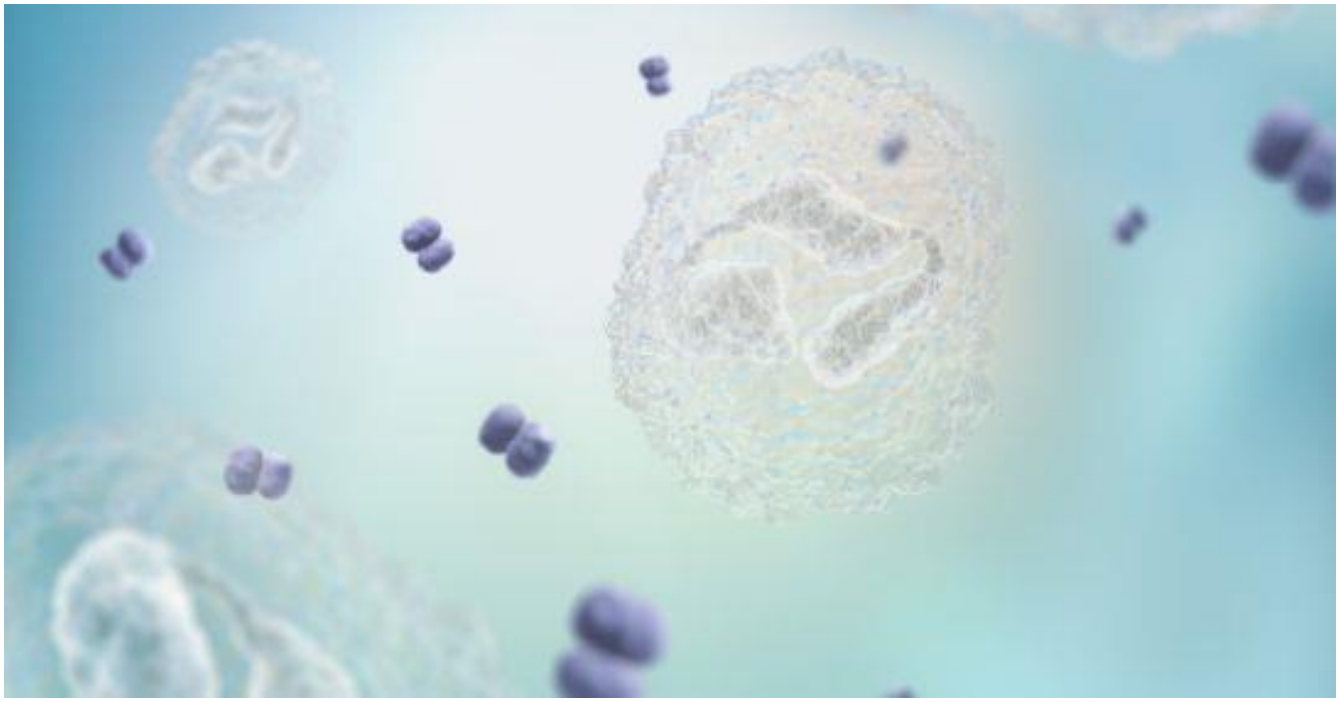
Literature List – Body Fluids

Customer Information

January 2024



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Note: Whether references are given in British or American English depends on the original.

NEW New entries are highlighted by this icon.

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The following list of research study publications is provided exclusively for scientific purposes.

- The studies may relate to the diagnostic use of the analytical parameters offered by Sysmex instruments. The diagnostic use is not validated by Sysmex and is therefore not in the scope of the Intended Purpose of the instruments. Details on the Intended Use can be found in the Sysmex Instructions For Use.
- Summaries of the study results are provided for convenience only and are not intended to convey any views of Sysmex on the study or the products used therein.
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General

NEW

Van Laer C *et al.* (2023)

Performance evaluation of the automated body fluid analysis of the new Sysmex XR haematology analyser.
J Lab Med; 47(6): 257

Free online: https://www.degruyter.com/document/doi/10.1515/labmed-2023-0064/html

Summary: The Body Fluid modes of the XR-Series and XN-Series analysers were compared in 392 measurements (86 CSF, 77 peritoneal, 78 pleural, 89 synovial and 62 bronchoalveolar lavage fluids). The correlation coefficients between the two analysers were excellent for the majority of diagnostic and research parameters (r > 0.9) and the flagging rate of 'WBC Abn Scattergram' was comparable.

