Literature list – platelets

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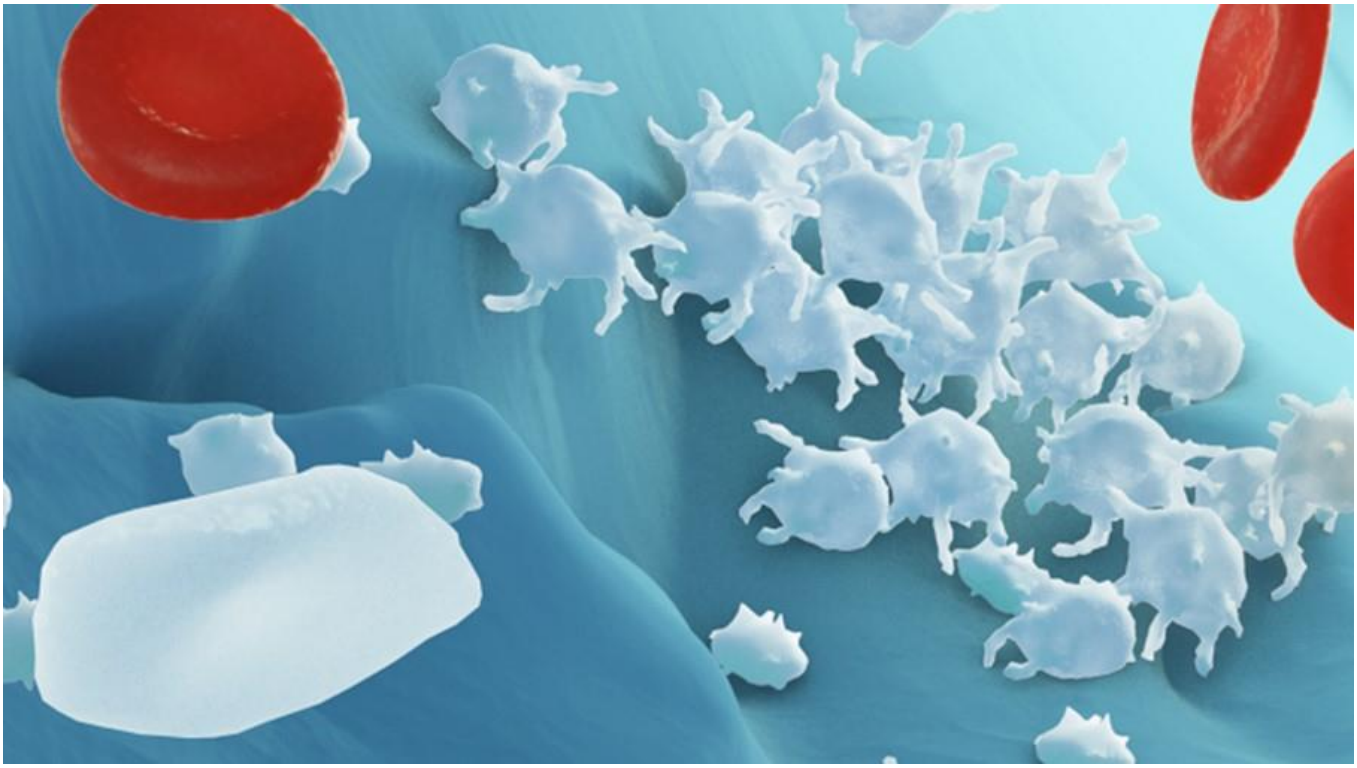

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Fluorescence platelets (PLT-F)

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

Summary: 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

Summary: PLT-I, PLT-O and PLT-F were compared with CD41/CD61 immune flow cytometry in thalassaemia patients. PLT-O and PLT-F had better correlations with flow cytometry than PLT-I and PLT-F had a better specificity for detection of PLT counts below 100,000/µL in this study.

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

Summary: 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*. (2014)

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

Summary: 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 in this study.

