

# Newsletter

## Help Avoid Anesthetic Complications

Run A Complete Blood Count On Every Preanesthetic Patient



Thanks to increased client awareness and compliance, preanesthetic testing is not only practical and accepted, it is also expected. The results benefit everyone as they decrease client anxiety, improve anesthetic safety, establish baseline data and increase a practice's financial health.

Most practices offer or require a chemistry panel with electrolytes for a preanesthetic screen, but rather than run a complete blood count (CBC), they perform only a packed cell volume (PCV) for a hematology profile. A PCV can help determine if a patient is anemic, but it cannot provide information on whether or not platelets are adequate for surgery or if inflammation or a glucocorticoid influence ("stress") is present. To maximize preanesthetic screening value, a CBC must include an accurate platelet count, a five-part white blood cell differential and an absolute reticulocyte count.

A CBC provides a broad overview of the general health status of a patient and should be performed on all patients undergoing preanesthetic screening since it may detect subclinical or early developing disease that might put the patient at risk during anesthesia.

Evaluation for potential red blood cell, white blood cell and platelet abnormalities should be performed prior to anesthesia for several important reasons.

- Anemic patients are more prone to tissue hypoxia, which increases

the likelihood of anesthetic complications. If anemia is present, an absolute reticulocyte count is needed to appropriately classify the anemia as either regenerative or nonregenerative; this is the first step in characterizing the anemia and eventually identifying the underlying disease process responsible for the anemia.

- Absolute reticulocyte counts are important even in nonanemic patients. Significant reticulocytosis without anemia may indicate important underlying disease, including hypoxia, compensated hemolysis or occult blood loss and other conditions that stimulate bone marrow release of these erythrocyte precursors.

- Polycythemia most commonly results from dehydration. Dehydration may cause hypotension and result in complications, especially when coupled with blood loss and the vasodilatory effects of many anesthetic agents.

- Leukocytosis may be associated with inflammation or a stress response and may intensify following routine dental or surgical procedures. The five-part white blood cell differential is essential to accurately

characterize these responses and to help identify underlying disease.

- Leukopenic and neutropenic patients may potentially indicate serious underlying disease or immunodeficiency and have complications in the postanesthetic period. Again, having a five-part differential is essential to further characterize white blood cell response to disease.
- Thrombocytopenia is the most common bleeding disorder in veterinary medicine, and platelets must be evaluated in every preanesthetic profile because the consequences can be life threatening in surgical or dental procedures.

Preanesthetic testing should be performed immediately prior to anesthesia on a fasted patient to properly evaluate a patient's status and adjust anesthetic agents or protocols.

- Client compliance increases when preanesthetic testing occurs in-house, which maximizes client convenience and ensures the patient has been fasted for the best possible results.
- Because red blood cell, white blood cell and platelet abnormalities can occur rapidly in response to a variety of disease processes, such as infectious, inflammatory and metabolic disease, it is essential



to perform blood work the same day as the anesthetic event. In addition, many of the hematologic abnormalities can be detected before clinical signs of disease appear, and by including the CBC in the preanesthetic evaluation of a patient, there is improved sensitivity in detecting potential anesthetic complications.

- Delayed sample processing by as little as 24–48 hours can result in artifactual changes in the CBC. For example, mean cell volume (MCV) and hematocrit (HCT) may increase with prolonged exposure to anticoagulant. Additionally, when sample collection is difficult, platelet clumping commonly occurs and exaggerated clumping may be seen if hematologic analysis is delayed, resulting in inaccurate platelet counts.

