IMMATURE GRANULOCYTE COUNT (IG) IN SUSPECTED INFECTION/SEPSIS

The Immature Granulocyte count (IG), performed as part of a 6-part differential, provides clinically relevant information to the clinician on immature white blood cell mobilization. Immature granulocytes in the peripheral blood of non-pregnant individuals can occur in response to infection, inflammation, or other stimulus to the bone marrow.

Peer-reviewed literature citations with abstract excerpts can be found below. To access the full abstract and paper in the United States National Library of Medicine PubMed database, copy the following links to your browser.

Citation #1 (2016)

...“Neutrophil function, IG count, and plasma cfDNA levels show potential as biomarkers for the prediction/early diagnosis of sepsis postburn injury and neutrophil dysfunction may actively contribute to the development of sepsis. Targeting neutrophil dysfunction and IG release may be a viable therapeutic intervention to help reduce the incidence of nosocomial infections and sepsis postburn.”

Citation #2 (2016)

...“CONCLUSIONS: We developed reference intervals for four methods of quantifying a neonate’s ‘left shift’. The information from automated differentials is not inferior to that from manual differentials in identifying infections, but automated differentials have the advantages of a larger sample size, being less expensive, and faster performance times.”
Citation #3 (2015)
Extended leukocyte differential count and C-reactive protein in septic patients with liver impairment: diagnostic approach to evaluate sepsis in intensive care unit.

...“Median value of all-leukocyte parameters was different in ICU patients compared to HS [healthy subjects]. Leukocytes, neutrophils (NE) and immature granulocytes (IGs) in sepsis and septic shock (SS) were higher than no sepsis (NS), with an area under the curve: 0.81, 0.82 and 0.78 respectively. Lymphocytes (LY) and monocytes (MO) were significantly associated with liver impairment. CONCLUSIONS: Diagnostic accuracy of all-leukocyte parameters may provide valuable information for diagnosis and follow-up of sepsis in ICU patients, especially those with liver impairment.”

Citation #4 (2014)
Arneth BM, Ragaller M, Hommel K, Tiebel O, Menschikowski M, Siegert G.
Novel Parameters of Extended Complete Blood Cell Count under Fluorescence Flow Cytometry in Patients with Sepsis.

...“CONCLUSION: The total IG count seems to be useful for distinguishing a septic patient from a nonseptic (P < 0.004).”

Citation #5 (2014)
Fraction of immature granulocytes reflects severity but not mortality in sepsis.

...“Conclusions. Given that IG% reflected sepsis severity and overt DIC without additional cost, IG% could be a useful biomarker in patients with sepsis.”

Citation #6 (2014)
Van der Geest PJ, Mohseni M, Brouwer R, van der Hoven B, Steyerberg EW, Groeneveld AB.
Immature granulocytes predict microbial infection and its adverse sequelae in the intensive care unit.

...“CONCLUSION: Immature granulocyte percentage is a useful marker, as CRP, to predict infection, its invasiveness, and severity, in critically ill patients. However, the IG percentage adds to WBC and CRP in the early exclusion of infection and can be obtained routinely without extra blood sampling or costs.”

Citation #7 (2013)
Cimenti C, Erwa W, Herkner KR, Kasper DC, Muller W, Resch B.
The predictive value of immature granulocyte count and immature myeloid information in the diagnosis of neonatal sepsis.

...“CONCLUSIONS: Automated determinations of immature granulocytes and immature myeloid information seem to be useful adjunctive methods in the diagnosis of neonatal early onset sepsis.”
Citation #8 (2013)
Revisiting the white blood cell count: immature granulocytes count as a diagnostic marker to discriminate between SIRS and sepsis - a prospective, observational study.

"CONCLUSIONS: The total number of IG in peripheral blood from ICU patients is a good marker to discriminate infected and non-infected patients very early during SIRS. However, the IG count is not suitable as a prognostic marker for mortality. Routine and serial measurement of IGs may provide new possibilities for rapid screening of SIRS patients on ICU with suspected infections."