Evren E *et al.* (2022)

Cell counting chamber vs. Sysmex XN-1000 for determining white blood cell count and differentiation for body fluids.
Turk J Biochem; 48(1):19

Free online: https://www.degruyter.com/document/doi/10.1515/tjb-2022-0179/html

Summary: The authors found a very strong correlation (r ≥ 0.90, p<0.0001) for the WBC count, MN%, and PMN% obtained by the XN-1000 BF mode compared to the manual counting chamber for synovial fluid (n=92), CSF (n=78), and peritoneal fluid (n=22). In method comparison XN-1000 showed acceptable performance, in this study.

Ivady G *et al.* (2022)

Comparative Evaluation of Body Fluid Analysis by Sysmex XN Hematology Analyzers, CellaVision, Manual Microscopy and Multicolor Flow Cytometry.
Ann Clin Lab Sci; 52(2):314

http://www.annclinlabsci.org/content/52/2/314.long

Summary: In this study, ascitic fluid and CSF samples have been analysed with XN-1000 and XN-2000 BF modes, manual microscopy, digital imaging analysis (DM96) and immunophenotyping. An excellent correlation between the analysers and imaging methods were found and only samples suspicious for the presence of malignant cells must be evaluated manually in this laboratory.

Yamatani K *et al.* (2019)

Performance evaluation of the Sysmex DI-60 overview application for tumor cell detection in body fluid samples.
Int J Lab Hematol; 41(6):e134

https://onlinelibrary.wiley.com/doi/abs/10.1111/ijlh.13039

Summary: The study aims to evaluate the Sysmex DI-60 instrument for the detection of malignant tumour cells in a range of different body fluid in comparison with manual microscopy and the XN-Series BF mode. The authors conclude that the DI-60 overview analysis allows faster screening of malignant cells with accuracy comparable to manual microscopy.

Favresse J *et al.* (2018)

Characterization of *Candida* spp. interference on the Sysmex XN-1000 body fluid mode.
Int J Lab Hematol; 40(2):e28

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12780/abstract

Summary: In this study, the presence of yeast interferes with WBC and TC counts, and in a less extend with HF count, when measuring body fluids on the XN-1000. Quote: 'Therefore, the assessment of the typical "blue surfboard pattern" is also useful to identify the presence of yeast as it is important for laboratory specialists to report their presence.' The absence of the flag "WBC abn Scattergram" does not proof that there are no interferences.

Cho YU *et al.* (2018)

Validation of reflex testing rules and establishment of a new workflow for body fluid cell analysis using a Sysmex XN-550 automatic hematology analyzer.
Int J Lab Hematol; 40(3):258

http://onlinelibrary.wiley.com/wol1/doi/10.1111/ijlh.12774/full

Summary: The XN-550 was evaluated for body fluid analysis and the authors conclude that the XN-550 is a suitable alternative to manual body fluid analysis. In addition, several laboratory-specific cytospin review criteria were established, resulting in significant workflow improvements.

Seghezzi M *et al*. (2017)

Preliminary evaluation of UF-5000 Body Fluid Mode for automated cerebrospinal fluid cell counting.
Clin Chim Acta; 473:133

https://www.sciencedirect.com/science/article/pii/S0009898117303327

Summary: The present study found a good agreement of the UF-5000 BF mode with manual chamber count for the parameters RBC, TNC, WBC (PMN/MN). The diagnostic performance was excellent especially in samples with few cells (RBC <1,000 cells/µL, WBC <20 cells/µL) as well as low LoB, LoD, LoQ and good linearity for CSF samples.

