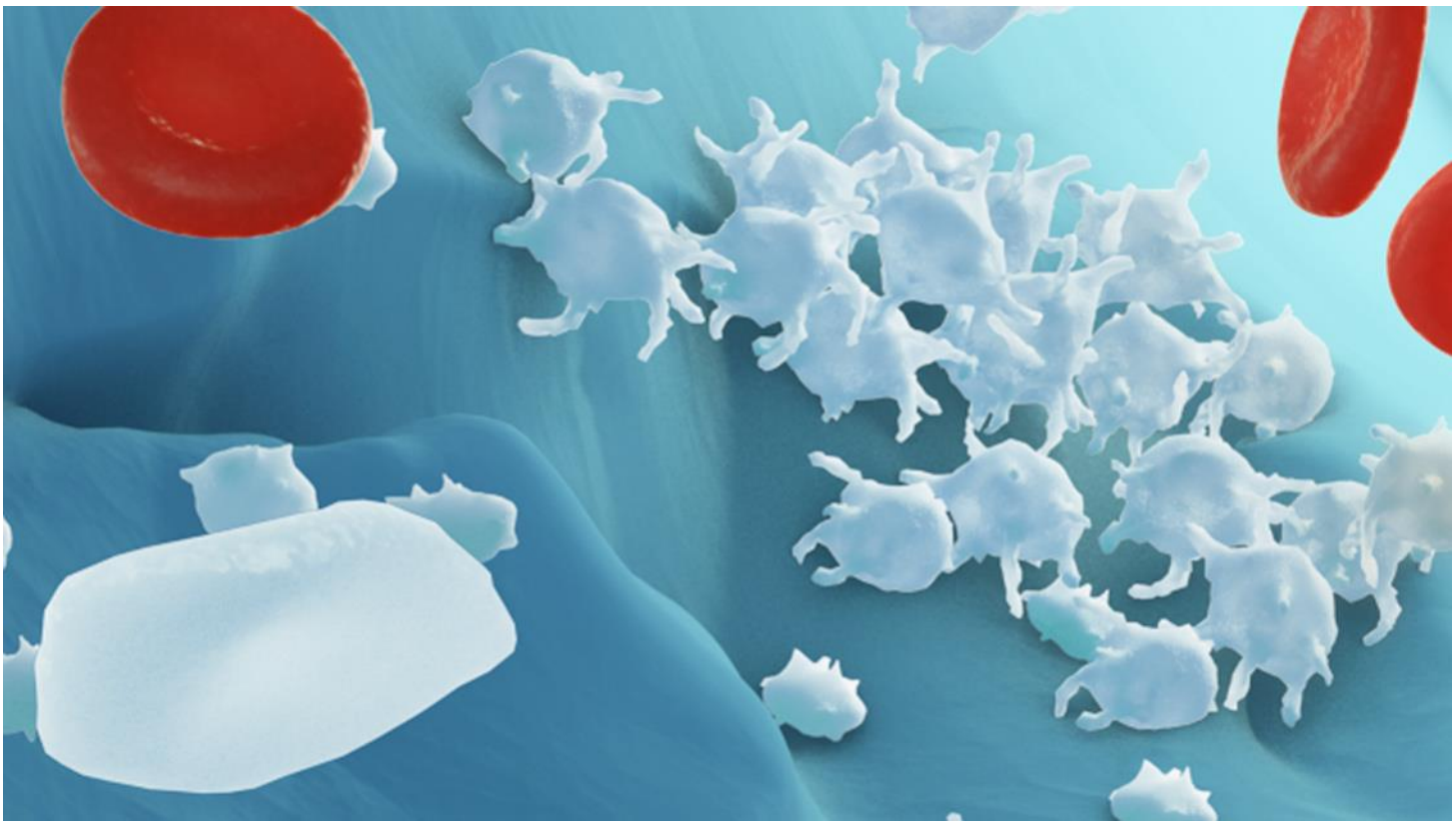
Literature List – Platelets

Customer Information

June 2022



Date: June 2022
Subject: Customer Literature List – Platelets
Issued by: Scientific Customer Services
Number: 2022 - 01
Note: Whether references are given in British or American English depends on the original.

NEW New entries are highlighted by this icon.

Bornbarch 1, 22848 Norderstedt, Germany · Phone +49 40 52726-0 · Fax +49 40 52726-100
info@sysmex-europe.com · **www.sysmex-europe.com**

Table of Contents

Fluorescence platelets (PLT-F)

Tantanate C *et al*. (2019)

Analytical performance of automated platelet counts and impact on platelet transfusion guidance in patients with acute leukemia.
Scand J Clin Lab Invest; 79(3): 160

https://www.tandfonline.com/doi/abs/10.1080/00365513.2019.1576100?journalCode=iclb20

What we see as the essence: In this study the performance of impedance platelet counting using PLT-I, LH-750 (PLT-LH), as well as PLT-F was analysed in patients with acute leukaemia. PLT-F demonstrated an excellent performance for the identification of thrombocytopenia and had the lowest rate of under transfusion. Additionally, the authors found that a high blast count is associated with inaccurate PLT-LH and PLT-I counts.

Tantanate C *et al*. (2017)

Performance Evaluation of Automated Impedance and Optical Fluorescence Platelet Counts Compared With International Reference Method in Patients With Thalassemia.
Arch Pathol Lab Med; 141(6): 830

Free online: http://www.archivesofpathology.org/doi/pdf/10.5858/arpa.2016-0222-OA

What we see as the essence: PLT-I, PLT-O and PLT-F in thalassaemia patients were compared with CD41/CD61 immune flow cytometry. PLT-O and PLT-F had better correlations with flow cytometry than PLT-I. PLT-F had a better specificity for detection of PTL counts below 100,000/µL.

