CYTOLOGY

GENERAL GUIDELINES

Cytology is the examination of cells collected from body fluids, fine needle aspiration (FNA), or impression smears from solid tissue lesions. It is a relatively non-invasive technique with the added advantage of requiring no or minimal sedation in the majority of patients. The turnaround time is more rapid than that for histopathology, with results generally available within one working day. With good sample quality (i.e., adequate numbers of intact cells that are well spread out), clinical description and history, cytology can provide a definitive diagnosis or give useful information with regard to further testing modalities, or treatment options.

Sites and tissues well suited to cytological examination include:

- Cutaneous and subcutaneous masses - Masses of spindle cell origin (i.e., sarcomas) are generally less exfoliative than round cell or epithelial masses and architecture is required to differentiate subtypes
- Nasal exudates and masses
- Bronchial and tracheal washes
- External ear canal
- Lymph nodes
- Synovial fluid
- Pleural and peritoneal fluids
- CSF taps - Being mindful that if the lesion is caudal to the cisterna magna, then a lumbosacral puncture is recommended. Cells are very fragile, and special handling is recommended (see below)
- Prostatic aspirates/washes
- Vaginal smears
- Blood smears
- Bone marrow
- Liver - Diffuse processes (e.g., infiltrative tumours, fatty changes) have a higher diagnostic yield than solitary masses (these may even be difficult to diagnose on histology)
- Intra-abdominal / thoracic masses - Ultrasound guided generally gives better result
- Urine / masses in the urinary bladder
- Spleen - Non-aspiration technique may be best

Sites less well suited to cytological examination, requiring greater attention to sample collection technique, or absolutely requiring biopsy for diagnosis of malignant potential:

- Kidney - Blood filled organ, unless a diffuse process is present (e.g., lymphoma), these samples are often non-diagnostic
- Mammary gland – specifically in canine, histology is preferable. Cytology can confirm a mass of mammary epithelial origin (rather than lipoma or mast cell tumour, for example). However, histopathology is required to confirm malignancy in dogs (because invasion cannot be assessed by cytology). In cats, cytology can be helpful as the majority of feline mammary neoplasms are malignant
- Lung - Often unrewarding because it is a blood filled organ, although FNA of distinct mass lesions may be diagnostic.
- Skin tumours on nose / ear tips (e.g., squamous cell carcinoma) - FNA if possible, or deep scrapings as impression smears often reflect only surface inflammation and dysplastic epithelium
- Oral masses - FNA preferred as impression smears often reflect only surface inflammation and dysplastic epithelium
- Conjunctival scrapes - If not deep enough or not enough material on slide, these samples can be non-diagnostic. Using a moistened cotton bud on the lesion and gently rolled onto the slide can work very well.
- Rectal mucosal scrapes
- Firm fibrous masses - Architecture is often an absolute requirement for determining whether these are scar tissue, the edge of a cyst, granulation tissue, or a neoplasm. If the latter, which specific subtype of mesenchymal neoplasm. Therefore, incisional / excisional biopsy will often be required. If that is not

possible, then multiple needle passes or aspiration technique may assist cell exfoliation.

- Cystic/fluid filled skin lesions - May be cell-poor and therefore not have enough cells to permit a diagnosis. Aiming for the wall of the cyst in addition to the centre may help. However, incisional or excisional biopsy is generally required because architecture is the key to understanding many of these cystic processes.

Things to avoid:

- Exposure of cytological material to formalin – including close exposure in the operating theatre, or being packaged in the same bag as the formalin-filled pottle. Formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic. Wrap cytology smears separately from histology containers and place in different plastic bags.
- Sufficiently dried smears should be placed in clean, dry slide holders - **Do not use flame or heat fixation** – rapid air drying (ideally with a fan, or vigorous arm flapping) is sufficient
- **Do not refrigerate smears at any time -** The cells will lyse when condensation forms on the slide after removal from the fridge
- Fluids however, should be refrigerated (never frozen) if there is a delay in dispatch. Make a smear of fluids prior to refrigeration.
- Urine should be refrigerated (never frozen) if there is a delay in dispatch.
- CSF should be processed within 4 hours of collection. If this is not possible, then adding autologous serum will help preserve cellular integrity (EDTA alone does not do this). For example, if there is approximately 90uL of CSF, then add 10uL of serum (2-3 drops; see below).