Tanaka M *et al.* (2016)

Performance evaluation of the XN-550 Automated Hematology Analyzer body Fluid Mode —Considerations for Operational Conditions for Cell Counting with Cerebrospinal and Synovial Fluids —.
Sysmex J Int; 26 (1)

https://www.sysmex.co.jp/en/products_solutions/library/journal/vol26_no1/vol26_1_03.pdf

Summary: The authors found good performance of the body fluid mode on XN-L compared to manual microscopy and on XN-9000 for cerebrospinal and synovial fluid samples.

Fleming C *et al.* (2015)

Clinical relevance and contemporary methods for counting blood cells in body fluids suspected of inflammatory disease.
Clin Chem Lab Med; 53(11):1689

Free online - http://www.degruyter.com/view/j/cclm.2015.53.issue-11/cclm-2014-1247/cclm-2014-1247.xml

Summary: Excellent review on body fluid analysis. Several different analysers were compared, including the XE-5000, XN-Series and UF-Series.

Cho YU *et al.* (2015)

Body fluid cellular analysis using the Sysmex XN-2000 automatic hematology analyzer: focusing on malignant samples.
Int J Lab Hematol; 37(3):346

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12292/abstract

Summary: It was found that cell counts obtained from the XN-2000 body fluid mode were comparable to counts obtained from microscopy. The authors recommend that samples with highly fluorescent cells (HF-BF) should be further analysed.

Fleming C *et al.* (2012)

Validation of the body fluid module on the new Sysmex XN-1000 for counting blood cells in cerebrospinal fluid and other body fluids.
Clin Chem Med Lab; 50:1791

http://www.degruyter.com/view/j/cclm.2012.50.issue-10/cclm-2011-0927/cclm-2011-0927.xml

Quote: 'The BF module on the XN-1000 is a suitable tool for fast and accurate quantification of WBC (differential) and RBC counts in CSF and other BFs in a diagnostic setting.'

De Jonge R *et al*. (2010)

Evaluation of the new body fluid mode on the Sysmex XE-5000 for counting leukocytes and erythrocytes in cerebrospinal fluid and other body fluids.
Clin Chem Lab Med; 48:665

http://www.degruyter.com/view/j/cclm.2010.48.issue-5/cclm.2010.108/cclm.2010.108.xml?format=INT

Summary: In this study, the body fluid mode on the Sysmex XE-5000 offers rapid and accurate RBC and WBC (differential) counts in clinically relevant concentration ranges in CSF and other body fluids.

Paris A *et al.* (2010)

Performance evaluation of the body fluid mode on the platform Sysmex XE-5000 series automated hematology analyzer.
Int J Lab Hematol; 32:539

http://onlinelibrary.wiley.com/doi/10.1111/j.1751-553X.2010.01220.x/abstract

Quote: 'The agreement between the automated method and the manual reference showed high correlation, with Pearson correlation coefficients greater than 0.9 for all types of body fluids. We also demonstrate that the automated body fluid analysis on the XE-5000 is an acceptable alternative to the microscopic reference method as far as ascitic fluid, peritoneal dialysis fluid, SF or PF are concerned.'

Riedl JA *et al*. (2010)

Automated morphological analysis of cells in body fluids by the digital microscopy system DM96.
J Clin Pathol; 63:538

http://jcp.bmj.com/content/63/6/538.abstract

Summary: The 24 h available DM96 body fluid module reliably and accurately preclassifies five main cell categories in cytospin slides with a low CV and an agreement of 90% as compared with highly trained technicians, thereby contributing to quality improvement.

Cerebrospinal Fluid (CSF)

Buoro S *et al.* (2018)

Two-site evaluation of the diagnostic performance of the Sysmex XN Body Fluid (BF) module for cell count and differential in Cerebrospinal Fluid.
Int J Lab Hematol; 40(1):26

https://onlinelibrary.wiley.com/doi/full/10.1111/ijlh.12723

Summary: In this study, the XN-BF mode provides rapid and accurate counts of cerebrospinal fluid samples in clinically relevant ranges. The authors considered it as a good alternative to conventional microscopic analysis.