Wada A *et al*. (2015)

Accuracy of a New Platelet Count System (PLT-F) Depends on the Staining Property of Its Reagents.
PLoS One; 10(10)

Free online: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141311

What we see as the essence: The study showed that the PLT-F reagent labels intracellular structures within platelets and confirms previous findings that it strongly marks CD41/CD61-positive platelets.

Park SH *et al*. (2015)

The Sysmex XN-2000 Hematology Autoanalyzer Provides a Highly Accurate Platelet Count than the Former Sysmex XE-2100 System Based on Comparison with the CD41/CD61 Immunoplatelet Reference Method of Flow Cytometry.
Ann Lab Med; 34(6): 471

Free online: http://pdf.medrang.co.kr/Kjlm/2014/034/Kjlm034-06-10.pdf

What we see as the essence: PLT-F counts from the XN-Series were more accurate than PLT-O counts from the XE-series when compared with the CD41/CD61 immunoplatelet reference method.

Tailor H *et al*. (2014)

Evaluating platelet counting on a new automated analyser.
Hospital Health Care Europe (HHE); 2: 181

http://hospitalhealthcare.com/news/evaluating-platelet-counting-on-a-new-automated-analyser/

What we see as the essence: The PLT-F channel of the XN-Series shows excellent precision and accuracy even in abnormal samples or samples with fragmented red cells, large platelets and low PLT counts when compared to the reference flow cytometric method.

Tanaka Y *et al*. (2014)

Performance Evaluation of Platelet Counting by Novel Fluorescent Dye Staining in the XN-Series Automated Hematology Analyzers.
J Clin Lab Anal; 28(5): 341

http://onlinelibrary.wiley.com/doi/10.1002/jcla.21691/abstract

What we see as the essence: Compared to PLT-I and PLT-O counts, PLT-F had the best correlation with CD61-immunoplatelet counts. PLT-F counts were not affected by WBC fragments in two acute leukaemia patients or by RBC fragments and microcytes in a burn injury patient.

Schoorl M *et al*. (2013)

New fluorescent method (PLT-F) on Sysmex XN2000 hematology analyzer achieved higher accuracy in low platelet counting.
Am J Clin Pathol;140: 495

https://academic.oup.com/ajcp/article/140/4/495/1760656

What we see as the essence: The PLT-F method of the XN-2000 demonstrated excellent reproducibility in samples with low platelet counts. Therefore, it is recommended for making decisions about platelet transfusions.

Optical platelets (PLT-O)

Briggs C *et al*. (2004)

The most accurate platelet count on the Sysmex XE-2100. Optical or impedance?
Clin Lab Haematol; 26: 157

http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2257.2004.00596.x/abstract

What we see as the essence: The accuracy of the XE-2100 platelet counting on chemotherapy samples with low counts is excellent when the switching algorithm is used. The optical count is not always the most accurate and the overriding of the algorithm is not good practice.

Immature platelet fraction (IPF)

NEW

Looi K *et al*. (2021)

Evaluation of immature platelet fraction as a marker of dengue fever progression.
Int J Inf Dis; 110: 187

Freeonline: https://linkinghub.elsevier.com/retrieve/pii/S1201-9712(21)00604-4

What we see as the essence: This study evaluated the trend of immature platelet fraction (IPF) as an early recovery indicator of platelets in dengue patients. Patients with severe dengue had higher IPF and stronger thrombocytopenia compared to non-severe dengue. The increase in IPF preceded platelet recovery by at least 3 days.

Jones N *et al*. (2021)

Immature platelet indices alongside procalcitonin for sensitive and specific identification of bacteremia in the intensive care unit.
Platelets; 7: 32(7): 941

https://www.tandfonline.com/doi/abs/10.1080/09537104.2020.1809646?journalCode=iplt20

What we see as the essence: The study results demonstrate the predictive power of IPF and IPF# for identification of bacteremia in ICU patients as individual parameters and even more by calculating the change in these parameters between day 1 and 2 of ICU stay (ΔIPF, ΔIPF#). The use of a combination of ΔIPF (cut-off > 1.95%) and day 2 PCT (cut-off > 0.57 ng/ml) has a PPV of 100% and a NPV of 96.1% and thereby accurately ruling out patients from a diagnosis of bacteremia.

Zhao Y *et al*. (2020)

The Prognostic Value of Reticulated Platelets in Patients With Coronary Artery Disease: A Systematic Review and Meta-Analysis.
Front Cardiovasc Med; 7: 578041

Free online: https://journals.lww.com/md-journal/Fulltext/2020/02140/Immature_platelet_fraction__A_useful_marker_for.42.aspx

What we see as the essence: This comprehensive metanalysis revealed that the level of immature platelets might be a useful prognostic biomarker for adverse cardiovascular events in patients with coronary artery disease even after adjustment for other prognostic factors.

Jeon MJ *et al*. (2020)

Immature platelet fraction based diagnostic predictive scoring model for immune thrombocytopenia.
Korean J Intern Med; 35(4): 970

Free online: https://journals.lww.com/md-journal/Fulltext/2020/02140/Immature_platelet_fraction__A_useful_marker_for.42.aspx

What we see as the essence: The authors concluded that immature platelet fraction (IPF) could be a useful parameter to distinguish immune thrombocytopenia (ITP) from other causes of thrombocytopenia. They developed the predictive scoring model that could predict ITP with high probability.