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/

Summary: 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 in this evaluation study.

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

Summary: 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

Summary: The PLT-F method of the XN-2000 demonstrated excellent reproducibility in samples with low platelet counts. Therefore, the authors recommended it 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

Summary: In this study different options for counting platelets on XE-2100 were compared using chemotherapy samples. The accuracy of XE-2100 platelet counting was excellent on low-count samples when the switching algorithm was applied.

Immature platelet fraction (IPF)

Kouno H *et al*. (2023)

Measurement of immature platelet fraction is useful in the differential diagnosis of MYH9 disorders.
Int J Lab Hematol; 45(5): 700

https://onlinelibrary.wiley.com/doi/10.1111/ijlh.14123

Summary: The study found that a median IPF of 48.7% in MYH9 disorders was significantly higher than in all other groups (ITP: 13.4%, MDS: 9.4%, control group: 2.6%). The authors concluded that IPF could be a useful supportive parameter in the differential diagnosis between MYH9 disorders and other types of thrombocytopenia.

Anetsberger A *et al*. (2023)

Association of immature platelets with perioperative complications in neurosurgery.
Platelets; 34(1): 2185462

Free online: https://www.tandfonline.com/doi/full/10.1080/09537104.2023.2185462

Summary: The study on 301 subjects revealed that increased levels of highly fluorescent immature platelets measured postoperatively (H-IPF ≥ 0.95%) are independently associated with an increased risk for serious complications after neurosurgical procedures (odds ratio: OR = 1.97).

Bongiovanni D *et al*. (2023)

Immature Platelet Fraction Predicts Adverse Events in Patients With Acute Coronary Syndrome: the ISAR-REACT 5 Reticulated Platelet Substudy.
Arterioscler Thromb Vasc Biol; 43(2): e83

https://www.ahajournals.org/doi/10.1161/ATVBAHA.122.318614

Summary: In acute coronary syndrome treated patients the incidence of the primary end point consisting of death, myocardial infarction or stroke was significantly higher in the IPF-high (IPF>3.6%) group compared to the IPF-low (IPF≤3.6%) group: 13.0% versus 7.2% regardless of the antiplatelet treatment used (prasugrel or ticagrelor).

Bongiovanni D *et al*. (2022)

Role of Reticulated Platelets in Cardiovascular Disease.
Arterioscler Thromb Vasc Biol; 42(5): 527

Free online: https://www.ahajournals.org/doi/10.1161/ATVBAHA.121.316244

Summary: The authors present a structured overview of preclinical and clinical findings concerning the role of reticulated platelets in cardiovascular disease. They conclude that reticulated platelets with their prothrombic features are a new biomarker that helps to identify patients at high risk for adverse ischemic events.

Looi K *et al*. (2021)

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

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

Summary: 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

Summary: 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.

Benlachgar N *et al*. (2020)

Immature platelets: a review of the available evidence.
Thromb Res; 195: 43

https://www.thrombosisresearch.com/article/S0049-3848(20)30290-5/fulltext

Summary: The authors summarized literature evidence about IPF%, # focussing on reference values, stability, correlation of IPF and MPV, and contribution of IPF to haematological and non-haematological disorders such as ITP, TTP, disseminated intravascular disorder, aplastic anaemia, MDS and cardiovascular disease, and on IPF in chemotherapy and stem cell transplantation.

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://www.frontiersin.org/articles/10.3389/fcvm.2020.578041/full

Summary: This comprehensive meta-analysis presents immature platelets as a potentially 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://www.kjim.org/journal/view.php?doi=10.3904/kjim.2019.093

Summary: 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://journals.lww.com/md-journal/Fulltext/2020/02140/Immature_platelet_fraction__A_useful_marker_for.42.aspx

Summary: The authors demonstrated that the IPF is an excellent marker for distinguishing hyperdestructive/consumptive from hypoproductive thrombocytopenia. Moreover, IPF is presented as 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

Summary: This study concluded that IPF and manual schistocyte counts can assist in differentiating pregnancy-associated severe pre-eclampsia/haemolysis, elevated liver enzymes and low platelet syndrome (SPE/HELLP) from thrombotic thrombocytopenic purpura (TTP). 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

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

Summary: Thorough review about reticulated platelets and immature platelet fraction including overview of preanalytical and analytical limitations of methods and clinical applications.

