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PATHCHAT

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Three extra helpful parameters on the full blood count
available only at reference facilities

The immature granulocyte count
The immature platelet fraction count
The platelet-O count

Immature granulocyte count:

With the exception of pregnant women and neonates, the presence of immature granulocytes (IG) in the blood indicates a response to infection, inflammation or other stimuli of the bone marrow. Having a six-part differential count facilitates new diagnostic possibilities. The IG count includes stab cells, metamyelocytes and myelocytes, and requires a specific Sysmex analyser (XE-2100) for determination.

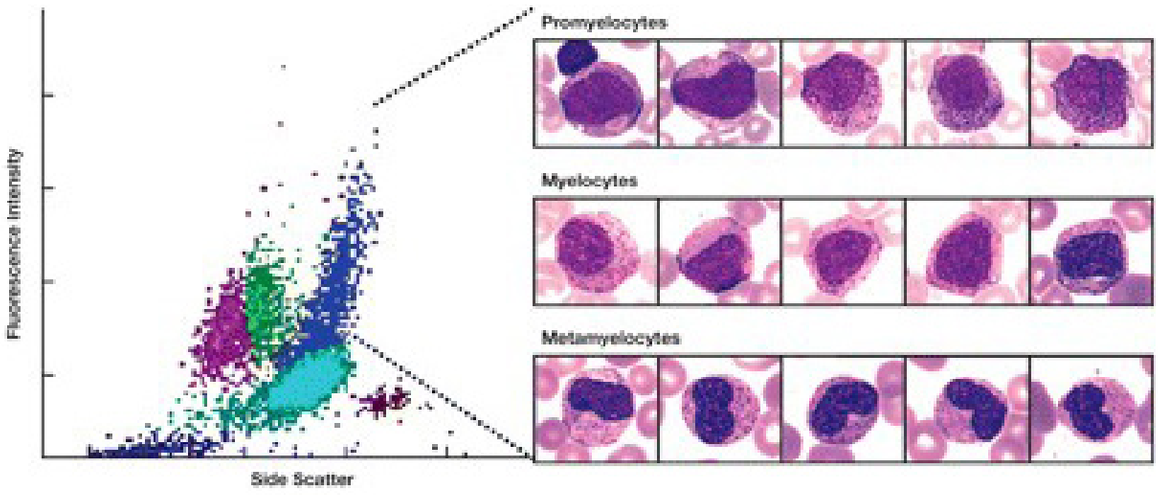
Current fields of research include the early and rapid discrimination of bacterial from viral infections, particularly in children, identifying bacterial infection in neonates and the early recognition of bacterial infection and sepsis in adults.

The IG count is used in patients who are highly susceptible to infections because of a suppressed immune system. These values may be of importance in:

- patients from the intensive care unit
- patients undergoing chemotherapy
- patients suffering from HIV/AIDS

This value is only available on instruments in reference facilities with specialised software.

Normal reference range: 0.5% or 0.03 x 109/l



The immature platelet fraction:

An accurate platelet count provides very little information on the likelihood of bleeding in a thrombocytopaenic patient. A quick assessment of platelet production could distinguish between thrombocytopaenia due to bone marrow failure and impending bone marrow recovery or thrombocytopaenia due to increased peripheral platelet destruction. In the latter case, bleeding is less common at any platelet count unless infection is present. Recently, a method was developed to measure newly released platelets, which are larger and more reactive than mature platelets. They contain RNA and were therefore termed "reticulated platelets". The number of these platelets reflects the rate of thrombopoiesis, increasing when platelet production rises and decreasing when production falls. The value is expressed on the Sysmex instrument as an IPF.