Jeon K *et al*. (2020)

Immature platelet fraction: A useful marker for identifying the cause of thrombocytopenia and predicting platelet recovery.
Medicine (Baltimore); 99(7): e19096

Free online: https://www.kjim.org/journal/view.php?doi=10.3904/kjim.2019.093

What we see as the essence: The authors demonstrated that the IPF is an excellent marker for distinguishing hyperdestructive/consumptive from hypoproductive thrombocytopenia. Moreover, IPF is a robust and reliable predictor of platelet recovery in patients with immune thrombocytopenia (ITP) and with malignancies undergoing chemotherapy.

El-Gamal RA *et al*. (2020)

Combined Immature Platelet Fraction and Schistocyte Count to Differentiate Pregnancy-Associated Thrombotic Thrombocytopenic Purpura from Severe Preeclampsia/Haemolysis, Elevated Liver Enzymes, and Low Platelet Syndrome (SPE/HELLP).
Indian J Hematol Blood Transfus; 36(2): 316

https://link.springer.com/article/10.1007/s12288-019-01200-y

What we see as the essence: IPF and manual schistocyte counts were able to discriminate pregnancy-associated severe preeclampsia/haemolysis, elevated liver enzymes, and low platelet syndrome (SPE/HELLP) versus thrombotic thrombocytopenic purpura (TTP) patients. The model based on combination of parameters had a good predictive value to discriminate TTP from SPE/HELLP - sensitivity of 92.3%, specificity of 62.5% and AUC 0.827.

Buttarello M *et al*. (2020)

Reticulated platelets and immature platelet fraction: Clinical applications and method limitations.
Int J Lab Hematol; 42(4): 363

https://onlinelibrary.wiley.com/doi/full/10.1111/ijlh.13177

What we see as the essence: Thorough review about reticulated platelets and immature platelet fraction including overview of preanalytical and analytical limitations of methods and clinical applications.

Thorup C *et al*. (2019)

Immature Platelets As a Predictor of Disease Severity and Mortality in Sepsis and Septic Shock - A Systematic Review.
Semin Thromb Hemost; 46(3): 320

https://www.thieme-connect.com/products/ejournals/abstract/10.1055/s-0039-3400256

What we see as the essence: Based on nine studies the review highlighted that an increased number of immature platelets is associated with increase disease severity and mortality in patients with sepsis and septic shock.

Perl L *et al*. (2019)

Prognostic significance of reticulated platelet levels in diabetic patients with stable coronary artery disease.
Platelets; 17: 1

https://www.tandfonline.com/doi/abs/10.1080/09537104.2019.1704712?journalCode=iplt20/

What we see as the essence: In stable coronary artery disease patients with diabetes the increased levels of immature platelets (IPF) are associated with a higher risk of major adverse cardiovascular events and inversely correlated with the risk of bleeding.

Van De Wyngaert Z *et al*. (2019)

Immature platelet fraction (IPF): A reliable tool to predict peripheral thrombocytopenia.
Curr Res Transl Med; 68(1): 37

https://www.sciencedirect.com/science/article/pii/S2452318619300170?via%3Dihub

What we see as the essence: This retrospective study found that IPF higher than 13 % is predictive of peripheral thrombocytopenia. In isolated thrombocytopenia bone marrow aspiration could have been avoided in 66% of patients in this study cohort.

Johnson S *et al*. (2019)

A CBC algorithm combined with immature platelet fraction is able to identify JAK2 V617F mutation-positive polycythaemia vera patients.
Int J Lab Hematol; 41(2): 271

https://onlinelibrary.wiley.com/doi/abs/10.1111/ijlh.12967

What we see as the essence: The study proposes an algorithm based on CBC and IPF# parameters that allows to identify a cohort of high-likelihood polycythaemia vera (PV) patients and refer them for haematological review. IPF# > 20 $\times 10^9$/L in combination with positive CBC criteria can identify JAK2 V617F mutation-positive PV patients.

Bernstein U *et al*. (2019)

The immature platelet fraction in hypertensive disease during pregnancy.
Arch Gynecol Obstet; 299(6): 1537

https://link.springer.com/article/10.1007/s00404-019-05102-2

What we see as the essence: This study shows that IPF% can be used to identify hypertensive diseases in pregnancy. Moreover, the absolute number of IPF and platelets could help to differentiate preeclampsia and HELLP syndrome.

Hannawi B *et al*. (2018)

Reticulated Platelets - Changing Focus from Basics to Outcomes.
Thromb Haemost; 118(9): 1517

https://www.thieme-connect.com/DOI/DOI?10.1055/s-0038-1667338

What we see as the essence: The authors discussed the role of reticulated platelets in coronary artery disease and in hypo responsiveness to the commonly used anti-platelet drugs. Reticulated platelets may be a useful marker for predicting worse cardiovascular outcome.

Buoro S *et al*. (2018)

Innovative haematological parameters for early diagnosis of sepsis in adult patients admitted in intensive care unit.
J Clin Pathol; 71(4): 330

http://jcp.bmj.com/content/71/4/330.long

What we see as the essence: The combination of an increased value of IPF# and a decreased value of RET% 24 hours before the onset of sepsis in ICU patients may be considered an early, rapid, inexpensive and widely available measure of sepsis prediction.

Sakuragi M *et al*. (2018)

Immature platelet fraction (IPF) as a predictive value for thrombopoietic recovery after allogeneic stem cell transplantation.
Int J Hematol; 107(3): 320

https://link.springer.com/article/10.1007%2Fs12185-017-2344-8

What we see as the essence: IPF was able to predict platelet recovery in patients after allogeneic haematopoietic stem cell transplantation in 5 out of 11 patients, while IPF# was able to predict recovery in 7 out of 11 patients. Cut-offs of 5.8 % and 200/µL were used, respectively.

