



HemeInsights

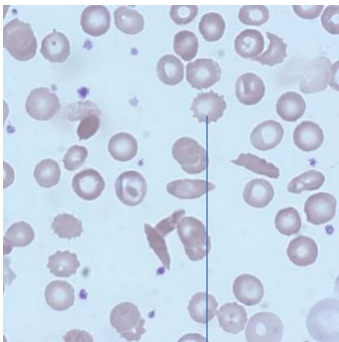
Issue 4 | August 2025

Morphology Case Study

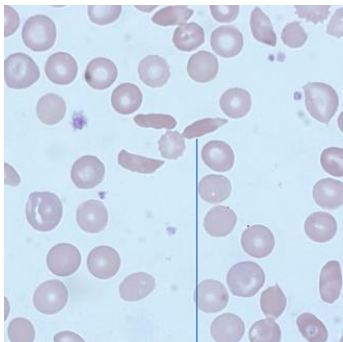
Patient Details
Female (age not given)

FBC	
WBC 11.20 (10 ³ /mm ³)	MCH 29.8 (pg)
RBC 2.72* (10 ⁶ /mm ³)	MCHC 34.9 (g/dL)
HGB 8.1* (g/dL)	PLT 519* (10 ³ /mm ³)
HCT 23.2* (%)	RET 568 (10 ⁹ /L)
MCV 55 (fL)	

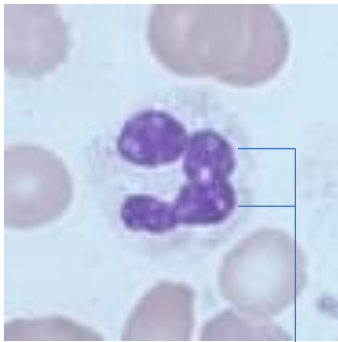
Smear comment
Sickle cell anemia. Aniso-poikilocytosis (++) . Sickle cells (++) . Echinocytes (++) . Hypochromic RBCs (++) . Reticulocytosis (21%) . To note: - The white blood cells seem +/- altered, - Apoptosis is clearly visible, especially on some images of Polynuclear Neutrophils, - And the presence of Echinocytes (++) . The whole is very evocative of "old" blood and could initially be mistaken as such. However, anemia and the sickle-shaped red blood cells indicate a requirement for hemoglobinopathy investigation.



Echinocyte- small projections on red cell membrane



Sickle red cells



Polynuclear Neutrophils-varied shapes and sizes of a cell's nucleus (the part of the cell that contains chromosomes). The nuclei of PMNs have two or three lobes with deep divisions.

Aged Sample Effects on a Blood Smear

The Effects of an Aged Blood Sample on Blood Smear Morphology

The quality and interpretability of a blood smear are highly dependent on the freshness of the sample. Aged blood samples—those that have been stored for prolonged periods, especially at room temperature—can introduce a range of artefactual changes that may complicate or compromise hematological interpretation.

1. Morphological Changes in Aged Samples

Over time, cellular components within a blood sample begin to degrade. This degradation is particularly evident in blood smears prepared from samples older than 6–8 hours post-collection. The following artefacts are commonly observed:

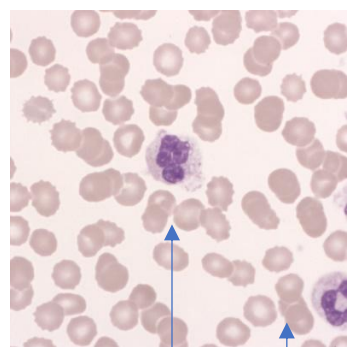
- **Red Blood Cells (RBCs):**
 - Increased central pallor, cell distortion, or crenation (echinocytosis).
 - Presence of artefactual spherocytes, making it difficult to differentiate from true spherocytosis.
 - Rouleaux formation may increase due to plasma protein changes or sample drying effects.
- **White Blood Cells (WBCs):**
 - Nuclear degeneration, with pyknotic or smudged nuclei, particularly affecting lymphocytes.
 - Cytoplasmic vacuolation or granule loss in granulocytes.
 - "Basket cells" or "smudge cells" due to cell fragility, especially in lymphocytes.
- **Platelets:**
 - Aggregation is more common in aged samples.
 - Degranulation or loss of platelet definition may occur.

2. EDTA-Induced Artefacts

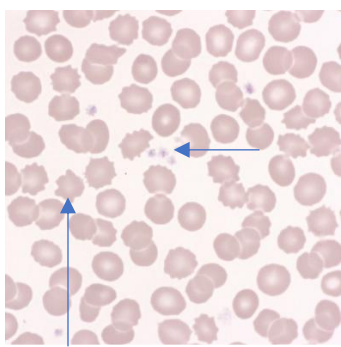
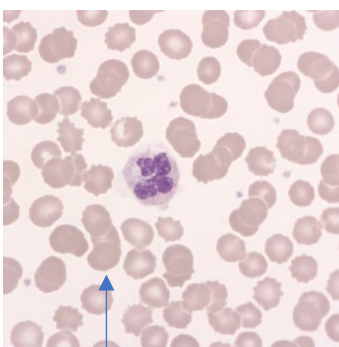
Ethylenediaminetetraacetic acid (EDTA) is the anticoagulant of choice for most hematological studies. While it is effective at preventing clotting by chelating calcium, EDTA can induce artefacts over time:

