

# Haematology

## BLOOD TYPING (CANINE)

**Species:** Dogs

**Specimen:** Whole blood

**Container:** EDTA (purple top)

**Collection protocol:** As for CBC

**Special handling/shipping requirements:** As for CBC

**General information about the test:** Testing is for DEA 1.1. A universal donor should be DEA 1.1 negative. Dogs have 8 standard blood groups (DEA system: 1.1, 1.2, 3, 4, 5, 6, 7, 8). 1.1, 1.2 and 7 are the most important antigens in transfusion medicine. Universal donors should be negative for all 3 antigens and must definitely be negative for 1.1.

DEA 1.1 antibody causes an acute haemolytic reaction. DEA antibodies to 1.2 and 3 cause a more chronic immune reaction with shortened RBC life span and no systemic signs.

Potential donor dogs should be clinically healthy, and on no medication at time of testing.

**General information about when this test is indicated:** Severe blood loss, haemorrhage

## BLOOD TYPING (FELINE)

**Species:** Cats

**Specimen:** Whole blood

**Container:** EDTA (purple top)

**Collection protocol:** Collect as for CBC

**Special handling/shipping requirements:** As for CBC

**General information about the test:** Cats have three blood types, A, AB and B. Cats have natural antibody against other blood groups. Type B kittens have high levels of anti-A antibodies and acute transfusion reactions can occur when type B kittens are given transfusions. Type B cats should only be given type B RBCs and type A RBCs should never be given to type B cats. RBCs from type B cats can be given to type A or AB cats.

**General information about when this test is indicated:** Severe blood/RBC loss, haemorrhage

## BONE MARROW ASPIRATE

**Species:** All species

**Specimen:** Aspirate of cells from head of femur and humerus, wing of ilium (small animals), and sternum (large and small animals)

**Container:** EDTA tube (purple top) and smears of aspirated cells

**Collection protocol:** Smears should be made as soon as possible due to fragility of the cells. See section on cytology. Make a number of smears so that a variety of smears may have both thin and thicker regions. Thinner regions are needed so the differential can be carried out. Thicker regions are needed to assess the cellularity. They need to be made as soon as possible after aspiration because the cells are fragile and degenerate quickly.

**Special handling/shipping requirements:** See section on cytology

**General information about the disease:** See section on cytology

**General information about when this test is indicated:** Required to diagnose causes of unexplained anaemias, cytopenias, presence of abnormal cells within the peripheral blood e.g. leukemias, and conditions affecting platelets.

When a bone marrow aspirate is sent to a laboratory send an EDTA blood sample for a concurrent CBC even if there are prior haematology results. This is because the best interpretation possible can be made only when both are carried at the same time. The blood picture is very dynamic and may vary from day to day.

*It is also recommended to send a bone marrow biopsy in formalin taken at the same time so the cellularity can be more accurately assessed.*

## CBC

**Species:** All species

**Specimen:** Whole blood

**Container:** EDTA (purple top)

**Collection protocol:** Mix blood and anticoagulant gently and as soon as possible to prevent clotting. Make and air dry a blood smear as soon as possible to prevent artefactual changes occurring in the RBCs and WBCs. Do not refrigerate smears. Keep smears away from flies

**Special handling/shipping requirements:** Keep cool and transport to laboratory as soon as possible

**General information about the test (disease):** Includes haematocrit (HCT), haemoglobin (Hb), red blood cell count (RBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), white blood cell count (WBC), WBC differential, reticulocytes if anaemic, assessment of RBC morphology and any descriptions of any abnormalities, platelet assessment.

**General information about when this test is indicated:** To check clinically normal animals and help with diagnosis in sick animals

*Excludes reticulocyte count in horses because they do not release reticulocytes if anaemia is present.*

## COOMBS TEST

**Species:** Dogs, cats, horses

**Specimen:** Whole blood

**Container:** EDTA (purple top)

**Collection protocol:** Mix blood and anticoagulant gently and as soon as possible to prevent clotting. Make and air dry a blood smear as soon as possible to prevent artefactual changes occurring in the RBCs and WBCs. Do not refrigerate smears. Keep smears away from flies.