Ali I *et al*. (2019)

Immature platelet fraction as a useful marker in the etiological determination of thrombocytopenia.
Exp Haematol; 78: 56

Free online: https://www.exphem.org/article/S0301-472X(19)30999-3/fulltext

Summary: In this study, the IPF was assessed to determine the aetiology of thrombocytopenia, in a relatively large cohort (n=637). The IPF was significantly higher in cases of increased platelet consumption or pseudothrombocytopenia compared with the control, and was able to discriminate idiopathic thrombocytopenic purpura (ITP) ($p<0.05$) from other causes of increased platelet consumptive disorders (infection, haemorrhage).

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

Summary: 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/

Summary: In stable coronary artery disease patients with diabetes the increased level of immature platelets (IPF) show an association 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

Summary: 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

Summary: 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

Summary: 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

Summary: The authors discussed the role of reticulated platelets in coronary artery disease and in hypo responsiveness to the commonly used anti-platelet drugs. They concluded that 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

Summary: The authors concluded that a combination of an increased IPF# value and a decreased RET% value 24 hours before the onset of sepsis in ICU patients can be considered an early, rapid, cost-effective and widely available measure for 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

Summary: In this study IPF was able to predict platelet recovery in patients after allogeneic haematopoietic stem cell transplantation in 5 out of 11 patients, while IPF# predicted recovery in 7 out of 11 patients, at cut-offs of 5.8 % and 200/µL, 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

Summary: 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

Summary: In this study, IPF presented as an independent predictor of serious adverse cardiovascular events, deep vein thrombosis or pulmonary embolism (modMACE) after non-cardiac surgery using the optimal cut-off value of > 5.4 % and improves 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

Summary: 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

Summary: 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/

Summary: In this study an elevated platelet turnover independently predicted 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

Summary: In this study IPF (XE-2100) was 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

Summary: In this study IPF% measured on the XE-5000 exhibited higher values in pregnant women suffering hypertensive disorders than the control group.

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

Summary: The review summarises the pathophysiology and current management (including platelet transfusion thresholds) of neonatal thrombocytopenia. A novel index score for bleeding risk in thrombocytopenic neonates was 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

Summary: In this study absolute IPF count (from XE-5000) was shown to be useful to diagnose and to monitor the clinical course of therapeutic plasma exchange in TTP patients. Routine analysis of absolute IPF count was 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

Summary: In this study, both IRF% and IPF% measured on an XE-5000 predicted neutrophil and platelet recovery, respectively.

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

Summary: In this study, the IPF percentage was shown to predict recovery of PLT numbers 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

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

Summary: In this study IPF# demonstrated stronger correlation with acute bleeding score than 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

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

Summary: 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

Summary: IPF% (XN-1000) and RP% (flow cytometry) exhibited comparable diagnostic accuracy in differentiating control patients, immune thrombocytopenia, and aplastic thrombocytopenia in this study.

Adly AA *et al*. (2015)

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

https://www.tandfonline.com/doi/abs/10.3109/09537104.2014.969220?journalCode=iplt20

Summary: IPF% obtained from the XE-2100 was increased in immune thrombo-cytopenia patients but not in patients with haematological malignancies in this study. The authors therefore suggest using IPF% 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

https://onlinelibrary.wiley.com/doi/10.1111/ijlh.12177

Summary: This study presents IPF as a useful parameter 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

https://www.thieme-connect.de/products/ejournals/abstract/10.1160/TH13-09-0746 l

Summary: 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

Free online: 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

Summary: According to this study 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

Summary: In this study, the IPF count was presented as a suitable parameter for assessing bone marrow activity 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

Summary: In this study, reticulated (immature) platelets predicted cardiovascular death independently and improved 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

https://www.nature.com/articles/jp201321

Summary: Low absolute IPF values during the course of neonatal sepsis/necrotising enterocolitis suggest suppression of megakaryopoietic activity according to the study conclusions.

