


COMPARATIVE IMAGERY

# RED BLOOD CELL EVALUATION IN BLOOD FILMS

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**B**lood film evaluation is an important part of the routine CBC, as it often provides valuable diagnostic and prognostic information regarding the patient and the disorder being investigated. Ideally, a blood film should be evaluated as a part of every CBC.

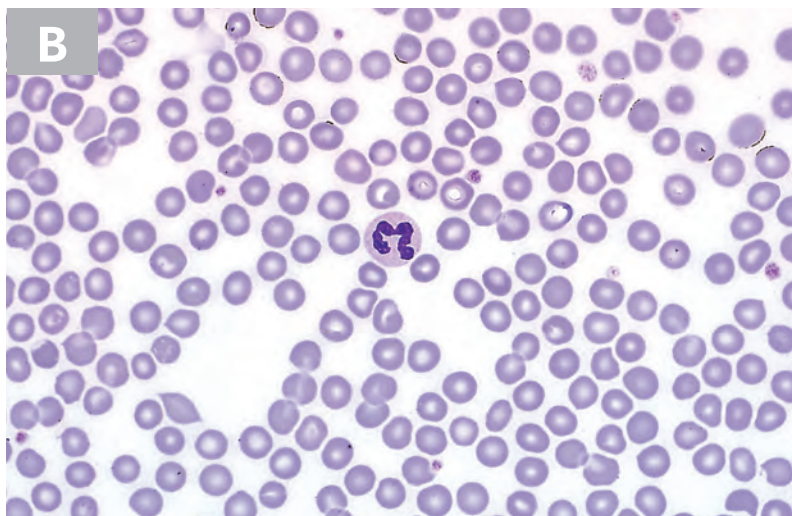
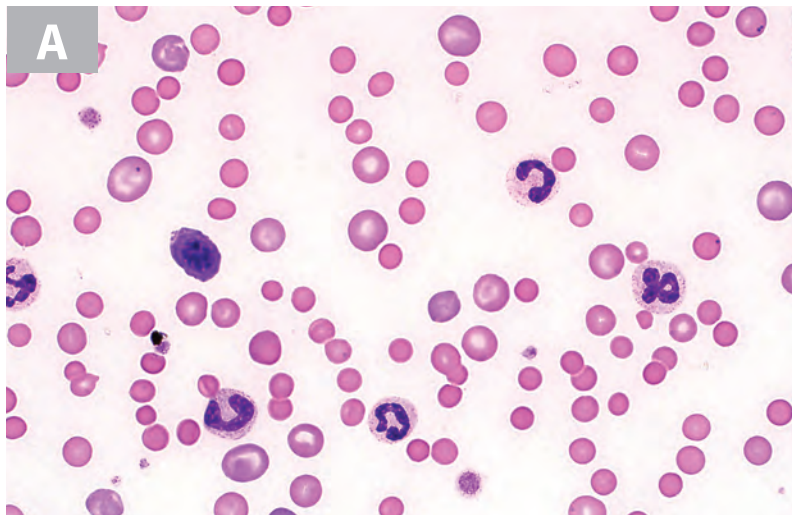
Regular blood film evaluation can provide the practitioner with a breadth of experience, including a better understanding of normal variation among patients; an increased ability to recognize, and thus not overinterpret, the presence of common contaminants and artifacts that result from sample collection, preparation, and handling; an improved capacity to recognize morphologic abnormalities; and enhanced skill in determining when abnormal findings are clinically significant.

Even in cases when all CBC values are within the reference interval, abnormalities may be detected on the blood film. The following images and their interpretations focus on RBC morphology.