Fleming C *et al.* (2015)

Liposomal interference on Sysmex XN-series body fluid mode.
Clin Chem Lab Med; 54(1):e19

http://www.degruyter.com/view/j/cclm.2016.54.issue-1/cclm-2015-0441/cclm-2015-0441.xml?format=INT

Summary: Liposomal particles from DepoCyt chemotherapy treatment may be misclassified as polymorphonuclear cells by the XN-BF mode (software version 18). The authors worked together with Sysmex to develop an alert, available from software version 20 on.

Li A *et al.* (2014)

Automated white blood cell counts in cerebrospinal fluid using the body fluid mode on the platform Sysmex XE-5000.
Scand J Clin Lab Invest; 74(8):673

https://www.tandfonline.com/doi/abs/10.3109/00365513.2014.939994?journalCode=iclb20

Quote: 'In the present study, we found that the open body fluid mode of the Sysmex XE-5000 was a favourable method for determination of WBC counts and for differentiation between MNCs and PMNs, compared to manual counting.'

Zur B *et al.* (2012)

Evaluation of 2 Hematology Analyzers in Body Fluid Mode versus Flow Cytometry Immunophenotyping of Mainly Neurosurgical Cerebrospinal Fluid Samples.
Cen Eur Neurosurg; 73(2):93

https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0031-1280839.pdf

Quote: 'Determination of CSF cells with the XE-5000 is presently the best automated method for counting leukocytes of blood-stained CSF.'

Zimmermann M *et al.* (2011)

Automated vs. manual cerebrospinal fluid cell counts: a work and cost analysis comparing the Sysmex XE-5000 and the Fuchs-Rosenthal manual counting chamber.
Int J Lab Hematol; 33:629

https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1751-553X.2011.01339.x

Summary: The authors found that using the XE-5000 for automated counting in CSF is trustworthy especially for severely pathological cell counts, but also for counts below this. The study demonstrates specific and significant savings in terms of time and money (about 6 times).

Boer K *et al.* (2009)

Evaluation of the XE-5000 for the automated analysis of blood cells in cerebrospinal fluid.
Clin Biochem; 42:684

https://www.sciencedirect.com/science/article/pii/S0009912009000435?via%3Dihub

Summary: In this study, most patients were classified correctly using the XE-5000 which is thus suitable for automated quantification of white blood cells in CSF in a defined diagnostic setting.

Other Body Fluids

Deirmengian CA *et al.* (2020)

False-Positive Automated Synovial Fluid White Blood Cell Counting Is a Concern for Both Hip and Knee Arthroplasty Aspirates.
J Arthroplasty; 35(6S): S304

Free online: https://www.arthroplastyjournal.org/article/S0883-5403(20)30097-8/fulltext

Summary: In a retrospectively reviewed cohort of 44,824 synovial fluid samples from an arthroplasty the rate of false-positive automated WBC counts >3,000 cells/mL, which were corrected by a manual count to a value <3,000 cells/mL, was 4.4% for fluid from native knees, 10.1% for fluid from total knee arthroplasties and 34.3% for fluid from total hip arthroplasties.

Haslacher H *et al.* (2021)

Adequate scattergram interpretation increases the reliability of automated polymorphonuclear (pmn) cell counts from ascitic fluid of patients with liver cirrhosis.
Int J Lab Hematol; 43(4): O176

Free online: https://onlinelibrary.wiley.com/doi/10.1111/ijlh.13488

Summary: In this study, polymorphonuclear cell count on both, XN-BF and manual differentials compared well in ascitic fluid samples. Automated PMN counts were overestimated among samples with the lowest microscopic counts and the extend of the difference was linked to scattergram patterns indicating misclassification of cells. These findings emphasise the importance of visual validation of the WBC scattergram.