CYTOLOGY – SAMPLES AND COLLECTION

Fine Needle Aspirates (FNA)

This technique is non-invasive, generally non-painful, quick, and simple. In contrast to histopathology, results are usually available within one working day. FNA is suitable for any surface mass, lymph node or mass in a body cavity that can be palpated and immobilised.

EQUIPMENT REQUIRED

- 5 mL or 10-12 mL syringes, 21-23 gauge 0.5-1.5 inch needles. Avoid larger needles as they result in greater blood contamination and “core biopsies” (too thick for cytological examination). Avoid smaller needles as cell lysis may occur.
- Clean glass slides and slide holders for transporting slides
- Pencil for labelling slides in frosted region (permanent marker is removed by the staining process)
- EDTA (lavender top) and plain (red/lemon top) tubes if fluid is obtained. If there is sufficient fluid, it is always useful to collect samples into both types of tubes. The EDTA sample for cytological examination and the serum/plain tube for culture or other specialized tests (if indicated).

COLLECTION TECHNIQUE

- Clipping / shaving of the area is usually unnecessary, but the site should be wiped free of dust and debris
- Localise the mass firmly and stabilise with one hand while sampling with the other using one of the techniques described below.

ASPIRATION TECHNIQUE - preferred for firm or poorly exfoliating lesions (e.g. mesenchymal neoplasms).

- Insert the needle attached to the syringe into the mass. Generally, aspirate from the centre of small masses, but aspirate large masses from periphery, as centre may be cystic or necrotic.
- Apply gentle negative pressure (1/2 - 3/4 volume of syringe)
- Without completely exiting the mass, retract and redirect the needle 3 times with each aspiration attempt (gently releasing suction in between aspiration attempts as the needle is retracted and replaced).
- In most cases, fluid will not be visible within the syringe. The cells are in the needle and hub
- Stop aspiration if any fluid / blood is noted in the syringe (if aspirating a solid mass)
- Release the vacuum before withdrawing out of the body / mass
- Once out of the mass, detach the needle from the syringe

- Draw air into the syringe and reattach the needle
- Gently expel the contents of the needle close to the frosted end of a clean glass slide. If the material is quite liquid, make a smear the same way as for a blood film. Make several smears if possible.
- If the material is thick, make a squash preparation by gently placing a clean slide on top of the material at right angles or parallel to the other slide.
- Use just enough pressure to smear the material out (often the weight of the slide is enough). Too much pressure will cause cellular disruption
- Pull the second slide along ***gently*** until the two slides separate, without lifting the slides directly apart.
- Dry material rapidly with a fan, hair dryer on 'cool' setting, or by flapping slides vigorously

NON-ASPIRATION TECHNIQUE – preferred for lymph nodes (neoplastic lymphocytes are quite fragile) or tissues that are more likely to bleed (e.g. thyroid, spleen, etc.). Also may be easier for smaller skin masses, if they exfoliate well.

- Insert the needle into the mass/organ (no syringe attached)
- After redirecting the needle multiple times, withdraw the needle
- Draw air into the syringe and attach to the needle
- Gently expel the contents of the needle close to the frosted end of a clean glass slide.
- Gently place a clean slide on top of the material at right angles or parallel to the other slide.
- Use just enough pressure to smear the material out (often the weight of the slide is enough). Too much pressure will cause cellular disruption.
- Pull the second slide along ***gently*** until the two slides separate, without lifting the slides directly apart.
- Dry material rapidly with a fan, hair dryer on 'cool' setting, or by flapping slides vigorously

NOTES:

- When handling material from aspiration of the lymph nodes and bone marrow, apply as little pressure as possible to spread the aspirated material. Cells are fragile and rupture easily.
- If a bone marrow aspirate is planned, please speak with a Clinical Pathologist prior to sampling for additional advice and information
- When submitting to the laboratory, it is not necessary to fix the smears. It is always a good idea to stain at least one of the smears, and examine to see if there is sufficient intact material on the preparation. Please also submit this smear.
- Prepare a few smears (e.g., 3-4) rather than just one – this allows for examination of more material, and enhances the diagnostic success rate.
- Label smears (with pencil) on frosted end of the slide, on the correct side of the smear, to prevent it from being wiped off in error. (Permanent markers come off in the alcohol used for fixing).
- Send the slides to the lab in slide containers, which are then packaged in bubble wrap to prevent breakage.