**Special handling/shipping requirements:** Keep cool and transport to laboratory as soon as possible

**General information about the disease:** N/A

**General information about when this test is indicated:** Where there is anaemia and haemorrhage is ruled out as a cause of anaemia

## COAGULATION SCREEN

Includes prothrombin time (PT), activated partial thromboplastin time (APTT), Thrombin time (TT) and platelet count

**Species:** All species - dogs and cats most commonly tested. Other species can be tested but accurate reference intervals may not be available, so send a control sample from a normal animal for comparison.

**Specimen:** Whole blood

**Container:** Citrate (blue top)

**Collection protocol:** Collect blood with a minimum of trauma so coagulation cascade is not triggered, preferably from the jugular so a good flow is ensured. Fill the tube to the level indicated on the blood tube.

**Special handling/shipping requirements:** Samples should reach the laboratory within 18 hours of collection, but the sooner the better. They should be kept at or below room temperature.

**General information about the disease:** A coagulation screen will help to differentiate Vitamin K antagonism, inherited coagulopathies, DIC and other rare causes such as severe hepatic disease where there is decreased clotting factor formation.

**General information about when this test is indicated:** Where there is unexplained haemorrhage, access to anticoagulant compounds (e.g. Vit K antagonists), and suspected inherited coagulopathies. Also include an EDTA blood sample for a routine CBC and blood smears as described above.

Reference intervals at Gribbles Veterinary have been developed using citrated blood.

If citrated blood is not available, in some circumstances a PT only may be carried out on an EDTA blood sample. Accurate reference intervals are not available but moderate to marked increases may diagnose Vit K antagonism. The other parameters i.e. APTT and TT cannot be carried out on EDTA.

## DIFFERENTIAL (BLOOD SMEAR)

**Species:** All species

**Specimen:** Glass slide with film made from EDTA blood (purple top) or from fresh blood immediately after collection

**Container:** Send in a plastic slide holder, to protect from breaking while in transit.

**Collection protocol:** Preferably make smears as soon as blood is taken, but as soon as is practicable. Degeneration of leukocytes may be seen within 15-20 minutes of blood collection.

**Special handling/shipping requirements:** Air dry as quickly as possible. Do not refrigerate.

**Comparison with other related tests:** Some of these preparation criteria apply to general cytology smears.

## FACTOR VIII (HAEMOPHILIA A)

**Species:** Dogs

**Specimen:** Whole blood

**Container:** Citrate (blue top)

**Collection protocol:** Collect blood with a minimum of trauma so coagulation cascade is not triggered, preferably from the jugular so a good flow is ensured. Fill the tube to the level indicated on the blood tube.

**Special handling/shipping requirements:** Deliver to laboratory as soon as possible because it has to be spun and frozen as soon as possible.

**General information about the disease:** Suspected in young dogs with history of haemorrhage and in which other causes have been ruled out.

**General information about when this test is indicated:** Where there is unexplained haemorrhage in young dogs and where other causes have been ruled out. The sample is subcontracted to an external laboratory for testing.

**Related tests:** Genetic testing is available via [www.orivet.com.au](http://www.orivet.com.au). Contact Orivet directly if you wish to carry out this testing.

## NEONATAL ISOERYTHROLYSIS (NI) IN FOALS

**Species:** Equine

**Specimen:** Whole blood

**Container:** EDTA (purple top)

**Collection protocol:** As for CBC

**Special handling/shipping requirements:** As for CBC

**General information about the disease:** This is a haemolytic disease of newborn foals that have suckled and ingested colostral antibodies. There are two antibodies that are most immunogenic, namely Aa and Qa. Mares that are negative for either Aa and Qa, or both Aa and Qa, are most at risk for causing this disease within their newborn foal, if these foals are positive.

**General information about when this test is indicated:** It is required when there is a difference of blood group between the dam and foal. It is most commonly seen where mares have been sensitised by a previous pregnancy. Prediction of this disease requires an EDTA sample and serum sample from the mare and an EDTA sample from the foal for an indirect coombs test. Colostrum from the mare may also be used before the foal suckles.