Pedersen OH *et al*. (2017)

Recurrent Cardiovascular Events Despite Antiplatelet Therapy in a Patient with Polycythemia Vera and Accelerated Platelet Turnover.
Am J Case Rep; 18: 945

https://www.amjcaserep.com/abstract/index/idArt/904148

What we see as the essence: The case report illustrates that insufficient platelet inhibition with clopidogrel monotherapy in a patient with thrombocytosis may be associated with recurrent arterial thrombosis. A plausible explanation may be an accelerated platelet turnover reflected by an increased number of immature platelets.

Anetsberger A *et al*. (2017)

Immature platelets as a novel biomarker for adverse cardiovascular events in patients after non-cardiac surgery.
Thromb Haemost; 117(10): 1887

https://www.thieme-connect.com/DOI/DOI?10.1160/TH16-10-0804

What we see as the essence: IPF with optimal cut-off of > 5.4% is an independent predictor of major adverse cardiovascular events, deep vein thrombosis or pulmonary embolism (modMACE) after non-cardiac surgery and improve risk stratification of surgical patients.

Buoro S *et al*. (2017)

Abnormal leukocyte scattergrams and immature platelet fraction on Sysmex XN-9000 analyzer: a new diagnostic tool for altered megakaryopoiesis?
Scand J Clin Lab Invest; 77(1): 73

https://www.tandfonline.com/doi/full/10.1080/00365513.2016.1262057

What we see as the essence: This case report shows how a high IPF, combined with abnormal WNR, WDF and WPC scattergrams could be used as a marker of dysmegakaryopoiesis, and led to the diagnosis of MDS type 2-refractory anaemia with excess blasts (REAB-2) in a nine year-old girl.

Ferreira FLB *et al*. (2017)

Evaluation of the immature platelet fraction contribute to the differential diagnosis of hereditary, immune and other acquired thrombocytopenias.
Sci Rep; 7(1): 3355

Free online: http://www.nature.com/articles/s41598-017-03668-y

What we see as the essence: The authors evaluated the use of IPF in the differential diagnosis between ITP and hereditary macrothrombocytopenia (HM). The IPF values were higher in HM than in ITP as already demonstrated by other studies.

Freynhofer MK *et al*. (2017)

Platelet turnover predicts outcome after coronary intervention.
Thromb Haemost; 117(5): 923

Free online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5442606/

What we see as the essence: An elevated platelet turnover independently predicts major adverse cardiovascular events after percutaneous coronary intervention. The optimal cut-off value was at IPF = 3.35 %.

Jaing TH *et al*. (2016)

Assessment of platelet activation and immature platelet fraction as predictors of platelet engraftment after hematopoietic stem cell transplantation.
Cell Transplant; 25: 1259

http://www.ingentaconnect.com/content/cog/ct/2016/00000025/00000007/art00005

What we see as the essence: The study showed that IPF (XE-2100) can be used to assess thrombopoietic recovery after stem cell transplantation. Patients in the cord blood group had a higher IPF than the peripheral blood group on day 56 and day 97 post-transplantation.

Moraes D *et al*. (2016)

Immature platelet fraction in hypertensive pregnancy.
Platelets; 27(4): 333

https://www.ncbi.nlm.nih.gov/pubmed/26587995

What we see as the essence: IPF% measured on the XE-5000 in pregnant women suffering hypertensive disorders was higher than in control group (3.8, 2.4–5.1 %; 8.6, 5.8–10.6 %; 7.3, 4.2–10.2%; $p < 0.001$ for control group, preeclampsia syndrome and non-proteinuric hypertension, resp.).

Cremer M *et al*. (2016)

Thrombocytopenia and platelet transfusion in the neonate.
Seminars in Fetal & Neonatal Medicine; 21(1): 10

Free online: http://www.sfnmjournal.com/article/S1744-165X(15)00128-6/fulltext

What we see as the essence: The review summarises the pathophysiology and current management (including platelet transfusion thresholds) of neonatal thrombocytopenia. Novel index score for bleeding risk in thrombocytopenic neonates is proposed (including IPF#).

Hong H *et al*. (2015)

Absolute immature platelet count dynamics in diagnosing and monitoring the clinical course of thrombotic thrombocytopenic purpura.
Transfusion; 55(4): 756

http://onlinelibrary.wiley.com/doi/10.1111/trf.12912/abstract

What we see as the essence: The absolute IPF (from XE-5000) is useful to diagnose and to monitor the clinical course of therapeutic plasma exchange in TTP patients. Routine analysis of the absolute IPF is recommended for diagnosis and to better assess the need for adjustment of treatment.

Morkis IVC *et al*. (2015)

Assessment of immature platelet fraction and immature reticulocyte fraction as predictors of engraftment after hematopoietic stem cell transplantation.
Int J Lab Hematol; 37(2): 259

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12278/abstract

What we see as the essence: Both IRF% and IPF% can be used to predict neutrophil and platelet recovery, respectively. Work was done on XE-5000.

Mao W *et al*. (2015)

Immature platelet fraction values predict recovery of platelet counts following liver transplantation.
Clin Res Hepatol Gastroenterol; 39(4): 469

http://www.sciencedirect.com/science/article/pii/S2210740114002940

What we see as the essence: IPF% value predict recovery of PLT counts after liver transplantation. PLT counts reached the pre-transplant levels at 3-4 days after the IPF% peak value.

Greene LA *et al*. (2015)

Beyond the platelet count: immature platelet fraction and thromboelastometry correlate with bleeding in patients with immune thrombocytopenia.
Br J Haematol; 166(4): 592

http://onlinelibrary.wiley.com/doi/10.1111/bjh.12929/abstract

What we see as the essence: The IPF# demonstrated stronger correlation with acute bleeding score than platelet counts. The strongest correlation was seen for paediatric patients with platelet counts <30 x10^9/L. High IPF# was associated with low bleeding score.