Citation #9 (2012)
Senthilnayagam B, Kumar T, Sukumaran J, M J, Rao KR.
Automated measurement of immature granulocytes: performance characteristics and utility in routine clinical practice.

"The absolute (IGC) and relative IG count (IG%) had area under curve (AUC) of 0.69 and 0.66. Moreover, the means of IGC and IG% between culture positive and negative groups were statistically significant suggesting that they are potential markers for bacteremia. IGC of 0.03 x 10^3 cu.mm and IG% of 0.5% offered sensitivity of 86.3% and 92.2%, respectively, and may be used for screening for bacteremia. Higher values, IGC > 0.3, and IG% > 3 had specificity greater than 90%, although the values were infrequent. It may not be long before that these automated hemograms are put into regular diagnostic use."

Citation #10 (2011)
Bernstein LH, Rucinski J.
Measurement of granulocyte maturation may improve the early diagnosis of the septic state.

"METHODS: This study calibrates and validates the measurement of granulocyte maturation [Immature granulocytes (IG)] to the identification of sepsis, a study carried out on a Sysmex Analyzer, model XE 2100 (Kobe, Japan). The Sysmex IG parameter is a crucial measure of immature granulocyte counts and includes metamyelocytes and myelocytes, but not band neutrophils. RESULTS AND CONCLUSIONS: We found agreement with previous work that designated an IG measurement cut-off of 3.2 as optimal. The analysis was then carried a step further with a multivariable discriminator."

Citation #11 (2005)
Nigro KG, O’Riordan M, Molloy EJ, Walsh MC, Sandhaus LM.
Performance of an automated immature granulocyte count as a predictor of neonatal sepsis.

“Neonatologists use immature granulocytes (IG) in manual differential counts as an indicator of sepsis. This study was designed to compare the predictive ability of automated vs manual IG counts for neonatal sepsis. Infants undergoing sepsis evaluation were identified prospectively for study if a CBC count was obtained in temporal proximity to the blood culture. Automated IG counts were obtained from the research software of the Sysmex XE-2100 (Sysmex, Kobe, Japan). Manual average IG counts were obtained from two 100-cell manual differential counts independently performed by a technologist and a hematopathology resident. A comparative analysis of manual and automated IG counts showed considerable overlap of ranges. The highest positive blood culture rate occurred in the nonneutropenic preterm subset of infant older than 7 days (14% [38%]). For these infants, elevated IG counts by manual and automated methods were associated significantly with positive blood culture results (odds ratio, manual, 3.74; odds ratio, automated, 3.63), albeit with low sensitivity.”
Citation #12 (2003)
Ansari-Lari MA, Kickler TS, Borowitz MJ.
Immature granulocyte measurement using the Sysmex XE-2100. Relationship to infection and sepsis.

..."The percentage of immature granulocytes was significantly higher in infected than in noninfected patients and in patients with positive than patients with negative blood cultures. Receiver operating characteristic curves showed that the percentage of immature granulocytes was a better predictor of infection than the WBC count and comparable to the ANC. Automated immature granulocyte measurements reflect a biologically and clinically relevant phenomenon but are not sensitive enough to be used as screening assays for prediction of infection or bacteremia. However, although infrequently encountered, a percentage of immature granulocytes of more than 3 was a very specific predictor of sepsis and might help expedite microbiologic laboratory evaluation of a subset of patients."

Citation #13 (2003)
Briggs C, Kunka S, Fujimoto H, Hamaguchi Y, Davis BH, Machin SJ.
Evaluation of immature granulocyte counts by the XE-IG master: upgraded software for the XE-2100 automated hematology analyzer.

..."We investigated the clinical significance of the IG count as a new marker of acute inflammation. In this preliminary study, most samples with a high IG count had positive values for C-reactive protein and the erythrocyte sedimentation rate (positive sample rates were 84.0% and 95.0%, respectively) despite neutrophil counts within the normal range. Elevated IG counts correlated most closely with CD64 expression on polymorphonuclear cells and less so with the concentration of interleukin 6. Compared with other available inflammation markers, the IG count is rapidly generated with each full blood count at no extra cost and with no delay in sample analysis."