Studies have shown that a PCV is not adequate when it comes to

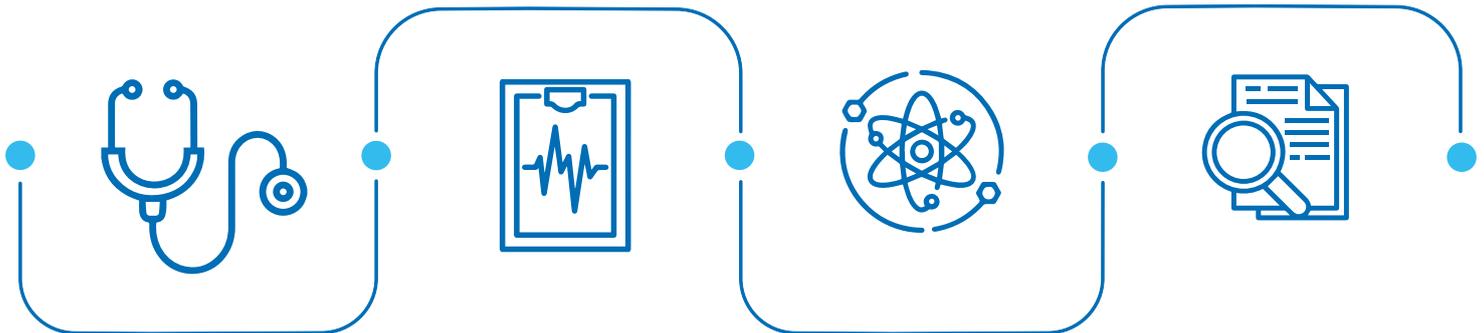
evaluating a patient’s health prior to anesthesia. Over a five year period, results were evaluated from 963,595 patients (mostly young cats and dogs undergoing elective surgical procedures) that were screened with a CBC, serum chemistry analysis and urinalysis.

The results regarding hematologic abnormalities included the following:

- Cats were six times more likely to have a platelet count of less than  $50 \times 10^3/\mu\text{L}$  or a white blood cell count of more than  $25,000/\mu\text{L}$  than a PCV of less than 25%.
- Dogs were four times more likely to have a platelet count of less than  $100 \times 10^3/\mu\text{L}$  or a white blood cell count of more than  $20,000/\mu\text{L}$  than a PCV of less than 35%.

Basic checklist when considering anesthesia:

## EVALUATION CHECKLIST



### Physical examination

**Findings are critical to outcome.**

Thoroughly evaluate:

- Cardiovascular system
- Respiratory tract
- Hepatic function (Blood Work)
- Renal function (Blood Work)
- Central nervous system

