Comparison of Reticulocyte Counts to Mean Corpuscular Volume and Mean Corpuscular Hemoglobin Concentration in Anemic Dogs

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Background: Anemia, a common abnormality in small animal medicine, is first classified as being regenerative or nonregenerative to aid in the identification of the underlying cause. Microscopic evaluation of routine-stained blood films or New Methylene Blue-stained blood samples for the recognition of polychromasia and reticulocytosis, respectively, can provide subjective information to allow this first classification. Although the use of in-house hematology analyzers is increasing in popularity in veterinary medicine, most veterinary practices that perform in-house hematology do not routinely look at blood films. Recent automation in in-house laser flow cytometry-based hematology analyzers can provide objective reticulocyte counts. Classically, the RBC indices, Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin Concentration (MCHC) have been used in the morphologic classification of anemias in both humans and domestic animals; their measurements became readily available with the widespread use of impedance-based hematology analyzers. An increased MCV (macrocytosis) and a decreased MCHC (hypochromasia) support a regenerative response; however, this profile may also be noted in nonregenerative responses and because they represent mean changes in these erythrocyte parameters, they are less sensitive than observing polychromatophilia on the blood film or counting reticulocytes manually or with automated analyzers. The potential for having an MCV and MCHC within reference interval limits during regeneration is high.

Objective: Identification of regenerative anemia in the dog reportedly can be accomplished by blood film inspection for polychromasia, evaluating red cell indices and determining reticulocyte counts. The classic erythrocyte indices profile for regeneration is macrocytosis and hypochromasia. The objective of this study was to compare Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin concentration (MCHC) changes to an absolute reticulocyte count in a series of anemic dogs to determine the frequency of a “classic” erythrocyte indices profile during a regenerative response.

Materials and Methods: All data from canine complete blood count (CBC) submissions to 14 IDEXX Reference Laboratories (IRL) in the United States from 01-01-05 through 03-31-05 were collected. A hematocrit value <35% was used to indicate anemia and an absolute reticulocyte value of >60,000/µL was used to indicate regeneration. In dogs classified as having a regenerative anemia, the number and percentage of cases with increased MCV, decreased MCHC, and both increased MCV and decreased MCHC values outside of the IRL reference intervals were determined.

Results: Collected data are summarized in the table below. During the three-month evaluation period, 203,939 comprehensive CBC data sets including absolute reticulocyte counts were complete enough for inclusion in this study. Anemia was observed in 18,975 (9.3%) of these cases and 6,752 (3.3%) of the cases had reticulocyte counts greater than 60,000/µL. Among the regenerative cases, 1,055 (15.6%) had increased MCV, 1,520 (22.5%) had decreased MCHC and only 562 (8.3%) had both an increased MCV and a decreased MCHC.

Conclusion: For routine CBC evaluations in the anemic dog, changes in erythrocyte indices are an unreliable predictor of regeneration. A blood film analysis and reticulocyte count are needed for a more accurate assessment of regeneration. The absolute reticulocyte count is the most objective measure of regeneration in the dog.

![Erythrocyte Indices Distribution Among Canine Regenerative Anemias](image)

*Only 8.3% of the cases had both an increased MCV and a decreased MCHC making this combination an unreliable predictor of anemia.