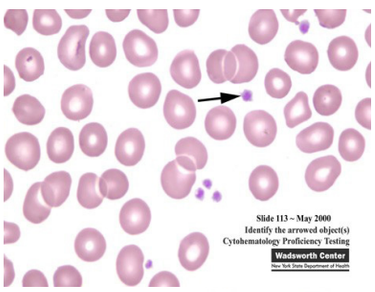
Normal reference range: 1.1 – 6.1%

The result is available at the same time as the full blood count and the IPF is stable in an EDTA sample stored at room temperature for at least 48 hours. The IPF percentage provides a valuable diagnostic method to clearly differentiate between the consumptive and aplastic causes of thrombocytopaenia; the highest levels are found in patients with autoimmune thrombocytopaenic purpura (ITP) and thrombotic thrombocytopaenic purpura (TTP). The level is also of value in proving peripheral immune destruction in bone marrow transplant patients and in differentiating normal pregnancies from those in which pre-eclampsia or pregnancy-induced hypertension is likely to develop.

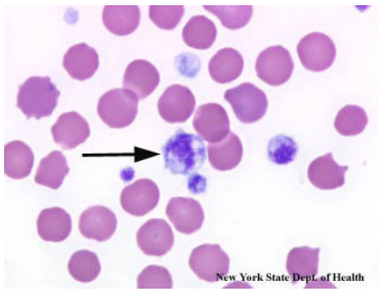
The platelet-O count:

Automated analysers use various methods to enumerate platelets, including impedance, optical light scatter and optical fluorescent techniques. However, their precision at low counts is poor as these methods fail to discriminate between platelets and other cell fragments and debris of similar size. This could result in spuriously high platelet counts or, in the case of giant platelets, where they may not be discriminated from red cells, their exclusion could result in a falsely low platelet count. Using the platelet-O method, the RNA in the platelets is stained with a patented fluorescent dye specific for diode lasers and the platelets are recorded flow-cytometrically by means of a semiconductor laser technology. This nucleic acid staining allows the instrument to correctly classify giant platelets (similar volume to erythrocytes, but with a different RNA content) and fragments (having no RNA). On the Sysmex instrument, the optical platelet count is derived from the reticulocyte count and improves the accuracy of the count.

Normal platelets



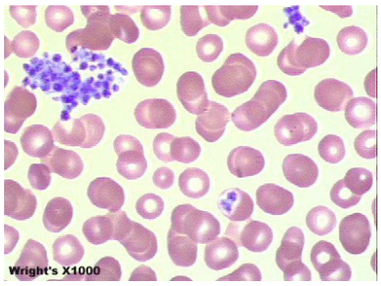
Giant platelets



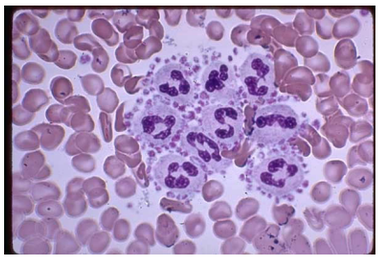
Platelet clumping:

A falsely low platelet count is often due to the presence of platelet aggregates/clumps in the blood sample. These aggregates usually form due to platelet activation after a faulty venesection or can be mediated by antibodies due to incompatibility to the anticoagulant EDTA. Platelet satellitism is an antibody-mediated, EDTA dependent phenomenon.

Clumping



Satellitism



It is important to ensure the correctness of an unexpectedly low platelet count. The haematology system will generate a warning message and microscopic evaluation of the platelet count is essential. Generally, a platelet count that is considered doubtful despite examination of the blood film should be reassessed with a freshly taken sample, using a different anticoagulant, e.g. citrate.

References:

1. Briggs C et al. 2000. New quantitative parameters on a recently introduced automated blood cell counter – the XE2100. *Clinical Laboratory Haematology*, 22, 345–350.
2. Briggs C et al. 2004. Assessment of an immature platelet fraction (IPF) in peripheral thrombocytopaenia. *British Journal of Haematology*, 126, 93–99.
3. Bruegel M et al. 2004. Reference values for immature granulocytes in healthy blood donors generated on the Sysmex XE-2100 automated Hematology analyser. *Sysmex Journal International*, 14(1), 5–7.
4. Segal HC et al. 2005. Accuracy of platelet counting haematology analysers in severe thrombocytopaenia and potential impact on blood transfusion. *British Journal of Haematology*, 128, 520–525.