Miyazaki K *et al*. (2015)

Immature platelet fraction measurement is influenced by platelet size and is a useful parameter for discrimination of macrothrombocytopenia.
Hematology; 20(10): 587

http://www.tandfonline.com/doi/abs/10.1179/1607845415Y.0000000021?journalCode=yhem20

What we see as the essence: The IPF% values were about five times higher in May-Hegglin disorders (IPF 48.6 ± 1.9 %) and about twice as high in other macrothrombocytopenias (IPF 18.4 ± 2.1 %) than in ITP patients with similar platelet counts (IPF 9.2 ± 0.3 %).

Sakuragi M *et al*. (2015)

Clinical significance of IPF% or RP% measurement in distinguishing primary immune thrombocytopenia from aplastic thrombocytopenic disorders.
Int J Hematol; 101(4): 369

http://link.springer.com/article/10.1007%2Fs12185-015-1741-0

What we see as the essence: IPF% from the XN-1000 and RP% obtained by immuno flow cytometry had a comparable diagnostic value for the distinction between controls, immune thrombocytopenia (due to platelet destruction) and aplastic thrombocytopenia.

Adly AA *et al*. (2015)

Evaluation of the immature platelet fraction in the diagnosis and prognosis of childhood immune thrombocytopenia.
Platelets; 26(7): 645

http://informahealthcare.com/doi/abs/10.3109/09537104.2014.969220

What we see as the essence: IPF% obtained from the XE-2100 was increased in immune thrombocytopenia patients but not in patients with haematological malignancies. Therefore, IPF% may be used to evaluate the thrombopoietic state of the bone marrow.

Dadu T *et al*. (2014)

Evaluation of the IPF as an indicator of PLT recovery in dengue patients.
Int J Lab Hematol; 36(5): 499

http://www.ncbi.nlm.nih.gov/pubmed/25356498

What we see as the essence: IPF can be used to monitor the thrombocytopenia in patients with dengue fever. Furthermore, it can predict the recovery of PLT and so avoid unnecessary blood transfusions.

Everett TR *et al*. (2014)

Immature platelet fraction analysis demonstrates a difference in thrombopoiesis between normotensive and preeclamptic pregnancies.
Thromb Haemost; 111(6): 1177

http://th.schattauer.de/en/contents/archive/issue/1870/manuscript/20753.html

What we see as the essence: The study illustrates the potential utility of IPF as a parameter to distinguish between normotensive and preeclamptic pregnant women. The authors suggest that IPF is a far better parameter than MPV, which has previously been suggested for this purpose, and can distinguish between the two groups even at normal platelet counts.

Van der Linden N *et al*. (2014)

Immature platelet fraction (IPF) measured on the Sysmex XN haemocytometer predicts thrombopoietic recovery after autologous stem cell transplantation.
Eur J Haematol; 93(2): 150

http://onlinelibrary.wiley.com/doi/10.1111/ejh.12319/abstract

Quote: "IPF is a promising predictor of platelet recovery in patients after autologous SCT." "The proposed cut-off value of 5.3% can theoretically be used to decide whether or not to give a platelet transfusion."

Ibrahim H *et al*. (2014)

Association of Immature Platelets With Adverse Cardiovascular Outcomes.
J Am Coll Cardiol; 64: 2122

Free online: http://www.sciencedirect.com/science/article/pii/S0735109714062147

What we see as the essence: IPF# (XE-2100) allows for stratification of patients with coronary artery disease in terms of risk for future adverse events. Patients with an IPF# level ≥ 7,632 /µL were more likely to experience an adverse event (hazard odds ratio: 4.65; $p < 0.002$).

Bat T *et al*. (2013)

Measurement of the absolute immature platelet number reflects marrow production and is not impacted by platelet transfusion.
Transfusion; 53(6): 1201

http://onlinelibrary.wiley.com/doi/10.1111/j.1537-2995.2012.03918.x/abstract

What we see as the essence: Absolute IPF is a good parameter to assess the megakaryocytic activity of the bone marrow in transfusion-dependent thrombocytopenic patients.

Cesari F *et al*. (2013)

Reticulated platelets predict cardiovascular death in acute coronary syndrome patients. Insights from the AMI-Florence 2 Study.
Thrombosis and Haemostasis; 109: 846

Free online: http://dx.doi.org/10.1160/TH12-09-0709

What we see as the essence: Reticulated (immature) platelets may be independent predictors of cardiovascular death and may potentially be useful in improving risk stratification for acute coronary syndrome patients.

Cremer M *et al*. (2013)

Low immature platelet fraction suggests decreased megakaryopoiesis in neonates with sepsis or necrotizing enterocolitis.
J Perinatol; 33(8): 622

http://www.nature.com/jp/journal/vaop/ncurrent/full/jp201321a.html

What we see as the essence: Low absolute IPF values during the course of neonatal sepsis/necrotising enterocolitis suggest suppression of megakaryopoietic activity.

Funck-Jensen K *et al*. (2013)

Increased platelet aggregation and turnover in the acute phase of ST-elevation myocardial infarction.
Platelets; 24(7): 528

http://informahealthcare.com/doi/abs/10.3109/09537104.2012.738838

What we see as the essence: Increased platelet turnover, indicated by IPF and MPV, was observed in the acute phase of ST-elevated myocardial infarction and may partly explain reduced efficacy of oral antiplatelet drugs.

