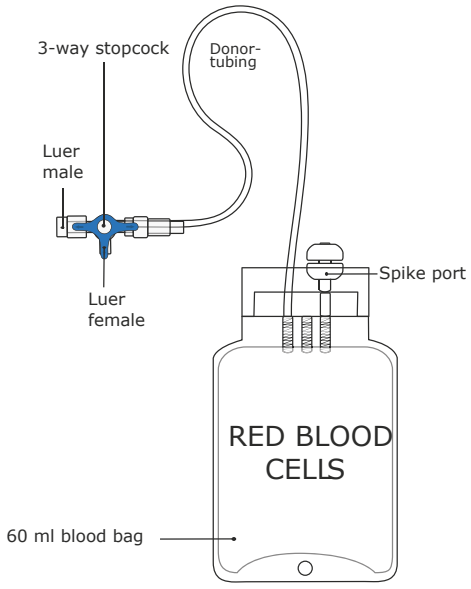



Provided in individual packaging sterilized:

OPTION:
Provided in a separate packaging




Alvedia single feline blood collection bag

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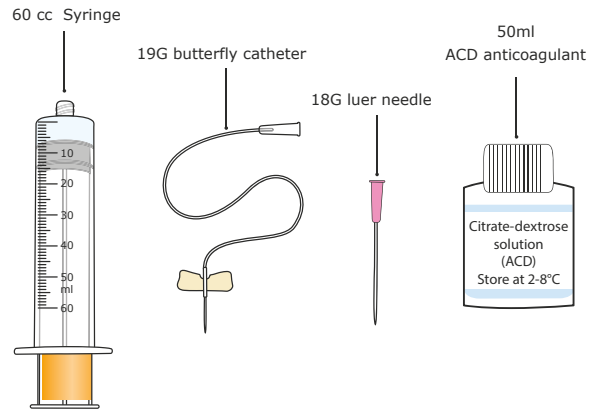




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# BLOOD COLLECTION

## 3. Puncture

In any case, animal has to be healthy.
Clinical exam is always recommended before blood collect.
Cats that donate blood on a monthly basis should be given an iron supplementation in their diet.
Almost all cats require sedation or anaesthesia.
Recommended sedation and anaesthesia protocols include :

- Ketamine 100 mg mixed 1:1 or 1:2 with diazepam 5mg/ml. Give 0.1 ml/kg i.v. Additional boluses of one-quarter to one half the initial dose may be given to prolong anaesthesia
- Ketamine 10mg/kg and midalolam 0.2 mg/kg, mixed together, i.m. Additional boluses of ketamine 1.0mg/kg i. v., may be given to prolong anaesthesia
- Ketamine 2mg/kg and midazolam 0.1 mg/kg, mixed together, i.v. Additional boluses of one-quarter to one-half the initial dose may be given to prolong anaesthesia.

*Caution : the elimination half-life in the cat of the ketamine is approximately 1 hour (Plumb's Veterinary Drug Handbook sixth edition 2008). This period is extended after the ketamine blood outside the body, but weighted by the ratio of blood collected / total blood of the cat. It is best to wait at least 1-2 hours before injecting the blood collected.*

## 4. Collection steps

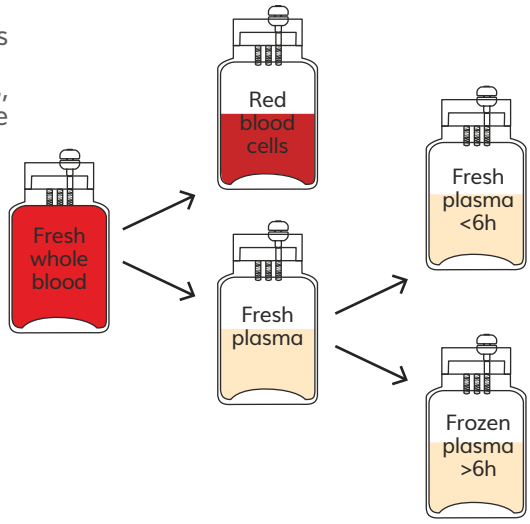
1. Prepare intervention :
   • shaving : jugular vein is the most common punction site;
   • cleaning : use of chlorhexidine is recommended;
   • disinfection.
2. Apply anaesthetic gel.
3. The patient is restrained in a **either lateral or sternal recumbency.**
4. Wear gloves (sampler).
5. Compress jugular groove. Set stopcock on position 1, facing towards syringe.
6. Stretch skin in order to locate vein clearly. given to prolong anaesthesia.
7. Fill in syringe (anticoagulant is already in the syringe) until blood quantity is reached.
8. Apply **compress on puncture** site and if needed, bandage for 30 minutes.
9. **Push blood** present in tube into the collection bag.
10. **Seal tube** close to the bag.
    **Label collection bags** indelibly : date and time of collection, expiration date, type of animal, name of donor, blood group.

    *NB : in case the animal moves and the needle slips out of vein, either push needle forward or remove it and start the puncture again.*

# BLOOD PRODUCTS

## 1. Blood Product Overview

Treatment of whole blood to obtain packed red blood cells and plasma is the easiest to carry out in practice. Thanks to the separation of blood in its two components, two products are obtained and two animals can be treated.