Impression smears

These are made when there is a solid piece of tissue available, e.g., biopsy specimen, solid core from a nasal flush etc.

- Use a saline moistened swab (sterile saline, not water, as water causes osmotic rupture of cells) to remove superficial debris. If the tissue is bloody, blot with clean paper towel to remove blood first
- Gently touch the surface to a clean slide several times so that there are up to five imprints per slide.
- Dry the slide rapidly by air drying or use a hair dryer on the 'cool' setting. This technique can be used for surface lesions but it is not as useful as a FNA for these as the imprint will most often contain just superficial inflammatory cells and the true lesion may not exfoliate.
- NB: If a culture is desired, transport medium can be used to protect swab contents, but once the swab has contacted transport medium that swab cannot be used to make cytology slides.

Scrapings

Some tissues or masses do not exfoliate well on impression smears made from incisional biopsies due to their firm consistency e.g., spindle cell tumours, squamous cell carcinomas, and bone lesions. In cases where impression smears do not result in material on a slide, the scraping technique can provide a diagnostic sample. The cut surface of the tissue is gently scraped with a scalpel blade and the accumulated material is transferred onto a slide and then spread as a squash preparation (see Fine Needle Aspiration section). Dry as above.

Swab Smears

Used for vaginal smears, fistulous tracts, ears, etc. Moisten swab with sterile saline (not water). Transfer cells by gently rolling swab along surface of slide.

NB: If a culture is desired, transport medium can be used to protect swab contents, but once the swab has contacted transport medium that swab cannot be used to make cytology slides.

Body Fluids

Cytological examination of body fluids can provide useful information if an organ within the body cavity is diseased. It also helps determine the cause for any increased volume of cavity fluid e.g., ascites. The body fluids most commonly evaluated are pleural, peritoneal, cerebrospinal, and synovial. Collection techniques are described in clinical pathology or some internal medicine textbooks.

For all fluids, it is important to:

- Collect most of the fluid into EDTA tubes (lavender top) for cytology, as this prevents clotting and preserves cells to some degree.
- Aseptically place a few drops into a serum tube (red/lemon top) for culture (EDTA inhibits microbial growth), or use a blood culture bottle.
- Always make a few smears from the fluid immediately after collection. Cells are never as well preserved as when they are first collected.

CSF Collection

For collection techniques, please refer to any recently published anaesthesia or internal medicine textbook.

In small animals, this is generally collected from the cisterna magna, and from the lumbar area in large animals. If a lesion is suspected between the cisterna magna and the lumbar area, then a lumbar puncture is recommended, even in small animals (recognising that this can be difficult to achieve).

CSF Sample Handling

CSF should drip gently from the needle to be collected in a sterile red top vacutainer. If a trail of blood appears, discard the first few drops of CSF to collect as clear a sample as possible. If there is sufficient CSF (>0.75 mL), the sample should be aliquoted into 2 red top tubes, one of which will be used for microbiological examination. Alternately, one aliquot can be transferred to a blood culture bottle, which is available from Gribbles Veterinary.

If the sample cannot be delivered to the laboratory within 30 - 60 minutes, then autologous serum should be added to one of the tubes to preserve cells because they degenerate rapidly due to the low protein content of CSF. EDTA alone is not an adequate preservative.

Procedure for adding protein to CSF (example calculation):

- The solution should be in a 9 parts CSF to 1 part serum ratio. For example, if you have 1 mL (or 1000 µL) CSF:

Calculation: $\frac{90 \times 1000\ \mu L}{100}$ = Amount of CSF

Calculation: $\frac{10 \times 1000\ \mu L}{100}$ = Amount of serum (adjust according volume you have)

- Mix by very gently inverting 5 to 10 times.

Store all CSF tubes at 4°C and ship (protected by paper towel) on ice. If there will be a very prolonged delay in shipment, make a smear as well. Air dry smears very rapidly using a small fan, hair dryer on "cool" setting, or by flapping vigorously.

Pleural, Peritoneal, Pericardial Fluid Sample Handling

Generally, collecting samples into both an EDTA and a red top (or lemon top) tube is sufficient. Making 1-2 direct preparations of fluid (as you would make a blood film) and air drying rapidly will help the clinical pathologist determine things like sampling-associated haemorrhage versus pre-existing haemothorax or haemoabdomen.

