

# Blood Smear Platelet Evaluation & Interpretation

**Lisa M. Pohlman, DVM, MS, DACVP**  
*Kansas State University*

In most laboratories and veterinary practices, platelet concentration is determined via automated analysis. However, there are several variables that can affect accuracy of results, the most common of which, in the author's experience, is platelet clumping. Platelet clumps must be identified on a blood film to avoid potential misdiagnosis of thrombocytopenia.

Analyzers that use impedance methodology can also produce erroneous results when platelet size overlaps with RBC size, causing large platelets to be counted as RBCs; this can result in a falsely decreased platelet concentration and misdiagnosis. This can occur in any animal that produces large platelets but is particularly common in cats, as their platelet size is similar to their RBC size.<sup>1,2</sup>

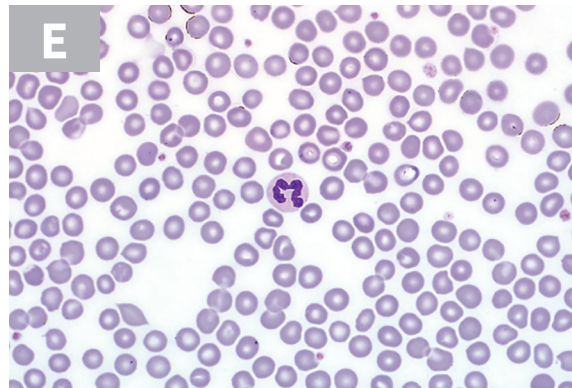
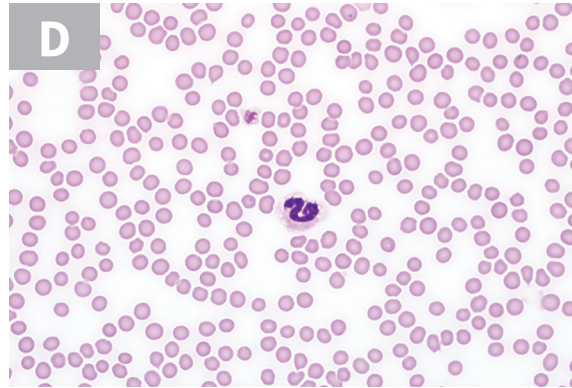
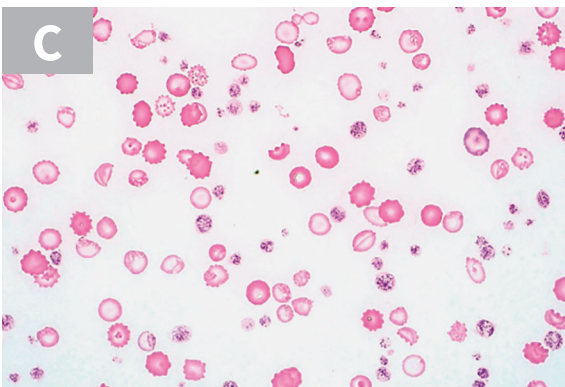
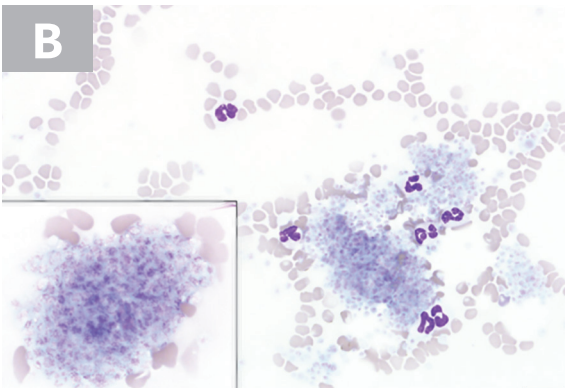
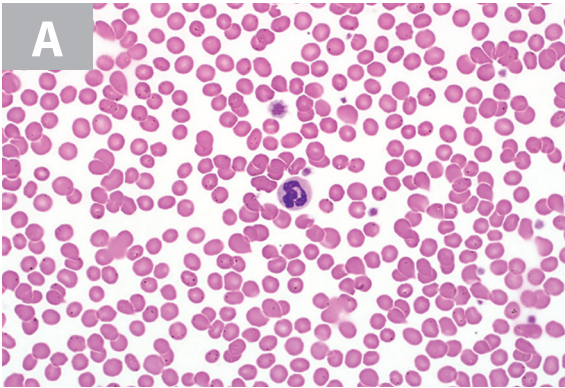
Estimation of the platelet concentration from a blood film should be performed in the monolayer using

