Diagnostic Guidelines

Canine Reticulocyte Counts on the IDEXX **ProCyte Dx*** and IDEXX **LaserCyte*** Hematology Analyzers

Reticulocyte Counts in the Dog: A Discussion with Dennis B. DeNicola, DVM, PhD, DACVP

Reticulocytes During Health

Reticulocytes in the peripheral blood of dogs are in very low relative numbers compared to mature red blood cells. Typically they are less than 1% of the total red blood cell population; however, reticulocytes are occasionally greater than 1% (up to 2% or slightly more) of the total in some apparently healthy animals. The absolute reticulocyte count is most commonly less than 110,000/μL; however, low numbers of healthy dogs may have reticulocyte counts as high as, or even higher than, 110,000–150,000/μL.

Reticulocytes in the Anemic Dog

Since the reticulocyte count is the most objective peripheral blood measure of bone marrow response to a demand for red blood cell production, it is the best measurement to use to determine if an anemia is regenerative and nonregenerative. A regenerative anemia is one that has an adequate bone marrow response, which is determined in the finding of a reticulocytosis; a nonregenerative anemia does not have a reticulocytosis. Before making the differentiation between regenerative and nonregenerative anemia, it is important to know that there is a lag period of 2–4 days from the onset of the anemia to the bone marrow response measured by a peripheral blood reticulocytosis.

Reticulocytes in the Nonanemic Dog

As previously stated, low numbers of clinically normal dogs will have reticulocyte counts as high as 110,000–150,000/μL; however, if a reticulocyte count of this degree or higher is observed in a nonanemic dog, underlying occult disease and conditions that could cause a reticulocytosis should also be considered. Some of these conditions are indicated below. Reevaluation of physical examination findings and detailed evaluation of routine testing, as well as possible specialized laboratory testing, are recommended if a significant reticulocytosis is seen in the nonanemic dog.

Potential underlying occult conditions resulting in reticulocytosis in the nonanemic dog include:

- Resolving regenerative anemia—a condition with a below baseline hematocrit (HCT) value and an associated reticulocytosis (which will be present until baseline HCT values are reached).
- Compensated blood loss or hemolytic process—conditions causing red blood cell loss or a shortened red blood cell lifespan, but the bone marrow has an increased production rate of red blood cells to maintain baseline or near baseline HCT values.
- Hyperadrenocorticism—glucocorticoids and other drugs can positively influence red blood cell production and associated reticulocytosis.
- Appropriate secondary erythrocytosis—conditions such as severe respiratory or cardiac disease may result in increased demand for oxygen-carrying capacity of the blood resulting in increased red blood cell production and associated reticulocytosis.
- Inappropriate secondary erythrocytosis—conditions resulting in compromised blood flow to the kidney (compressing masses) result in localized decreased oxygen tension, increased production in the kidney of the hormone responsible for red blood cell production (erythropoietin) and a reticulocytosis.
- Primary erythrocytosis/polycythemia—condition where there is uncontrolled increased erythropoietin and increased red blood cell production with associated reticulocytosis.
- Potential excitement-related transient reticulocytosis—several key opinion leaders in veterinary hematology have proposed this mechanism, which has not been documented to date.

Definitions

Erythrocytosis: increased red blood cell mass; if the erythrocytosis is above the upper reference interval limit, the term polycythemia is often used

Erythropoietin: hormone produced in the kidney responsible for positively controlling red blood cell production

Hematocrit (HCT): the percentage of a blood sample that consists of red blood cells; objective measure of red blood cell mass

Hemoglobin: the oxygen-carrying protein of red blood cells

Polychromasia: an immature red blood cell that stains pale blue with typical hematology stains compared to the orange-red coloration of a mature red blood cell

Polycythemia: disease process resulting in an increased HCT; erythrocytosis

Reticulocyte: an immature red blood cell that lacks a nucleus but retains some cytoplasmic RNA lacking in the mature red blood cell; reticulocytes are the most objective peripheral blood measure of a bone marrow response to a demand for red blood cell production

Reticulocytosis: an increase in reticulocyte count above the upper reference interval limit or above the baseline value for that particular animal

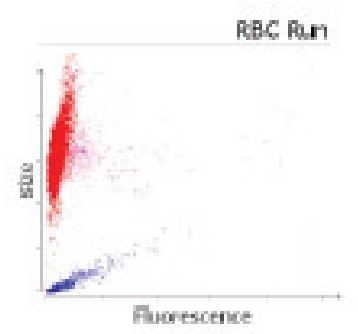
Ribonucleic acid (RNA): RNA molecules are found in immature red blood cells and many other cells and are essential for protein synthesis

Dot Plots and Reticulocytes

Reviewing dot plots can help to verify the presence of a reticulocytes population.

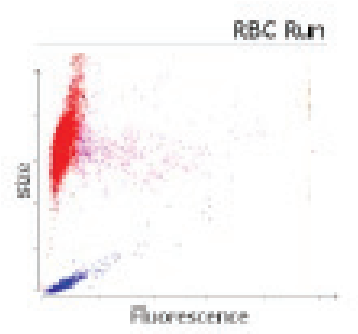
ProCyte Dx* Hematology Analyzer

Mild



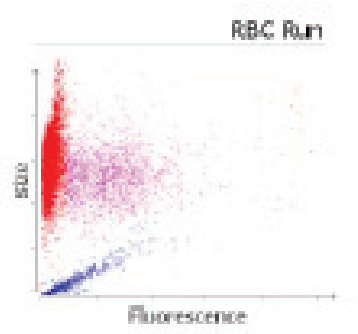
RBC Retic PLT
WBC RBC Frag

Moderate



RBC Retic PLT
WBC RBC Frag

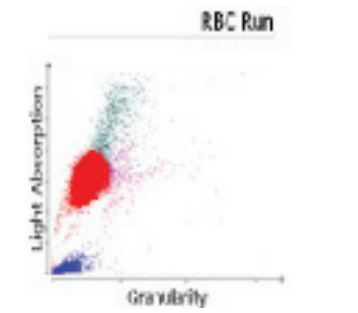
Marked



RBC Retic PLT
WBC RBC Frag

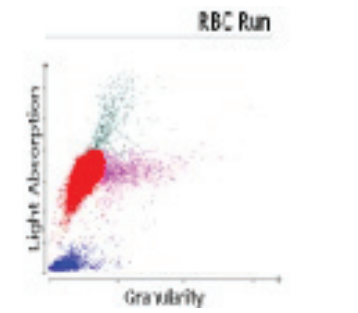
LaserCyte* Hematology Analyzer

Mild



RBC Retic PLT
Doublets RBC Frag

Moderate



RBC Retic PLT
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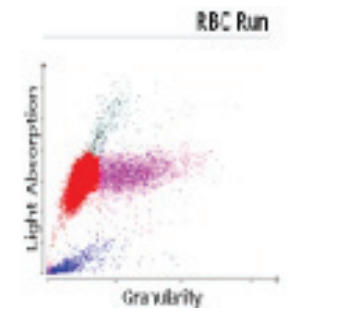

RBC Retic PLT
Doublets RBC Frag

Sincerely,

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