Synovial Fluid Collection

Cytological and microbiological examination of synovial fluid is extremely helpful in differentiating septic, immune-mediated, and degenerative joint diseases. As well as in cases of lameness, collecting joint fluid is also useful in cases of pyrexia of unknown origin and in suspected immune-mediated diseases, even in the absence of lameness.

Strict aseptic technique is needed and the necessity for sedation or anaesthesia is dependent on the animal and the joint involved. The carpi and hock joints are commonly affected in immune-mediated diseases.

When collecting synovial fluid, the order of priorities for handling the specimen is:

- Make 1-2 smears (as you would a blood smear) and **air dry rapidly**
- With remaining fluid, place 3-4 drops into blood culture medium or red top (or lemon top) tube for possible future microbiological culture. There may be a 50% decrease in the culture rate if the sample is received in a red top container compared with blood culture bottles.
- Blood culture bottles can be ordered from Gribbles Veterinary via our consumables order form.
- If any fluid still remains, place it into EDTA for cell counts and assessment by the clinical pathologist

Nasal Cavity Sampling

It may be difficult to get a diagnostic sample from a suspect lesion in the nasal cavity. Nasal swabs often do not yield satisfactory material as they cannot be inserted far enough or are not abrasive enough to yield representative samples of deep mucosal lesions. A diagnosis may occasionally be obtained if a causative agent such as Cryptococcus is present. Flush and direct aspiration can be used to obtain diagnostic material from deeper lesions.

NB: If a culture is desired, transport medium can be used to protect swab contents, but once the swab has contacted transport medium that swab cannot be used to make cytology slides.

Bone Marrow Examination

Examination of bone marrow is an adjunct to haematology and is indicated in a number of different circumstances. These include:

- Pancytopenia (anaemia + neutropenia + thrombocytopenia)
- Persistent, unexplained, non-regenerative anaemia
- Persistent, unexplained neutropenia with no left shift
- Persistent, unexplained thrombocytopenia (rule out DIC first, can perform even with platelets as low as 10 $x10^9$/L, tends not to cause problems so long as secondary haemostasis is adequate)
- Leukocytosis, especially if there are atypical cells in the blood
- Atypical cells or immature cells
- Hyperproteinaemia due to a monoclonal gammopathy (or polyclonal if ehrlichiosis is a possibility due to travel history of the animal, but assess lymph nodes first)
- Hypercalcaemia with no other identifiable cause
- Pyrexia of unknown origin
- Clinical staging of neoplasia
- Evaluation of iron stores (not in horses, cats, neonatal animals)

Bone Marrow Aspiration – Dogs, Cats, Horses, Cattle

As with all of these techniques, a good, current internal medicine textbook will have all the information you require for obtaining bone marrow cores and aspirates, but following are a few extra points and tips. A concurrent CBC is required for a proper assessment of bone marrow. Bone marrow core biopsies and cytology very much complement one another. Individual cell morphology is largely a mystery on histology, so that is why cytology is required.

- Consider adding sodium bicarbonate to the lidocaine (immediately prior to injection) to minimize pain (e.g., 0.9 mL lidocaine and 0.1 mL sodium bicarbonate. Do not increase sodium bicarbonate beyond 10% as this will cause precipitation of lidocaine, mix immediately prior to use).
- "Rinsing" the syringe(s) to be used for aspiration with sterile EDTA can help prevent clotting (take up some sterile EDTA and expel it, enough will remain in the syringe).
- Syringe contents can be expelled onto a petri dish held at an angle to drain off excess blood. Individual particles can be suctioned up using a pipette, transferred to a glass slide, from which pull apart smears can be made. Otherwise, excess blood can be allowed to drain down a glass slide and then a squash preparation can be made. Finally, a regular "blood film making" technique can be used to make both feather edge and "stop edge" preparations. The latter involves stopping the pushing slide so a line of material results. This concentrates cells of interest and minimises breakage that can occur with the feather-edge preparation technique.
- Dry slides rapidly with a small fan, a hairdryer set on "cool", or by flapping vigorously.
- It is good to stain one slide in house and examine microscopically to ensure adequate cellularity.
- Please remember to package the bone marrow core in formalin separately from cytology slides – formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

BONE MARROW ASPIRATES

Species: Any

Specimen: Bone marrow, Peripheral blood (for concurrent CBC)