- **EDTA-Induced Pseudothrombocytopenia:** Platelets may clump in the presence of EDTA, leading to falsely low platelet counts and visible platelet clumps on the smear.
- **Leukoagglutination:** Rarely, EDTA can cause white cell clumping.
- **Granular and cytoplasmic changes:** Extended exposure to EDTA leads to cytoplasmic vacuolation and nuclear condensation, particularly in neutrophils.
- **RBC Morphology:** Prolonged EDTA exposure can cause crenation and distortion of erythrocytes, mimicking pathological forms. See images below:

Slides below showing age deterioration:



Red cells showing central area of pallor & Rouleaux formation



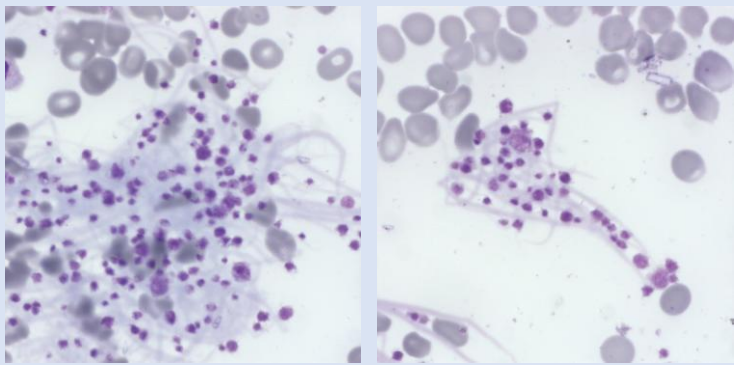
Crenated & distorted red cells
Platelet aggregation

Conclusion

To ensure accurate morphological interpretation, blood smears should ideally be prepared within 2–4 hours of collection. Delays beyond this window, especially when samples are stored at room temperature, can significantly alter cellular morphology due to both natural degradation and EDTA-induced artefacts. Awareness of these changes is essential for laboratory professionals to distinguish between true pathology and pre-analytical artefacts.

Quiz

What is the best course of action when seeing numerous features as below in the tail of the smear with the following results?



FBC

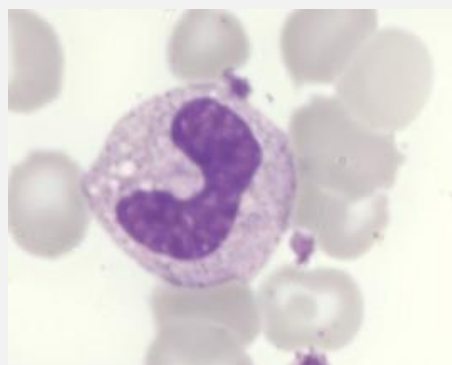
WBC 8.60 ($10^3/\text{mm}^3$)	MCH 29.6 (pg)
RBC 3.21 ($10^6/\text{mm}^3$)	MCHC 32.6 (g/dL)
HGB 9.5 (g/dL)	PLT 222* ($10^3/\text{mm}^3$)
HCT 29.1 (%)	RDWsd 40.3 (fL)
MCV 90.7 (fL)	RDWcv 12.3 (%)

- a) Ignore the features as they are in the tail of the smear.
- b) Manually check the sample for clots. Comment on the fact that the platelet count may be underestimated and request a repeat.
- c) Query if Microfilaria is present.

Answers are revealed two weeks after launch—check your inbox, our socials, or the next issue.

Last Issue's Quiz Answer

Name the cell and what may it indicate?



The Answer:

The cell shown is known as a Band cell or Stab cell; if numerous are present in the blood smear, it is an indicator of infection or inflammation. Gross red cells abnormalities with large platelets and platelet clumps in a Beta Thalassemia patient. Platelet production and their function in hemostasis and infection.

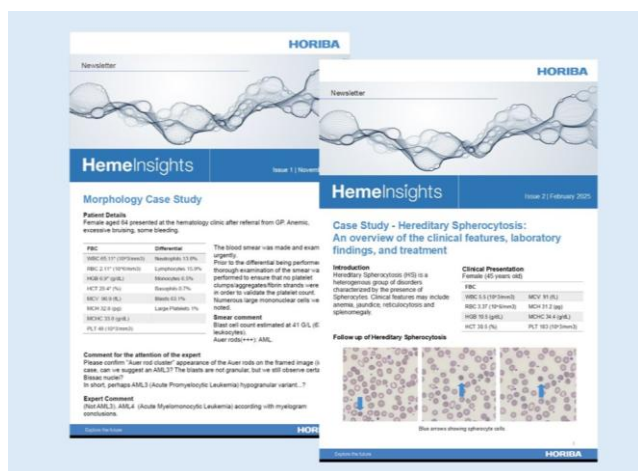
HemeInsights

Subscribe now!



<https://horiba.link/90a885>

Subscribe now and get Heme Insights delivered from the next issue!



Editorial Team

Kelly Duffy, Andrew Fisher, HORIBA UK Limited

HORIBA ABX SAS

398 rue du Caducée 34790 Grabels - France

<https://www.horiba.com/healthcare> | webmaster.med@horiba.com

Read on website

<https://horiba.link/6vy>