Sinclair L (2012)

The immature platelet fraction: where is it now?
Aust J Med Sci; 33(1): 10

http://search.informit.com.au/documentSummary;dn=122594560112708;res=IELHEA

What we see as the essence: A clear and concise review of 53 original publications concerning the clinical value of IPF. The diagnostic and prognostic potential of IPF in various conditions, and also advantages and limitations of IPF are described.

Sinclair L (2012)

The immature platelet fraction: an assessment of its application to a routine clinical laboratory.
Aust J Med Sci; 33(2): 48

http://search.informit.com.au/documentSummary;dn=548339320391320;res=IELHEA

What we see as the essence: The purpose of the review is to assess the suitability of the IPF% as a routine test. Productivity rather than clinical value is discussed. Reference ranges are given.

Psaila B *et al*. (2012)

In vivo effects of eltrombopag on platelet function in immune thrombocytopenia: no evidence of platelet activation.
Blood; 119: 4066

Free online: http://bloodjournal.hematologylibrary.org/cgi/pmidlookup?view=long&pmid=22294727

What we see as the essence: IPF% was higher in patients with ITP than the controls, reflecting the increased platelet production. Treatment with eltrombopag led to increased platelet counts, platelet size, and absolute IPF, but no significant change in IPF%.

Parco S *et al.* (2012)

Application of reticulated platelets to transfusion management during autologous stem cell transplantation.
OncoTargets and Therapy; 5: 1

Free online: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278260/pdf/ott-5-001.pdf

What we see as the essence: Using IPF-rich platelet transfusions reduces the number of transfusions and bleedings after stem cell transplantation in paediatric patients.

Zucker ML *et al*. (2012)

Mechanism of thrombocytopenia in chronic hepatitis C as evaluated by the immature platelet fraction.
Int J Lab Hematol; 34: 525

http://onlinelibrary.wiley.com/doi/10.1111/j.1751-553X.2012.01429.x/abstract

What we see as the essence: IPF% can support the differentiation between platelet destruction and bone marrow failure in hepatitis C patients.

Barsam SJ *et al.* (2011)

Platelet production and platelet destruction: assessing mechanisms of treatment effect in immune thrombocytopenia.
Blood 117; 5723

Free online: http://bloodjournal.hematologylibrary.org/content/117/21/5723.full.pdf+html

What we see as the essence: The absolute immature platelet count (IPF#) can be used to assess the effect of different treatments of immune thrombocytopenia and could in such cases be more useful than IPF%.

Goncalo A *et al.* (2011)

Predictive value of immature reticulocyte and platelet fractions in hematopoietic recovery of allograft patients.
Transplant Proc; 43: 241

http://www.transplantation-proceedings.org/article/S0041-1345(10)01945-7/abstract

What we see as the essence: The immaturity fractions IPF and IRF offer an easy and early evaluation method of post-transplantational recovery of the bone marrow.

Strauss G *et al*. (2010)

Immature Platelet Count: A Simple Parameter for Distinguishing Thrombocytopenia in pediatric acute lymphocytic leukemia from immune thrombocytopenia.
Pediatr Blood Cancer; 57(4): 641

http://onlinelibrary.wiley.com/doi/10.1002/pbc.22907/abstract

What we see as the essence: "Both IPF% and IPF# parameters should become a standard for evaluating the respective pathophysiology's underlying both congenital and acquired thrombocytopenias."

Cesari F *et al*. (2010)

High platelet turnover and reactivity in renal transplant recipients patients.
Thrombosis and Haemostasis; 104: 804

http://dx.doi.org/10.1160/TH10-02-0124

What we see as the essence: Renal transplant recipients showed significantly higher values of reticulated platelets (IPF) than healthy control subjects, especially in those not on aspirin treatment. An elevated IPF% could be an additional hint for a mechanism involved in the increased cardiovascular risk profile of those patients.

Yamaoka G *et al.* (2010)

The immature platelet fraction is a useful marker for predicting the timing of platelet recovery in patients with cancer after chemotherapy and hematopoietic stem cell transplantation.
Int J Lab Hematol; 32: e208

Free online: http://onlinelibrary.wiley.com/doi/10.1111/j.1751-553X.2010.01232.x/pdf

What we see as the essence: An IPF% of above 10% is a useful marker for predicting the timing of platelet recovery after chemotherapy and haematopoietic stem cell transplantation and has the potential to facilitate optimal platelet transfusion.

Hong KH *et al*. (2009)

Prognostic value of immature platelet fraction and plasma thrombopoietin in disseminated intravascular coagulation.
Blood Coag and Fibrinolysis; 20(6)): 409

https://journals.lww.com/bloodcoagulation/Abstract/2009/09000/Prognostic_value_of_immature_platelet_fraction_and.4.aspx

What we see as the essence: The authors demonstrated that the IPF is an excellent marker for distinguishing hyperdestructive/consumptive from hypoproductive thrombocytopenia. Moreover, IPF is a robust and reliable predictor of platelet recovery in patients with immune thrombocytopenia (ITP) and with malignancies undergoing chemotherapy.

Cremer M *et al*. (2009)

Immature platelet fraction as novel laboratory parameter predicting the course of neonatal thrombocytopenia.
Br J Haematol; 144: 619

Free online: http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2141.2008.07485.x/pdf

What we see as the essence: If the IPF is high, thrombocytopenic neonates are likely to recover on their own.

Takami A *et al*. (2007)

Immature platelet fraction for prediction of platelet engraftment after allogeneic stem cell transplantation.
Bone Marrow Transplant; 39: 501

Free online: http://www.nature.com/bmt/journal/v39/n8/pdf/1705623a.pdf

What we see as the essence: IPF counting can provide an accessible marker of engraftment after transplantation, especially of thrombopoietic activity.