## RBC PARASITES/ ORGANISMS

**Species:** All species

**Specimen:** Whole blood

**Container:** EDTA (purple top)

**Collection protocol:** Mix blood and anticoagulant gently and as soon as possible to prevent clotting. Make and air dry a blood smear as soon as possible to prevent artefactual changes occurring in the RBCs and WBCs. Do not refrigerate smears. Keep smears away from flies.

**Special handling/shipping requirements:** Make a smear as soon as possible after collection of blood as some blood parasites/organisms may fall off the RBCs.

**General information about when this test is indicated:** When anaemia is detected or suspected.

**Organisms present in New Zealand:**

- Cats - *Mycoplasma haemofelis* (formerly *Haemobartonella felis*), *Candidatus Mycoplasma haemominutum*, *Candidatus Mycoplasma turicensis*.
- Cattle - *Theileria orientalis* – Ikeda, Chitose, Buffeli, *Mycoplasma wenyonii*, (formerly *Eperythrozoon wenyonii*), *Candidatus Mycoplasma haemobos*
- Sheep - *Mycoplasma ovis* (formerly *Eperythrozoon ovis*)
- Alpacas - *Candidatus Mycoplasma haemolamae*
- Dogs - *Mycoplasma haemocanis* has been reported but presence was not confirmed by PCR

**Comparison with other related tests:** See PCR section for specific tests. A PCR test is available for feline haemotropic mycoplasma confirmation if required. This requires a fresh EDTA blood sample or a sample that

has not already been used for testing via an analyser, due to the very small chance that there may be transfer of organisms from a prior infected sample.

## **VITAMIN K ANTAGONISM** – warfarin, brodifacoum toxicity

**Species:** Dogs and cats most commonly tested.

**Specimen:** Whole blood

**Container:** Citrate (blue top)

**Collection protocol:** Collect blood with a minimum of trauma so coagulation cascade is not triggered, preferably from the jugular so a good flow is ensured. Fill the tube to the level indicated on the blood tube.

**Special handling/shipping requirements:** Keep cool and send to laboratory as soon as possible

**General information about the disease:** A full coagulation screen will help to rule out some causes of haemorrhage. PT is increased first but both PT and APTT may be increased TT is normal. Platelets may be mildly to moderately decreased as a result of consumption/ haemorrhage. It may take up to 48-72 hours for clotting times to be increased.

Measure PT 2-3 days after stopping Vit K therapy to ensure it is safe to stop treatment. If anticoagulant is still within the body times will still be increased. Warfarin may cause haemorrhage for up to one week. Brodifacoums may cause haemorrhage for at least 2 weeks.

**General information about when this test is indicated:** Where there is suspected ingestion of rat baits containing these compounds. Where there is unexplained haemorrhage.

**Comparison with other related tests:** Liver, urine and EDTA blood may also be screened at a referral laboratory for the presence of the toxic compounds.

## **VON WILLEBRAND'S DISEASE**

**Species:** Dogs only

**Specimen:** Whole blood

**Container:** Citrate (blue top)

**Collection protocol:** Collect blood with a minimum of trauma so coagulation cascade is not triggered, preferably from the jugular so a good flow is ensured. Fill the tube to the level indicated on the blood tube.

**Special handling/shipping requirements:** Deliver to laboratory as soon as possible because it has to be spun and frozen as soon as possible.

**General information about the disease:** This is the most common inherited disorder of haemostasis. It is a defect of primary haemostasis and has a high prevalence in some breeds but may be found in other breeds. Von Willebrand's factor is produced in endothelial cells and is used in the formation of the platelet plug and aids in the incorporation of fibrin into the platelet plug. There are 3 types namely types I, II and III with type I being the most common.

**General information about when this test is indicated:** Where there is unexplained haemorrhage in young dogs and where other causes have been ruled out.

**Related tests:** Genetic tests for carriers of VWD are available via [www.orivet.com.au](http://www.orivet.com.au). Contact Orivet directly if you wish to carry out genetic testing.