### Medical History

**Note any:**

- Injuries
- Diseases
- Post anaesthetic complications
- Concurrent medications

### Signalment Lab data

**Consider:**

- Species
- Breed Full
- Age
- Sex

### Evaluation

**Evaluate:**

- CBC
- Chemistry Panel

## Here is a preanesthetic blood work evaluation:

<b>Hct, Hgb, RBC count</b>	<ul style="list-style-type: none"> <li>• If Hct &lt; 25% and/or Hgb &lt; 10 g/dl, postpone or transfuse before surgery</li> <li>• If Hct &gt; 40% (cat) or &gt; 45% (dog),* see prerenal azotemia protocol.</li> <li>• If other abnormalities, use appropriate protocol. Give diphenhydramine at 1 mg/lb intramuscularly (maximum dose 50 mg) 30 minutes before transfusion and do not use acepromazine premedication.</li> <li>• Look for underlying cause.</li> </ul>
<b>Platelets, clotting problems</b>	<ul style="list-style-type: none"> <li>• Platelet count &lt; 125, 000/<math>\mu</math>l, von Willebrand's disease or other clotting disorder: Postpone or transfuse (use fresh frozen plasma or fresh whole blood before surgery).</li> <li>• Confirm platelet abnormality/clotting problem by reviewing blood smear, checking BMBT and ACT.</li> </ul>
<b>ALT/Bilirubin/ALP</b>	<ul style="list-style-type: none"> <li>• If elevated, evaluate for liver disease. If total bilirubin &lt;2.0 mg/dl, check bile acids and evaluate electrolytes. Consider radiographs and ultrasound.</li> <li>• If electrolytes abnormal, treat as cardiac case.</li> <li>• If liver disease present, avoid using acepromazine and proceed to liver protocol.</li> </ul>
<b>WBC Count</b>	<ul style="list-style-type: none"> <li>• WBC &lt; 4,000/<math>\mu</math>l or &gt; 15,000/<math>\mu</math>l: Review blood smear.</li> <li>• If neutrophilia with left shift, postpone surgery and make diagnosis. Otherwise, see abdominal protocol</li> </ul>
<b>MCV, MCH, MCHC**</b>	<ul style="list-style-type: none"> <li>• If values are abnormal, check Pet with pulse oximetry.</li> <li>• If oxygenation low, check liver function.</li> <li>• If MCV low, check bile acids.</li> <li>• Postpone surgery if possible.</li> <li>• Select liver protocol if suspect portosystemic shunt.</li> </ul>
<b>Potassium</b>	<ul style="list-style-type: none"> <li>• If high or low (suspected or documented), verify sample value</li> <li>• Look for cause (check renal function and urinary tract for urethra blockage or ruptured bladder).</li> <li>• Proceed to cardiac protocol (perform ECG).</li> </ul>
<b>BUN/Creatinine</b>	<ul style="list-style-type: none"> <li>• Low: Use liver protocol</li> <li>• High: see next step</li> </ul> <p><b>Elevated BUN and creatinine:</b></p> <ul style="list-style-type: none"> <li>• Palpate bladder. If obstructed, do urinalysis by cystocentesis and proceed to postrenal protocol.</li> </ul> <p><b>BUN elevated and normal creatinine:</b></p> <ul style="list-style-type: none"> <li>• Consider gastrointestinal bleeding.</li> <li>• Check urinalysis.</li> <li>• Urine specific gravity &gt; 1.020 (dog) and &gt;1.030 (cat): Rehydrate. Address underlying cause before proceeding. Consider prerenal azotemia</li> <li>• Urine specific gravity &lt; 1.020 (dog) and &lt; 1.030 (cat): Check other urinalysis parameters. Consider renal disease and proceed to renal protocol</li> </ul>
<b>Albumin/Total Protein</b>	<ul style="list-style-type: none"> <li>• If total protein &lt; 3.5 g/dl, look for cause.</li> <li>• Give plasma if possible (administer diphenhydramine at 1 mg/lb [maximum dose 50 mg] intramuscularly before infusion; wait 30 minutes).</li> <li>• Remove acepromazine from premedication. Use healthy Pet protocol if no other abnormalities</li> </ul>
<b>Calcium</b>	<ul style="list-style-type: none"> <li>• If elevated, look for renal disease or neoplasia (lymphoma, perianal). Consider Addison's Disease</li> <li>• If low, check albumin.</li> <li>• Proceed to cardiac workup and perform ECG. If normal, proceed with anesthesia</li> </ul>
<b>Glucose</b>	<ul style="list-style-type: none"> <li>• If &lt; 100 mg/dl, look for cause. Start 2.5% dextrose in 0.45% NaCl intravenously. Go to healthy Pet protocol.</li> <li>• If &gt; 200 mg/dl, do serum fructosamine test and postpone anaesthesia.</li> <li>• If serum fructosamine test elevated, use diabetic protocol or postpone anaesthesia and stabilize Pet.</li> </ul>

At Pathologists Lancet Kenya, we offer a comprehensive CBC utilizing the most advanced hematology technology available for veterinary use. Fluorescent laser flow cytometry methods and veterinary-specific algorithms make it possible to provide automated CBC results with an extremely high level of accuracy in your patients. Additionally, a smear review by a technologist and pathologist is included for all CBC samples.