Container: EDTA bone marrow, direct smears of bone marrow, EDTA blood

Collection protocol: Collect using standard techniques with appropriate sedation/anaesthesia/analgesia. The iliac crest and humeral head are preferred sites for dogs; iliac crest and proximal femur for large cats; proximal femur for smaller cats and neonates; and a sternal vertebra in horses and ruminants. It is always recommended to obtain a needle aspiration and core biopsy when sampling. Make a few direct smears of the aspirated material and place the remainder in an EDTA tube. Bone marrow aspirates/biopsies must be interpreted along with a concurrent CBC so make sure to send in EDTA blood as well. The CBC is included in the bone marrow cytology fee. Also, a thorough clinical history is essential.

Special handling/shipping requirements: Do not ship with formalin (or wrap and bag separately) as the formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

General information about the disease: See general cytology section

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 unusual 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.

Comparison with other related tests: When sampling bone marrow, it is recommended to obtain both an aspirate for cytology as well as a biopsy for histopathology.

FLUID-FILLED MASS ASPIRATES

Species: Any

Specimen: Aspirated material, fluid in ETDA (for cytology) and plain tube/pottle (in case culture is required)

Container: Glass slides, slide container, EDTA (for cytology only as EDTA is bacteriostatic), red or lemon top tube /pottle (culture)

Collection protocol: See “Cytology – solid mass aspirates”. Try to aspirate both solid areas and fluid-filled areas of the mass. With any fluid, always send a direct smear with the remainder of the fluid in EDTA (for cytology) and red or lemon top tube /pottle (for culture, if required)

Special handling/shipping requirements: Do not ship with formalin (or wrap and bag separately) as the formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

General information about the disease: N/A

General information about when this test is indicated: N/A

Comparison with other related tests: N/A

FLUIDS

Species: Any

Specimen: Effusions, joint fluid, washes, CSF

Container: EDTA (for cytology only as is bacteriostatic), red or lemon top tube /pottle for culture, direct smears

Collection protocol: Collect fluid using sterile techniques with appropriate sedation/pain management. It is always advisable to make direct smears of the fluid at the time of sampling and to dry them rapidly with a fan or flapping motion. The remainder of the fluid should be submitted in an EDTA tube (cytology) as well as a red or lemon top tube or pottle (should culture be required). EDTA assists in preservation of cells for cytology but is bacteriostatic so not ideal for culture. CSF samples must be sent to the lab as soon as possible, preferably protected and on ice.

Special handling/shipping requirements: Do not ship with formalin (or wrap and bag separately) as the formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

General information about the disease: N/A

General information about when this test is indicated: N/A

Comparison with other related tests: N/A

Refer to samples types and collection for more information.

LYMPH NODE ASPIRATES

Species: Any

Specimen: Aspirated material

Container: Glass slides, slide container

Collection protocol: 21-22 gauge needle alone ("woodpecker" or non-aspiration technique). A smaller gauge needle may lyse the cells (neoplastic lymphocytes are quite fragile) and a large needle may result in too much blood contamination. Expel the aspirated contents onto the top 1/3 of a clean glass slide. Then take another slide, gently place it on top. Do not apply pressure, but use only the weight of the slide to spread out the material. Gently pull the slides along each other lengthwise until they separate. This will result in two slides with a nice monolayer of cells. Aspirate multiple lymph nodes. Submandibular lymph nodes tend to be more reactive (as they are draining the oral cavity) so it is not recommended to aspirate only these nodes unless, of course, they are the only nodes that are enlarged.

Special handling/shipping requirements: Do not ship with formalin (or wrap and bag separately) as the formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

General information about the disease: N/A

General information about when this test is indicated: N/A

Comparison with other related tests: Immunocytochemistry can be performed on submitted cytology slides if they are of good quality (monolayer, not too many lysed cells, etc.).

NASAL EXUDATES AND MASSES

Species: Any

Specimen: Nasal discharge, aspirated material

Container: Glass slides, slide container, swab for culture

Collection protocol: Place the nasal discharge on a glass slide. Then take another slide, gently place it on top. Applying a small amount of downward pressure to spread out the mucoid material, pull the slides along each other lengthwise until they separate. This will result in two slides with a nice monolayer of cells. If there is a nasal mass, fine needle aspiration is recommended (see "solid mass aspirates").

