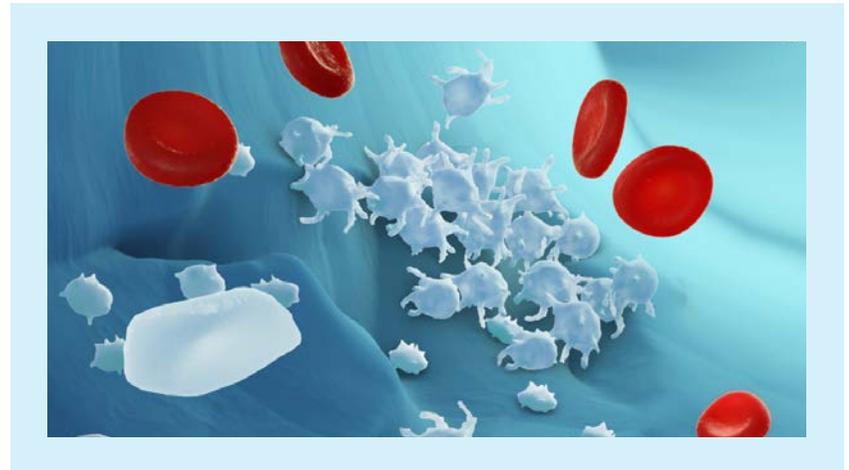


## Immediate support for determining the cause of thrombocytopenia

Differential diagnosis of thrombocytopenia is a complex process that usually covers patient history, clinical symptoms, platelet function tests and assessing routine blood-derived platelet parameters. If the cause of the low platelet concentration remains unclear, the invasive bone marrow biopsy technique is generally recommended for investigating the underlying aetiology. Since thrombocytopenia can be life-threatening, rapid diagnosis and a related decision regarding therapy is essential. A specific, fast and easily accessible blood test marker is therefore desirable to promptly discriminate between decreased bone marrow production and increased destruction or consumption in peripheral blood. The studies showed that the immature platelet fraction (IPF) parameter can help in this area.



### IMMATURE PLATELETS CLINICAL USE

Know more.  
Decide with confidence.  
Act faster.

A five-year-old girl with a history of prolonged mucocutaneous bleeding following trivial injuries and current isolated thrombocytopenia with a platelet count of  $30 \times 10^9/L$  is admitted to the haematology ward. Bleeding time, prothrombin time, activated partial thromboplastin time and thrombin time are all within the normal range. The immature platelet fraction (IPF) is highly increased to 46%. Based on the girl's unusually high IPF and other laboratory results the physician suspects hereditary macrothrombocytopenia rather than immune thrombocytopenia (ITP). A follow-up smear review reveals the presence of large platelets with high RNA content and Döhle-like inclusions within the cytoplasm of the leucocytes. Confirmatory diagnosis of May-Hegglin anomaly is made by molecular testing for the MYH9 gene.

#### What is the immature platelet fraction, or IPF?

- The percentage of immature platelets within the total platelet count, determined from a patient's peripheral blood sample.
- Immature or reticulated platelets are newly released from bone marrow reflecting its activity, and their high amount of RNA is measured by a specific fluorescence method.
- The platelet analogue of reticulocytes in red cell populations.
- IPF reference range: 1.2–8.9% [1]
- IPF is readily available from a routine laboratory analysis of an EDTA blood sample.

**Table** Aetiology of thrombocytopenia and associated IPF values. The ranges in the table are based on the literature [1, 2] and provided for guidance only; interpretation of IPF should always occur within the complete clinical context, including clinical symptoms and other laboratory tests.

Acquired	Hereditary	
Ineffective platelet production	Increased platelet destruction/consumption	Congenital macrothrombocytopenia
IPF 1.2 – 8.9%	IPF > 8.9%	IPF > 12%
<b>Bone marrow damage</b> <ul style="list-style-type: none"> <li>Neoplastic bone marrow infiltration</li> <li>Aplastic anaemia caused by chemicals, drugs or infections</li> <li>Chronic ITP with apoptotic megakaryocytes</li> </ul>	<b>Immune causes</b> <ul style="list-style-type: none"> <li>Immune thrombocytopenia (ITP)</li> <li>Heparin-induced thrombocytopenia (HIT) type II</li> </ul>	<b>IPF &gt; 12%</b> <ul style="list-style-type: none"> <li>Bernard-Soulier syndrome</li> <li>ACTN1-related thrombocytopenia</li> <li><math>\alpha\delta</math>-storage pool disease</li> <li>Variant form of Glanzmann thrombasthenia</li> </ul>
<b>Ineffective production</b> <ul style="list-style-type: none"> <li>Megaloblastic anaemia</li> </ul>	<b>Non-immune causes</b> <ul style="list-style-type: none"> <li>Thrombotic thrombocytopenic purpura (TTP)</li> <li>Haemolytic uraemic syndrome (HUS)</li> <li>Disseminated intravascular coagulation (DIC)</li> <li>HIT type I</li> <li>Bleeding</li> </ul>	<b>IPF &gt; 40%</b> <ul style="list-style-type: none"> <li>May-Hegglin MYH9 disorders</li> </ul>

## References

- [1] L van Pelt J et al. (2022): Reference intervals for Sysmex XN hematological parameters as assessed in the Dutch Lifelines cohort. *Clin Chem Lab Med.* 60(6): 907–920.
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## IPF and differential diagnosis of thrombocytopenia

The haematological parameter ‘immature platelet fraction’ (IPF) supports differential diagnosis of thrombocytopenia.

- IPF was not found to be increased when thrombocytopenia is caused by decreased platelet production in bone marrow (aplastic pathology) [3–6].
- IPF was found to be increased when thrombocytopenia is caused by increased destruction or loss of platelets in peripheral blood (consumptive pathology) [3–6].
- IPF was found to be highest in hereditary macrothrombocytopenia; generally higher than in consumptive thrombocytopenia [2].

## Your benefits

- Knowing the immature platelet fraction can help avoid invasive bone marrow biopsies. This is far more comfortable for the patient and saves costs and time.
- The IPF parameter is readily available from a routine blood test in the laboratory, and may be ordered and processed together with the complete blood count.
- Since younger platelets are not necessarily larger, the IPF can better discriminate between the causes of thrombocytopenia than the mean platelet volume (MPV) and is reported reliably even with very low platelet counts.
- The earlier the disease is identified and treated, the less expensive and more effective treatment will be.

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