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

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

https://www.tandfonline.com/doi/abs/10.3109/09537104.2012.738838?journalCode=iplt20

Summary: Increased platelet turnover, indicated by IPF and MPV, was observed in the acute phase of ST-elevated myocardial infarction in this study 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

Summary: 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

https://www.researchgate.net/publication/281944357_The_Immature_Platelet_Fraction_An_assessment_of_its_application_to_a_routine_clinical_laboratory

Summary: 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: https://ashpublications.org/blood/article/119/17/4066/29869/In-vivo-effects-of-eltrombopag-on-platelet

Summary: 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

Summary: The use of IPF-rich platelet transfusions reduced the number of transfusions and bleedings after stem cell transplantation in paediatric patients in this study.

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

Summary: IPF% supported the differentiation between platelet destruction and bone marrow failure in hepatitis C patients in this study.

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

Summary: In this study, absolute immature platelet count (IPF#) was shown to reflect the effect of different treatments of immune thrombocytopenia and was in such cases considered 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

Summary: In this study, immature platelet (IPF) and immature reticulocyte fraction (IRF) were presented as early and readily available assessment methods for post-transplant bone marrow recovery.

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

Quote: ‘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

Summary: 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% value was shown to be an additional indication of a mechanism involved in the increased cardiovascular risk profile of those patients in this study.

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

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

Summary: In this study, IPF above 10% was a useful marker for predicting the timing of platelet recovery after chemotherapy and haematopoietic stem cell transplantation and could allow optimised 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

Summary: The authors demonstrated that the IPF is an excellent marker for distinguishing hyperdestructive/consumptive from hypoproductive thrombocytopenia. Moreover, IPF was 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

Summary: In this study, thrombocytopenic neonates were more likely to recover when IPF levels were high.

Takami A *et al*. (2007)

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

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

Summary: In this study, IPF was presented as an easily available marker for the engraftment after stem cell transplantation, especially regarding 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

Summary: The results of this study showed that the IPF reflects the pathology of thrombocytopenic disorders (i.e. consumptive versus productive). Measurement of IPF was concluded to be 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

Summary: Automated IPF was presented as a useful parameter in the clinical evaluation of thrombocytopenic patients and the authors saw a potential to optimise transfusion management.

Kickler T *et al*. (2006)

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

Free online: https://academic.oup.com/ajcp/article/125/2/282/1759923?login=true

Summary: In this study, IPF (here named HFPF for ‘high fluorescence platelet fraction’) was predictive in the evaluation of thrombocytopenia. Elevated IPF values were found in case of increased platelet production, associated with peripheral platelet destruction. In disorders associated with decreased platelet production IPF was found normal.

Briggs C *et al*. (2004)

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

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

Summary: The authors recommend automated IPF% as a standard parameter in evaluating the thrombocytopenic patient.

General

NEW

Tabata M *et al.* (2024)

Performance evaluation and user experience of BT-50 transportation unit with automated and scheduled quality control measurements.
Clin Chem Lab Med; online ahead of print

Free online: https://www.degruyter.com/document/doi/10.1515/cclm-2024-0220/html

Summary: The authors evaluated the performance of the BT-50 and the manual method using XN CHECK Levels 1, 2 and 3 and the results were equivalent. For PLT, BT-50 showed lower variability compared to the manual method. The BT-50 streamlined the workflow, reduced operator workload and provided standardised control measurements.