Abe Y *et al*. (2006)

A simple technique to determine thrombopoiesis level using immature platelet fraction (IPF).
Thromb Res; 118: 463

http://www.sciencedirect.com/science/article/pii/S0049384805003853

What we see as the essence: The results show that the IPF reflects the pathology of thrombocytopenic disorders (i.e. consumptive versus productive). Measurement of the IPF is useful for the differential diagnosis and analysis of platelet kinetics and significantly more so than the mean platelet volume (MPV).

Briggs C *et al.* (2006)

Immature platelet fraction measurement: a future guide to platelet transfusion requirement after haematopoietic stem cell transplantation.
Transfus Med; 16: 101

http://onlinelibrary.wiley.com/doi/10.1111/j.1365-3148.2006.00654.x/abstract

What we see as the essence: The automated IPF is a useful parameter in the clinical evaluation of the thrombocytopenic patient and has the potential to allow optimal transfusion of platelet concentrates.

Kickler T *et al*. (2006)

A clinical evaluation of high fluorescent platelet fraction percentage in thrombocytopenia.
Am J Clin Pathol; 125: 282

Free online: http://ajcp.ascpjournals.org/content/125/2/282.long

What we see as the essence: The IPF (here named HFPF for ‘high fluorescence platelet fraction’) was predictive in the evaluation of thrombocytopenia. An elevated IPF is found with increased platelet production, particularly associated with platelet destruction, and in disorders associated with decreased platelet production the IPF is normal.

Briggs C *et al*. (2004)

Assessment of an immature platelet fraction (IPF) in peripheral thrombocytopenia.
Br J Haematol; 126: 93

http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2141.2004.04987.x/abstract

What we see as the essence: Automated IPF% measurement should become a standard parameter in evaluating the thrombocytopenic patient.

General

NEW

Shaikh MS *et al.* (2021)

Ensuing adequate mixing of blood samples before analysis—A proposed method for verification of satisfactory sample mixing by automated red blood cell count analyzers.
Int J Lab Hematol; 43(3): e141

https://onlinelibrary.wiley.com/doi/full/10.1111/ijlh.13447

What we see as the essence: The authors report an excellent correlation (r value of 0.99) between manual and automated blood sample mixing with a minimal bias (0.009), proving an exceptional pre-analysis mixing of samples on the XN-1000 analyser.

Ortiz A *et al.* (2020)

Performance Comparison of Sysmex Hematology Analyzers XN-550 and XN-10.
Sysmex J Int; 30(1): 9

Free online: https://www.sysmex.co.jp/en/products_solutions/library/journal/vol30_no1/summary02.html

What we see as the essence: The XN-550 is highly reliable with functionality comparable to the XN-10. It has shown high correlation coefficients and excellent comparative performance in all CBC, DIFF and RET parameters (except BASO%). The overall flagging comparison was excellent among the XN-10, the XN-550 and the manual differential.

Cao J *et al.* (2017)

Establishing a Stand-Alone Laboratory Dedicated to the Care of Patients With Ebola Virus Disease.
Lab Med; 48(2): 188

https://doi.org/10.1093/labmed/lmw072

What we see as the essence: The pocH-100*i* was used in a laboratory dedicated to detection of Ebola virus disease. Its accuracy was verified by comparison with the XE-2100 in the main laboratory, and its precision and reportable range were also consistent with Sysmex's claims.

Van Dievoet MA *et al*. (2016)

Performance evaluation of the Sysmex® XP-300 in an oncology setting: evaluation and comparison of hematological parameters with the Sysmex® XN-3000.
Int J Lab Hematol; 38(5): 490

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12522/abstract

What we see as the essence: The XP-300 showed very good precision and linearity results, comparable with the XN-3000 analyser.

Cornet E *et al*. (2016)

Evaluation and optimization of the extended information process unit (E-IPU) validation module integrating the sysmex flag systems and the recommendations of the French-speaking cellular hematology group (GFHC).
Scand J Clin Lab Invest; 76(6): 465

http://www.tandfonline.com/doi/full/10.1080/00365513.2016.1199049?scroll=top&needAccess=true

What we see as the essence: Using the biomedical validation criteria, 21.3 % of samples triggered a smear review. Modification of four criteria reduced the number of smears from 21.3 % to 15.0 % without loss of clinical value.

Seo JY *et al*. (2015)

Performance evaluation of the new hematology analyzer Sysmex XN-series.
Int J Lab Hematol; 37(2): 155

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12237/abstract

What we see as the essence: A good correlation was found between the XN-Series and XE-series for all parameters. The XN-Series dramatically reduced the smear rate (by 58%). Even at counts below 500/µL the XN provided an accurate WBC count using the Low WBC mode.

Arneth B *et al*. (2015)

Technology and New Fluorescence Flow Cytometry Parameters in Hematological Analyzers.
J Clin Lab Anal; 29(3): 175

http://onlinelibrary.wiley.com/doi/10.1002/jcla.21747/abstract

What we see as the essence: This paper gives a good overview of the technology behind the XE-series and the benefits of flow cytometry and automatic cell counting. It shows that the XE-5000 delivers faster accurate results than older analysers.

Genevieve F *et al*. (2014)

Smear microscopy revision: propositions by the GFHC.
feuillets de Biologie; VOL LVI N° 317

Free online: http://www.gfhc.fr/upload/smear-microscopic-revision.pdf

What we see as the essence: The GFHC reviewed in detail the criteria used within the CBC to generate blood smears and has decided on a number of minimum recommendations, defining threshold values and various situations in which the blood smear review is desirable.