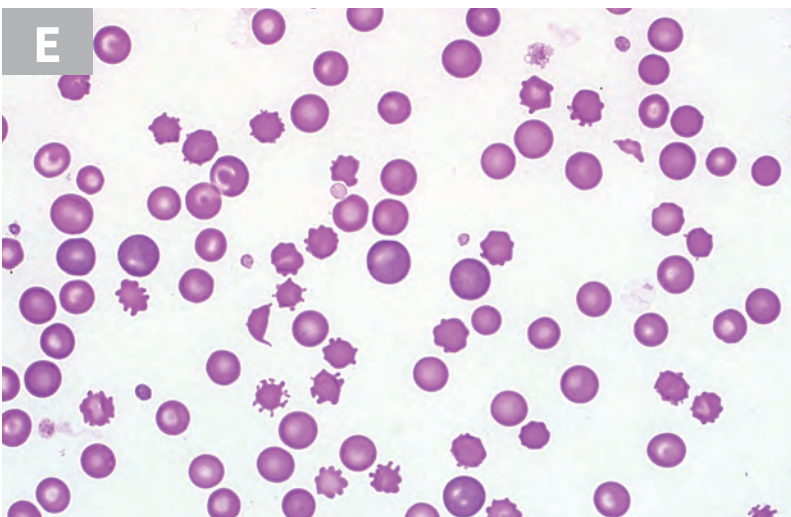
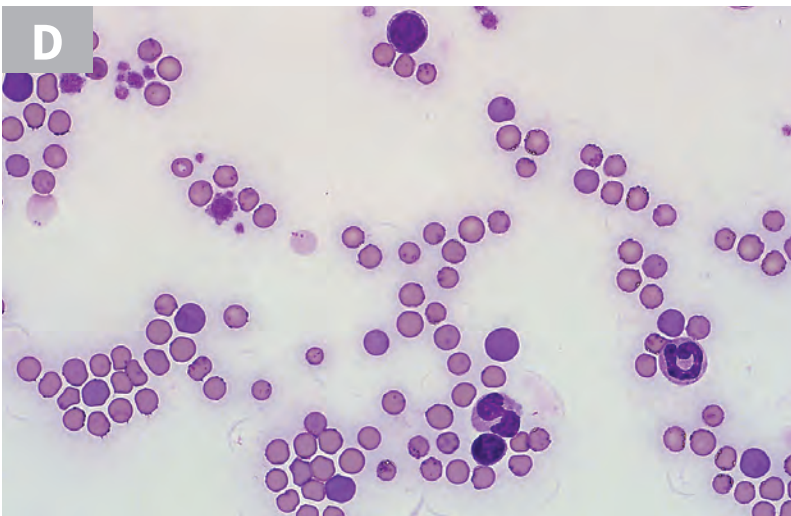
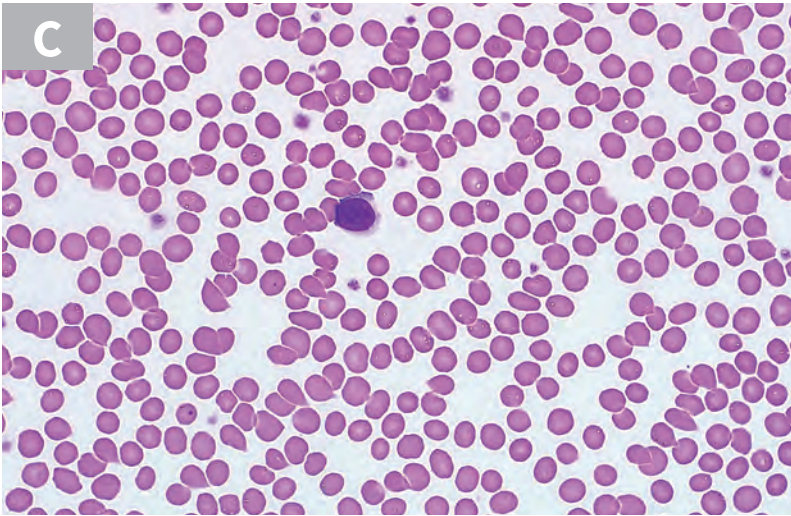
### MATCH THE IMAGES

Match the images with the correct interpretation.

- \_\_\_ Markedly regenerative anemia due to *Mycoplasma haemofelis* infection in a kitten
- \_\_\_ Normal blood film from a cat
- \_\_\_ Regenerative anemia with acanthocytes and schistocytes due to hemangiosarcoma in a dog
- \_\_\_ Immune-mediated hemolytic anemia with marked evidence of regeneration in a dog
- \_\_\_ Normal blood film from a dog



**Even in cases when all CBC values are within the reference interval, abnormalities may be detected on the blood film.**



#### PLATELET EVALUATION & INTERPRETATION

Find an image gallery on platelet evaluation and interpretation on blood smears at [cliniciansbrief.com/article/blood-smear-platelet-evaluation-interpretation](https://www.cliniciansbrief.com/article/blood-smear-platelet-evaluation-interpretation)

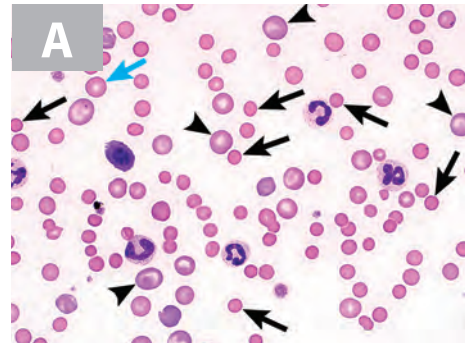
#### LOOK FOR THIS RELATED ARTICLE IN A FUTURE ISSUE

- ▶ White Blood Cell Evaluation in Blood Films

**ANSWER KEY**

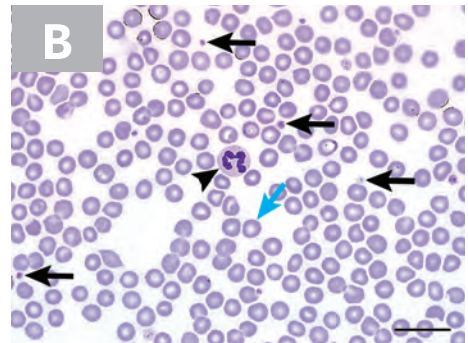
**A** Immune-mediated hemolytic anemia with marked evidence of regeneration in a dog

The spherocytes (*black arrows*) are smaller and a darker shade of pink; they lack central pallor as compared with a normal erythrocyte (*blue arrow*). Regeneration is supported by the frequent, large polychromatophilic erythrocytes (*arrowheads*), which are analogous to reticulocytes.