100× objective (ie, 1000× magnification). A well made blood film with even distribution of platelets throughout the monolayer is essential. If platelet clumps are present, the platelet estimation will be falsely decreased to an unknown degree, depending on the amount of clumping. However, estimation using the method provided should help to provide the minimum concentration of platelets present.

First, the entire film should be examined for clumps. Then, at least 10 fields within the monolayer should be reviewed to determine the average number of platelets per 1000× magnification field. The number observed should be multiplied by 15 000 to get the lower end of the reference interval and then by 20 000 to determine the upper end of the reference interval.<sup>2</sup>

Average number of platelets per  
 1000× field × 15 000 = lower end of reference interval  
 Average number of platelets per  
 1000× field × 20 000 = upper end of reference interval

$10 \times 15\,000 = 150\,000/\mu\text{L}$   
 $10 \times 20\,000 = 200\,000/\mu\text{L}$



## MATCH THE IMAGES

Match the images with the correct interpretation.

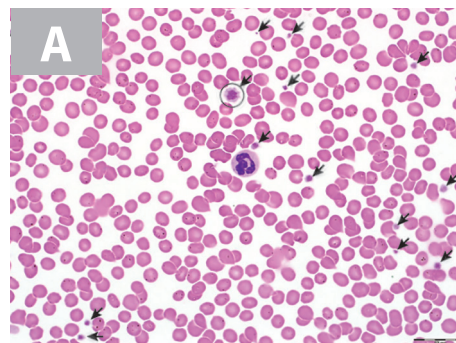
Although individual laboratory reference values vary, healthy dogs and cats typically have 150 000 to 500 000 platelets/ $\mu$ L. For the purposes of this article, less than 150 000/ $\mu$ L is indicative of thrombocytopenia and greater than 500 000/ $\mu$ L is indicative of thrombocytosis. Of note, the purpose of this exercise is to demonstrate the method of platelet estimation; because the images in this exercise are square, they may not be representative of the number of platelets seen in an entire 1000 $\times$  magnification field. All films are stained with modified Wright's Stain.

- \_\_\_ Platelet clumps
- \_\_\_ Thrombocytosis
- \_\_\_ Thrombocytopenia in a cat
- \_\_\_ Platelet concentration within reference limits (dog)
- \_\_\_ Platelet concentration within reference limits (cat)

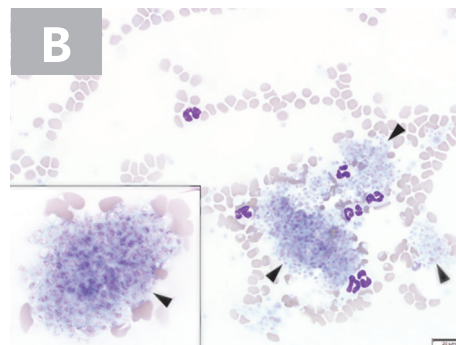
**Although individual laboratory reference values vary, healthy dogs and cats typically have 150 000 to 500 000 platelets/ $\mu$ L.**

## ANSWER KEY

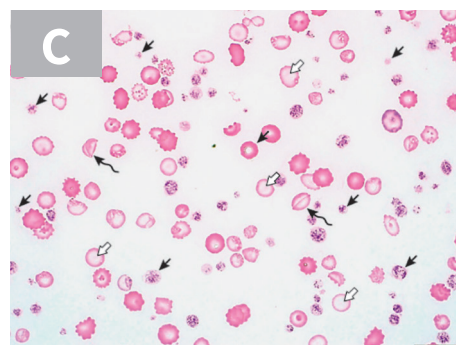
**A** **Platelet concentration within reference limits (cat)**  
This blood film (1000× magnification) from a cat shows 13 platelets (**arrows**). No platelet clumps are evident on the smear. A large platelet (**circle**), which is typical of cat blood, can be observed. With the assumption that this field is representative of other 1000× fields within the monolayer, the estimated platelet concentration would be 195 000/μL to 260 000/μL.



