Blood smears: A critical part of the CBC!

Always examine a blood smear

How often do you look at a blood smear or send it to the lab for evaluation when putting a sample through your in-clinic haematology analyser? Every sample? Or just when something odd shows up? A study in 2013 (Cora *et. al.*, 2013) found 20% of smears detected abnormalities missed by the analyser. This percentage increases if the scatter diagram is not interpreted in conjunction with the numerical results. Modern analysers are machines working from computer-based algorithms and as such work from a limited range of data points. Accuracy is best when patient parameters are normal and falls as abnormalities becomes less common.

If you are not sending smears to your lab, it is even more important to look at every smear. How do you learn to recognise "abnormal" if "normal" is not soundly understood?

Reference: MC Cora, JA Neel, CB Grindem, GE Kissling, PR Hess. Comparison of automated versus manual neutrophil counts for the detection of cellular abnormalities in dogs receiving chemotherapy: 50 cases (May to June 2008). J Am Vet Med Assoc. 242:1539-43, 2013

How to make a Blood Smear

The BLOOD

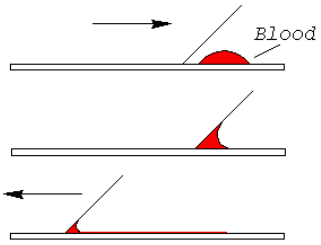
- The EDTA blood should be fresh and at room temperature
- Invert gently several times to mix before making the smear

The SLIDES

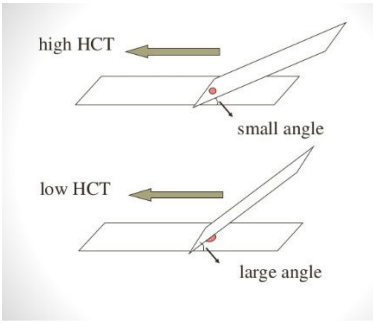
- Good quality spreader slides are vital and should have a cut, not ground, glass edge
- Run your fingernail along the edge of the slide. It should feel smooth not rough. No matter how perfect a technique, a good smear cannot be made with a rough edge spreader slide
- The quality of the slide on which the smear is made is less important

The SMEAR

- Place a drop of well mixed blood at one end of the slide
- Place the spreader slide on the sample slide and draw it back into the blood
- Angle the spreader slide according to the Hct
- Allow the blood to move under the spreader slide to within 1 mm of the edge of the slide then push forward smoothly and quickly



- Do not place too much pressure on the spreader or many of the WBCs end up in the feather edge
- The smear should cover ½ to ¾ of the slide
- Aim for a round not feathered distal edge
- Dry quickly



- Do not place the smear in a slide holder until it is dry – it can stick like glue!

Why Smears should be made from Fresh Blood

When sending an EDTA sample to a commercial lab for a CBC it may seem redundant to make a blood smear as well. After all, the staff at the lab are experienced at making smears. So, why go to the trouble when an expert will have the blood within the next 12 to 24 hours?

As EDTA has no preservative and is hypertonic, it is damaging to cells. RBC morphology is stable for about 6 hours (likely shorter in hot weather), after which crenation, sphering and fragmentation begin. This can make it difficult to detect ecchinocytes, acanthocytes, Heinz bodies, spherocytes and RBC parasites. WBCs begin to degenerate within 3 hours and show severe degeneration by 12 to 18 hours. Degenerative changes seen in aged WBCs mimic those found in an inflammatory leukogram with cytoplasmic vacuolation and nuclear swelling occurring. Cellular degeneration may eventually occur.

Refrigeration of whole blood sample slows the deterioration of cell morphology (note smears should NOT be refrigerated).