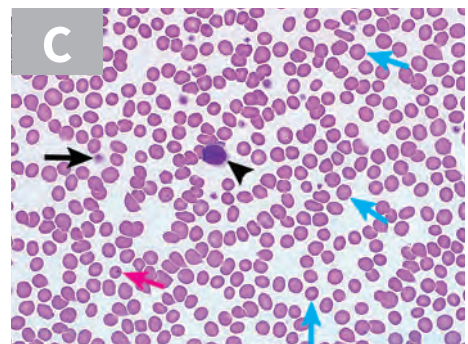
**B** Normal blood film from a dog

The normal erythrocytes (one represented by a *blue arrow*) in the monolayer are smaller than a neutrophil and have a small area of central pallor. Platelets (*black arrows*) and a segmented neutrophil (*arrowhead*) are also present.



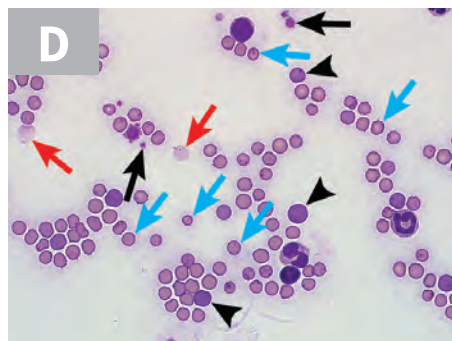
**C** Normal blood film from a cat

Normal feline erythrocytes (*blue arrows*) have little to no central pallor as compared with those in dogs.<sup>1</sup> Platelets (one represented by a *black arrow*), an erythrocyte with a Howell-Jolly body (*pink arrow*), and a lymphocyte (*arrowhead*) can also be seen.



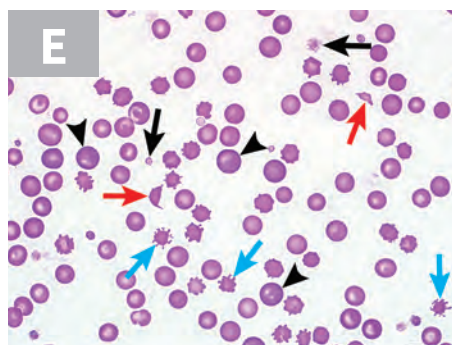
## **D** Markedly regenerative anemia due to *Mycoplasma haemofelis* infection in a kitten

This kitten was presented recumbent with a hematocrit of 4%, as evidenced by the paucity of erythrocytes seen here. Small cocci can be seen on the erythrocytes (**blue arrows**), and organisms can also be seen on the lighter-colored ghost cells (ie, erythrocytes that have lost their contents as a result of intravascular hemolysis, leaving only the membrane and the organisms attached to it; **red arrows**). Typically, extravascular hemolysis predominates in cases of *M haemofelis*<sup>2</sup>; however, in the author's experience, in severe cases, intravascular hemolysis (evidenced in this figure by the presence of ghost cells) may occur to a lesser degree if the immunoglobulins coating the RBCs are able to activate the complement system, which is an important part of the immune system. Its main function is to facilitate rapid and direct destruction of target cells or pathogens.<sup>3</sup> Frequent large polychromatophilic erythrocytes (**arrowheads**) are evidence of regeneration. Platelets (**black arrows**), 2 neutrophils, and a lymphocyte (top center) can also be observed. This kitten was treated with a blood transfusion and doxycycline and recovered.



## **E** Regenerative anemia with acanthocytes and schistocytes due to hemangiosarcoma in a dog

When observed together, schistocytes (**red arrows**), acanthocytes (**blue arrows**), and large polychromatophilic erythrocytes (**arrowheads**) should raise concern for hemangiosarcoma. Acanthocytes can be difficult to differentiate from echinocytes (ie, crenated erythrocytes). Acanthocytes have more prominent, blunt projections that are wider and often appear paddle-like or have additional extensions at their end. Platelets (**black arrows**) can also be observed. ■



## References

1. Thrall MA. Erythrocyte morphology. In: Thrall MA, Weiser G, Alison R, Campbell T, eds. *Veterinary Hematology and Clinical Chemistry*. 2nd ed. Ames, IA: John Wiley & Sons; 2012:61-74.
2. Allison RW, Meinkoth JH. Anemias caused by *Rickettsia*, *Mycoplasma*, and *Protozoa*. In: Weiss DJ, Wardrop KJ, eds. *Schalm's Veterinary Hematology*. 6th ed. Ames, IA: Blackwell; 2010:199-210.
3. Kierszenbaum AL, Tres L. Immune-lymphatic system. In: Kierszenbaum AL, Tres Laura. *Histology and Cell Biology: An Introduction to Pathology*. 4th ed. Philadelphia, PA: Elsevier Saunders; 2016:325-326.