Briggs C *et al*. (2012)

Performance evaluation of the Sysmex haematology XN modular system.
J Clin Pathol; 65: 1024

http://jcp.bmj.com/content/65/11/1024.abstract (Available from Sysmex upon request)

What we see as the essence: The XN showed reduced sample turnaround time and reduced number of blood film reviews compared to the XE-2100 without loss of sensitivity and with more precise and accurate results for both platelets and low WBC counts.

Reference intervals

NEW

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

Freeonline: https://www.degruyter.com/document/doi/10.1515/cclm-2022-0094/html

What we see as the essence: The publication provides reference intervals for 105 XN parameters (incl. functional and cell activation parameters) based on data of 15,803 healthy individuals from the Lifelines cohort in the Netherlands. The reference intervals were calculated in accordance to the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) recommended statistical methods.

Wilson S *et al.* (2021)

Continuous reference curves for common hematology markers in the CALIPER cohort of healthy children and adolescents on the Sysmex XN-3000 system
Int J Lab Hematol; 43(6): 1394

https://onlinelibrary.wiley.com/doi/10.1111/ijlh.13670

What we see as the essence: First study that generated continuous reference intervals (curves) of healthy children and adolescents for 19 haematological XN parameters. Seven parameters required sex-specific reference curves. Continuous reference intervals were found to be accurate estimate of haematological reference ranges over the paediatric age range.

Angelo A *et al.* (2021)

Umbilical cord blood hematological parameters reference interval for newborns from Addis Ababa, Ethiopia.
BMC Pediatrics; 21: 275

Free online: https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-021-02722-z

What we see as the essence: This pilot study enrolled 139 umbilical cord blood samples from healthy newborns to establish reference values for the KX-21N. For WBC, RBC, and NEUT significant differences were found between caesarean and natural birth.

Florin L *et al.* (2020)

Establishment of common reference intervals for hematology parameters in adults, measured in a multicenter study on the Sysmex XN-series analyzer.
Int J Lab Hematol; 42(3): e110

https://onlinelibrary.wiley.com/doi/abs/10.1111/ijlh.13151

What we see as the essence: The study provides reference intervals (CBC+DIFF+RET) that could serve as reference values for haematology parameters in adults for laboratories that use the XN-Series analysers.

Bohn MK *et al.* (2020)

Complex biological patterns of hematology parameters in childhood necessitating age- and sex-specific reference intervals for evidence-based clinical interpretation.
Int J Lab Hematol; 42(6): 750

https://onlinelibrary.wiley.com/doi/10.1111/ijlh.13306

What we see as the essence: The study establishes a comprehensive paediatric (birth to 21 years) reference intervals for haematology parameters using the XN analyser. The data highlight the dynamic haematological profiles observed in healthy children and adolescents and the need for reference interval stratification by age and sex.

Ozarda Y *et al*. (2017)

A nationwide multicentre study in Turkey for establishing reference intervals of haematological parameters with novel use of a panel of whole blood.
Biochem Med (Zagreb); 27(2): 350

Free online: https://www.biochemia-medica.com/en/journal/27/2/10.11613/BM.2017.038

What we see as the essence: Using the Cell Dyn and Ruby (Abbott), LH780 (Beckman Coulter) and XT-2000i (Sysmex) analysers, Turkish reference intervals were obtained for CBC-DIFF parameters. Analyser-specific reference intervals were reported for BASO%, BASO#, MCHC, RDW and MPV.

Ianni B *et al*. (2020)

Defining Normal Healthy Term Newborn Automated Hematologic Reference Intervals at 24 Hours of Life
Arch Pathol Lab Med; 145(1): 66

Free online: https://meridian.allenpress.com/aplm/article-lookup/doi/10.5858/arpa.2019-0444-OA

What we see as the essence: Reference intervals on Sysmex XN-Series for normal healthy term newborns at 23-25 hours of life were prospectively established for CBC, IG%, IG#, IRF, RET-He, IPF and IPF#.

Arbiol-Roca A *et al.* (2018)

Reference intervals for a complete blood count on an automated haematology analyser Sysmex XN in healthy adults from the southern metropolitan area of Barcelona.
EJIFCC; 29(1): 48

Free online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5949618/

What we see as the essence: The aim of the study was to establish reference intervals for CBC, DIFF and reticulocytes for a Spanish population. Significant gender differences were found for RBC, PLT, HCT and HGB.

MacQueen BC *et al*. (2017)

The immature platelet fraction: creating neonatal reference intervals and using these to categorize neonatal thrombocytopenias.
J Perinatol; 37(7): 834

http://www.nature.com/articles/jp201748

What we see as the essence: Neonatal reference intervals for IPF and IPF# were reported according to gestational age, and during the first 90 days after birth. Moreover, neonates with hyporegenerative thrombocytopenias had lower IPF and IPF# than neonates with consumptive ones.

Ko Y *et al*. (2015)

Reference interval for immature platelet fraction on Sysmex XN hematology analyzer: a comparison study with Sysmex XE-2100.
Clin Chem Lab Med; 53(7): 1091

h https://www.degruyter.com/view/journals/cclm/53/7/article-p1091.xml

What we see as the essence: Reference intervals for PLT, IPF% and IPF# were established on the XE- and XN-Series. It was found that the values measured on the XN were higher than on the XE-2100.

Ko Y *et al.* (2013)

Establishment of reference interval for immature platelet fraction.
Int J Lab Hematol; 35(5): 528

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12049/abstract

What we see as the essence: The study provides reference intervals for PLT, IPF% and absolute IPF from more than 2,000 healthy individuals and from umbilical cord blood, according to the CLSI guideline. These results could be used as fundamental data for clinical use as well as future researches.