Lunde HE *et al.* (2022)

The diagnostic accuracy of Sysmex XN for identification of pseudothrombocytopenia using various thresholds for definition of platelet aggregation.
Int J Lab Hematol; 44(5): 854

Free online: https://onlinelibrary.wiley.com/doi/10.1111/ijlh.13920

Summary: The diagnostic accuracy of the flag PLT Clumps from PLT-F channel for identification of pseudothrombocytopenia was very high (AUC = 0.97) and superior to the WNR/WDF channel (AUC = 0.57) in samples with platelet count <150 x 10^9/L and a moderate to high number of aggregates in the smear.

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

Summary: 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

Summary: According to the authors 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%). In this study 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

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

Summary: 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 precision and reportable range were also consistent with specifications by the manufacturer.

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

Summary: The XP-300 showed very good precision and linearity results in this study, 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

Summary: Using the biomedical validation criteria, 21.3 % of samples triggered a smear review in this study. Modification of four criteria reduced the number of smears from 21.3 % to 15.0 % without losing clinical value.

Arneth B *et al*. (2015)

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

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

Summary: 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.

Seo JY *et al*. (2015)

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

https://onlinelibrary.wiley.com/doi/10.1111/ijlh.12254

Summary: In this study 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.

Genevieve F *et al*. (2014)

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

https://de.calameo.com/read/003436754410b87250196?language=en&page=1&authid=8e2V7RVjbzE8&view=slide

Summary: 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

Summary: In this study 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

Bildirici A *et al.* (2023)

Determination of reference intervals of hemogram with advanced clinical parameters by indirect method on Sysmex XN-1000.
Turk J Biochem; 48(4): 388

Free online: https://www.degruyter.com/document/doi/10.1515/tjb-2022-0287/html?lang=en

Summary: The CBC+DIFF reference intervals of 68 316 patients aged 18–65 years were determined by indirect method using the non-parametric percentage estimation in Turkish Kastamonu Training and Research Hospital.

Becker M *et al.* (2022)

Differences between capillary and venous blood counts in children—A data mining approach.
Int J Lab Hematol; 44(4): 729

Free online: https://onlinelibrary.wiley.com/doi/10.1111/ijlh.13846

Summary: In this multicentric study the differences between capillary and venous bloods were investigated in paediatric samples specifying a delta for the CBC parameters dependant on measurement range of the parameter value, time difference in sampling and age of the patient.

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

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

Summary: 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.

Mrosewski I *et al.* (2021)

Indirectly determined hematology reference intervals for pediatric patients in Berlin and Brandenburg.
Clin Chem Lab Med; 60(3): 408

https://www.degruyter.com/document/doi/10.1515/cclm-2021-0853/html

Summary: The study presents indirectly determined CBC reference intervals (RI) for paediatric patients (0-18 years) in Berlin and Brandenburg area in Germany.

Song MY *et al.* (2021)

Establishment of pediatric reference intervals for complete blood count parameters in capillary blood in Beijing.
Int J Lab Hematol; 43(6): 1363

https://onlinelibrary.wiley.com/doi/10.1111/ijlh.13631

Summary: The authors established reference intervals for 22 CBC+DIFF parameters from capillary blood in 6799 children aged 3 months to 18 years from Beijing area in China.

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

Summary: 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

Summary: 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

Summary: 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

Summary: 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.

NEW

Zierk J *et al.* (2019)

Next-generation reference intervals for pediatric hematology.
Clin Chem Lab Med; 57(10): 159548

https://www.degruyter.com/document/doi/10.1515/cclm-2018-1236/html

Summary: The authors determined percentile charts and z-scores for CBC reference intervals from birth to adulthood. A total of 9,576,910 specimens were gathered from ten German facilities and analysed using predominantly Sysmex X-Class and XN-Class analysers and one Beckman Coulter DxH800 analyser.

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

Summary: 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

Summary: Reference intervals on Sysmex XN-Series for normal healthy term new-borns 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/

Summary: 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

Summary: 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

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

Summary: 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

Summary: 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 research.