## 2. Characteristics and use of blood products

| Blood product | Use | Precautions |
|---|---|---|
| **Whole blood**<br>• until 24 hours after collection | • Haemostasis disorders : thrombocytopenia, thrombopathias, coagulopathies;<br>• Anaemia, hemorrhage;<br>• Renal failure;<br>• Liver failure;<br>• Septic shock. | • In anaemic patients, risk of volume overload. |
| **Fresh Plasma**<br>• separated for less than 4 h use within 24 h<br><br>**Frozen Plasma**<br>• frozen within 6 to 8h | • Hypovolemia (trauma, surgical resuscitation);<br>• Acquired or hereditary deficiency of coagulation factors;<br>• Antivitamin K poisoning<br>• Hypoproteinemia;<br>• Pancreatitis;<br>• Antioxydant properties. | • Because of the short half-life of coagulation factors, several transfusions may be necessary. |
| **Packed Red Blood Cells**<br>• Erythrocyte suspension obtained after centrifugation : 2000 rpm for 30 min, or 5000 rpm for 5 min<br>• 50% < Ht < 80% | • Anaemia. | • High viscosity reduces administration speed.<br>• Dilution with NaCl 0,9% (0,5mL per mL of concentrate). |



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# BLOOD PRODUCTS

## 3. Material needed for separation

*Centrifuge*

*Plasma extractor*

*Scale*

# BLOOD PRODUCTS

## 4. Preservation of blood products

Anticoagulant for single or double blood collection bags

| Blood product | Anticoagulant & Storage | Remarks |
|---|---|---|
| Whole blood | Storage at 1-6°C<br>- CPD-A: 35 days<br>- CPD: 28 days<br>- ACD: 28 days | • Changes in blood with time: progressive cell alteration, rise in haemoglobin, potassium and plasmatic ammonia products, reduction of potassium in erythrocytes.<br>• Gently agitate blood bag twice a week.<br>• Thanks to vertical or lateral storage of the bags, shocks are minimized, sorting facilitated, diffusion of oxygen inside the bags and carbon dioxide outside is easier. |
| Fresh plasma | 24 hours at 1-6°C | |
| Frozen fresh plasma | 6 month to 1 year between<br>-18°C et -30°C | • At -30°C, coagulation factors remain active during one year.<br>• At -20°C, in the freezer, coagulation factors remain active during 6 month.<br>• For albumin and K-dependant coagulation factors (II, VII, IX, X), shelf life of 3 years.<br>• It is not recommended to use an auto-defrost freezer.<br>• Once frozen, the bag becomes fragile and has to be handled with carefully. Wrap the bags. |
| Packed red blood cells | Storage at 1-6°C<br>- CPD-A: 21 days<br>- CPD: 21 days<br>- ACD: 21 days | • Beyond 2 weeks, do not administer to cats in a critical state: loss of a part of ATP and of the 2,3DPG of erythrocytes, their membrane becomes rigid and half-life is reduced.<br>• Gently agitate blood bag twice a week in order to maintain sufficient rate in ATP and 2,3DPG.<br>• Vertical or lateral storage of the bags.<br>• Avoid opening and closing freezer too often. |

Additive for double blood collection bags only (with RBC / plasma separation.

| Blood product | Anticoagulant & Storage | Remarks |
|---|---|---|
| Packed red blood cells | Storage at 1-6°C<br>- AS-1 (ADSOL): 42 days<br>- AS-3 (NUTRISOL): 42 days<br>- AS-5 (OPTISOL): 42 days | • For cat blood, 10 ml of additive can be added to one feline unit RBC.<br>• Additive should be added to RBC within 72 hours of collection.<br>• The additive can be added directly to the RBC bag after separation by using the injection port. |

# ADMINISTRATION OF BLOOD PRODUCTS

## Blood transfusion

| Blood product | Indications | Volume and transfusion rate | Frequency |
|---|---|---|---|
| **Whole blood** | Anaemia, deficiency in platelets, coagulation factors, immunodeficiency, hypoproteinemia, haemorrhagic hypovolemic shock, leucopenia | • Volume : Cf formula below<br>• Tranfusion rate: 0,5 ml / Kg / hour over the first 5-15 min. Then 10 ml / Kg / hour. | Every 24 hours |
| **Packed red blood cells** | Anaemia | • Volume : Cf formula below<br>• Tranfusion rate: 0,5 ml / Kg / hour over the first 5-15 min. Then 10 ml / Kg / hour.<br>• Addition of 10 mL of NaCl 0,9% pro 30-40 mL of concentrate in order to improve the flow. | Every 12 to 24 hours |
| **Fresh Plasma**<br><br>**Fresh Frozen Plasma** | coagulopathies, DIVC, hypoproteinemia, Von Willebrand disease, pancreatitis, immunodeficiency, non haemorrhagic hypovolemic shock | 6-12 mL/Kg<br>3-6 mL/min<br>• The quantity must be calculated according to patient desease. | Every 8 to 12 hours |

- Normal range cat PCV : 27 - 45%.
- PRBC PCV : 70%.
- Whole blood PCV : 35%.

$$\text{Volume of donor blood to be transfused (ml)} = \text{Recipient weight (kg)} \times 60 \times \frac{\text{Recipient desired PCV - Current PCV}}{\text{PCV of anticoagulated donor blood}}$$

## Reactions during transfusion and post transfusion reactions

| | Reactions during transfusion | Post transfusion reactions |
|---|---|---|
| Immunological | • Haemolysis;<br>• Type I Hypersensitivity: Shivers & Fever *<br>• Anaphylactoid reactions;<br>• Reactions to white blood cells and platelets;<br>• Bacterial infection;<br>• Citrate intoxication. | • Extravascular hemolysis;<br>• Purpura. |
| Non immunological | • Erythrocyte distortion;<br>• Volume overload;<br>• Embolus;<br>• Hyperammonaemia;<br>• Hypothermia;<br>• Electrolyte disorder. | • Transmission of infectious agents;<br>• Iron Overload. |

* To avoid fever and shivers you can inject to the patient an An antihistamine.