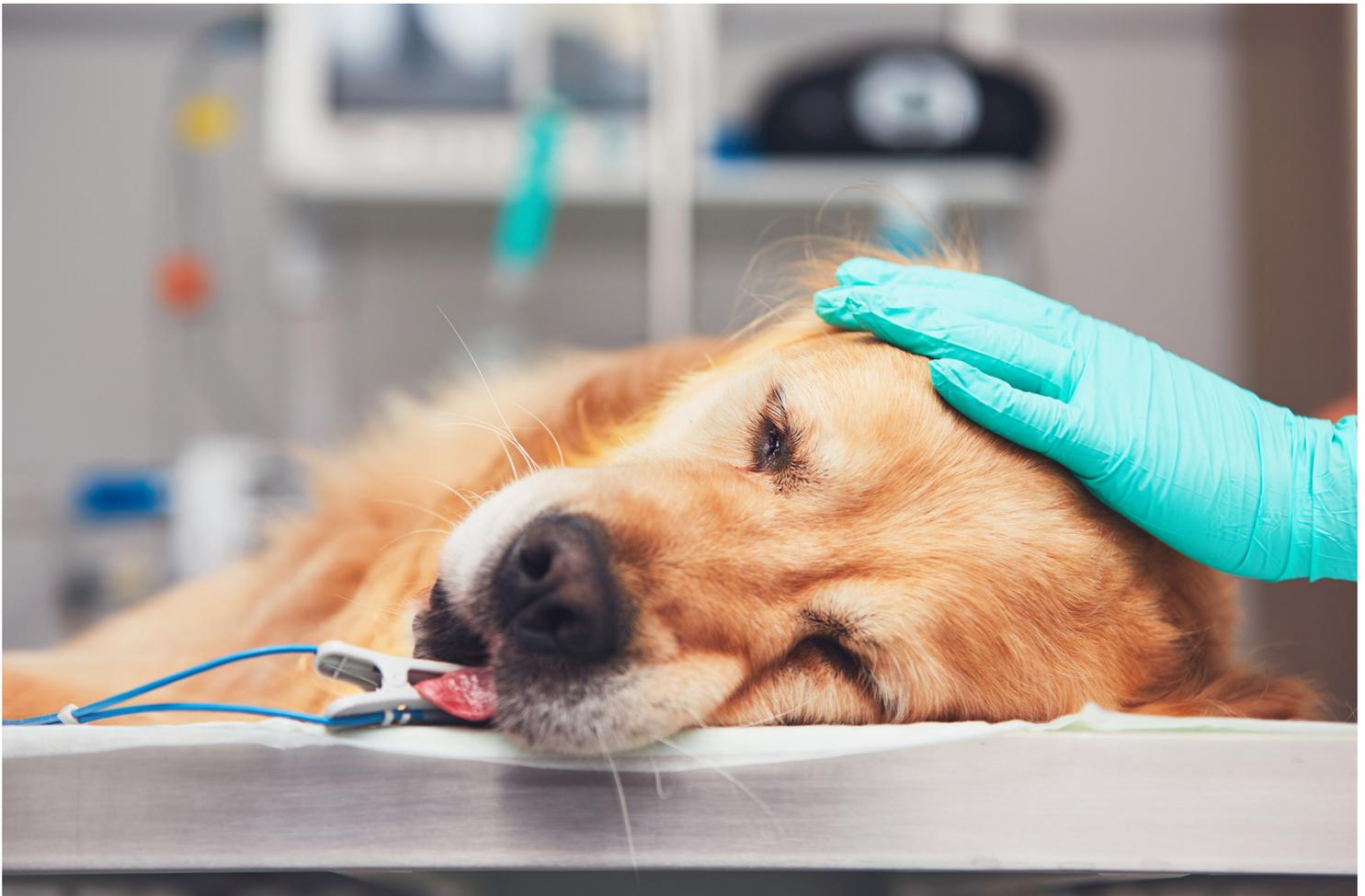
All canine and feline CBCs include a reticulocyte count regardless of the presence of anemia. A reticulocyte count on anemic patients helps to classify the anemia as regenerative or nonregenerative. In nonanemic animals, a persistent reticulocytosis may indicate compensated occult blood loss or underlying hemolytic disease. Early identification and management of the underlying disease process is important for a good clinical outcome in these patients.

We also offer a preanesthetic wellness chemistry panel comprising Alkaline phosphatase, Alanine transaminase, Total protein, Albumin, Urea, Creatinine and Glucose. This panel enables you to have a basic understanding of your patient's liver and kidney.

### References:

Lewis, HB. *Healthy pets benefit from blood work. Banfield J. 2006; 2(1): 18-20*

Engler, K. *Evaluating preanesthetic patients: A step-by-step approach helps you detect potential complications – and take action to prevent them. Banfield Pet Hospital 2006*



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