**B** **Platelet clumps**  
Platelet clumps (**arrowheads**) at the feathered edge of the blood film (600×) can be observed in this blood film from a cat. The inset image shows another platelet clump at high power (1000× oil).

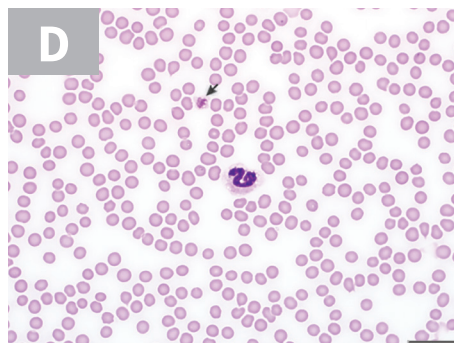


**C** **Thrombocytosis**  
There are 71 platelets in this field (some indicated by **black arrows**) from a blood film (1000×) from a dog. Using the formula provided and assuming that there are no platelet clumps and that this field of view is representative of other fields, the estimated platelet concentration is 1 065 000/μL to 1 420 000/μL. This dog had a severe iron deficiency; marked hypochromasia (ie, increased central pallor; **white arrows**) and thin RBCs (ie, leptocytes; **curved arrows**) can be seen; RBCs are often folded due to a lack of internal contents. Reactive thrombocytosis is a common CBC finding in patients with iron deficiency.<sup>2,3</sup>



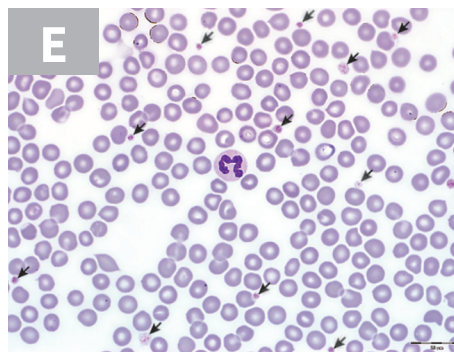
## **D** Thrombocytopenia

This field from a blood film (1000×) from a cat shows a large platelet (**arrow**). Assuming that there are no platelet clumps and that this field of view is representative of other fields, the estimated platelet concentration is low at 15 000/μL to 20 000/μL.



## **E** Platelet concentration within reference limits (dog)

Blood film from a dog (1000× magnification). Twelve platelets (**arrows**) can be observed. Note the central pallor in the majority of the RBCs, which is a normal finding in dogs.<sup>4</sup> Assuming that there are no platelet clumps in the sample and that this field of view is representative of other fields in the monolayer, the estimated platelet concentration would be 180 000/μL to 240 000/μL. ■



## References

1. Baker DC. Diagnosis of disorders of hemostasis. In: Thrall MA, Weiser G, Alison R, Campbell T, eds. *Veterinary Hematology and Clinical Chemistry*. 2nd ed. Ames, IA: Wiley-Blackwell; 2012:185-204.
2. Stockham S, Scott M. Platelets. In: Stockham S, Scott M. *Fundamentals of Veterinary Clinical Pathology*. 2nd ed. Ames, IA: Blackwell Publishing; 2008:223-257.
3. Thrall MA. Regenerative anemia. In: Thrall MA, Weiser G, Alison R, Campbell T, eds. *Veterinary Hematology and Clinical Chemistry*. 2nd ed. Ames, IA: Wiley-Blackwell; 2012:87-114.
4. Rizzi TE, Meinkoth JH, Clinkenbeard KD. Normal hematology of the dog. In: Weiss DJ, Wardrop KJ, eds. *Schalm's Veterinary Hematology*. 6th ed. Wiley-Blackwell; 2010:799-811.

## LOOK FOR THESE RELATED ARTICLES IN FUTURE ISSUES

- ▶ Image Gallery: Blood Smear Evaluation of White Blood Cells
- ▶ Image Gallery: Blood Smear Evaluation of Red Blood Cells