Special handling/shipping requirements: Do not ship with formalin (or wrap and bag separately) as the formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

General information about the disease: N/A

General information about when this test is indicated: Cytology from nasal exudates often reveals septic purulent inflammation which is consistent with rhinitis but could be secondary to an underlying disease (fungal infection, foreign body, viral infection, tumour, etc.). Deep swabs from the nasal cavity, especially if any white plaques are observed, can reveal fungal hyphae (e.g., *Aspergillus* sp.).

Comparison with other related tests: Chronic nasal discharge/epistaxis cases can be a bit of a diagnostic challenge. A definitive diagnosis may require a combination of imaging, cytology, rhinoscopy, histopathology, and culture.

SOLID MASS ASPIRATES

Species: Any

Specimen: Aspirated material

Container: Glass slides, slide container

Collection protocol: 21-22 gauge needle alone ("woodpecker" or non-aspiration technique) or with a 3-6cc syringe attached for aspiration. A smaller gauge needle may lyse the cells and a large needle may result in too much blood contamination. Round cell tumours and epithelial tumours typically exfoliate readily whereas mesenchymal tumours (e.g., sarcoma) do not. If the mass feels firm and deeply adhered to underlying tissue, then use a syringe for aspiration. Expel the aspirated contents onto the top 1/3 of a clean glass slide. Then take another slide, gently place it on top. Do not apply pressure, but use only the weight of the slide to spread out the material. Gently pull the slides along each other lengthwise until they separate. This will result in two slides with a nice monolayer of cells.

Special handling/shipping requirements: Do not ship with formalin (or wrap and bag separately) as the formalin fumes prevent cellular uptake of differential stains rendering the slides non-diagnostic.

General information about the disease: N/A

General information about when this test is indicated: N/A

Comparison with other related tests: N/A

IMMUNOCYTOCHEMISTRY

CD3

Species: Dog

Specimen: Smears (unstained or stained with Wright's stain – Diff Quik renders smears unsuitable). Submit multiple (e.g. 3-5) smears so that the best can be selected for testing, since smear thickness, cellularity and cell preservation are important in their final interpretation.

Container: Slide holder.

Collection protocol: As per normal cytology sample collection methods.

Special handling/shipping requirements: As apply generally to shipping of cytology smears.

General information about the disease: Not applicable.

General information about when this test is indicated: CD3 is part of the T-cell receptor, the critical part of T-cells responsible for recognising antigens presented by other cells. Therefore, this antibody recognises lymphocytes of T-cell lineage (including CD4+ and CD8+ cells). It may also label Natural Killer cells, and cerebellar Purkinje cells.

This antibody is used to confirm and characterise diagnoses of T-cell lymphoma or leukaemia, and to help rule out lymphoma or leukaemia in cases of poorly differentiated "round cell" tumours. It is typically used in conjunction with a B-cell antibody (CD20).

This is helpful because the prognosis and treatment for different forms of lymphoma varies according to their classification. There are low-grade T- and B-cell lymphomas that may have a fair to good prognosis, medium-grade B-cell lymphomas that are often chemoresponsive, and high-grade T-cell lymphomas that may be poorly chemoresponsive and may have a poor prognosis.

CD20

Species: Dog

Specimen: Smears (unstained or stained with Wright's stain – Diff Quik renders smears unsuitable). Submit multiple (e.g. 3-5) smears so that the best can be selected for testing, since smear thickness, cellularity and cell preservation are important in their final interpretation.

Container: Slide holder.

Collection protocol: As per normal cytology sample collection methods.

Special handling/shipping requirements: As apply generally to shipping of cytology smears.

General information about when this test is indicated: CD20 is a transmembrane protein found on B-lymphocytes, which plays a role in their differentiation into plasma cells.

This antibody is used to confirm and characterise diagnoses of B-cell lymphoma or leukaemia, and to help rule out lymphoma in cases of poorly differentiated "round cell" tumours. It is typically used in conjunction with the T-cell antibody CD3.

This is helpful because the prognosis and treatment for different forms of lymphoma varies according to their classification. There are low-grade T- and B-cell lymphomas that may have a fair to good prognosis, medium-grade B-cell lymphomas that are often chemoresponsive, and high-grade T-cell lymphomas that may be poorly chemoresponsive and may have a poor prognosis.