Pearson L *et al.* (2020)

Reliability of Total Nucleated Cell Counts in the Setting of Hip Arthroplasty.
J Appl Lab Med; 6(3): 679

Free online: https://academic.oup.com/jalm/article-abstract/6/3/679/5975020?redirectedFrom=fulltext

Summary: The authors introduced that metallosis following total hip arthroplasty is a risk for spurious total nucleated cell counts measured by automated methods in synovial fluid. This study confirms automated methods as generally reliable for analysis of synovial fluid. XN-BF flagged all but one of the samples in the metallosis group for manual verification of the results.

Saadalla A *et al.* (2020)

Evaluation of automated synovial fluid total cell count and percent polymorphonuclear leukocytes on a Sysmex XN-1000 analyzer for identifying patients at risk of septic arthritis.
Clin Chim Acta; 510: 416

https://www.sciencedirect.com/science/article/abs/pii/S000989812030382X?via%3Dihub

Summary: The authors suggest cut-offs on Sysmex XN-BF (TC-BF > 10,000 cells/µL and PMN% > 60%) that minimise differences between automated and manual cell counts and allow rapid automated reporting in the vast majority of septic arthritis cohort.

Wong-Arteta J *et al.* (2019)

High fluorescence cell count in pleural fluids for malignant effusion screening.
Clin Chim Acta; 499:115

https://www.sciencedirect.com/science/article/abs/pii/S0009898119320376?via%3Dihub

Summary: From the perspective of a clinical workflow, the study evaluated the use of HF-BF [#] in pleural fluids for screening for malignancies. A previously published cut-off of ≥17 cells/µL for HF-BF was confirmed also considering the absence of heart failure and low respiratory infection, resulting in a sensitivity of 87% and specificity of 97%.

Favresse J *et al.* (2019)

Utility of the XN-1000 research mode for leukocytes counting in ascitic and pleural fluids.
Int J Lab Hematol; 42(3):e92

https://onlinelibrary.wiley.com/doi/epdf/10.1111/ijlh.13128

Summary: The study results confirm the good performance of the XN-BF mode for ascitic and pleural fluids for total cell count (TC-BF), polymorphonuclear (PMN) and mononuclear (MN) cells. Additionally, research parameters for neutrophils, lymphocytes, monocytes and high fluorescent cells have a good performance especially when malignant cells containing samples are excluded.

Xu W *et al.* (2017)

Evaluation of Sysmex XN-1000 hematology analyzer for cell count and screening of malignant cells of serous cavity effusion.
Medicine (Baltimore); 96(27):e7433

Free online: https://journals.lww.com/md-journal/Fulltext/2017/07070/Evaluation_of_Sysmex_XN_1000_hematology_analyzer.49.aspx

Summary: In this study, the analysis of serous fluid on the XN-BF mode showed good comparability with microscopy. High fluorescence cells (HF-BF) count correlated with the presence of malignant cells.

Seghezzi M *et al.* (2016)

Optimization of Cellular analysis of Synovial Fluids by optical microscopy and automated count using the Sysmex XN Body Fluid Mode.
Clin Chem Acta; 462:41

http://www.sciencedirect.com/science/article/pii/S0009898116303680

Summary: The authors found an excellent performance for the XN-BF mode.

Buoro S *et al.* (2016)

Cell population data and reflex testing rules of cell analysis in pleural and ascitic fluids using body fluid mode on Sysmex XN-9000.
Clin Chem Acta; 452:92

https://www.sciencedirect.com/science/article/pii/S0009898115300425?via%3Dihub

Summary: Results of the study confirm that the XN-BF mode on Sysmex XN-9000 is a suitable alternative to optical microscopy for screening body fluid samples. Peritoneal and pleural fluids were analysed in the study. Authors implemented own validation rules that increased the productivity.

Bottini PV *et al.* (2015)

Comparison between automated and microscopic analysis in body fluids cytology.
Int J Lab Hematol; 37(2):e16

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12228/abstract

Summary: The authors describe a performance evaluation of the XE-5000 body fluid mode for peritoneal and serous fluids. A good correlation between the XE-5000 and microscopy was found as well as good precision and low carryover.

Labaere D *et al.* (2015)

Detection of malignant cells in serous body fluids by counting high-fluorescent cells on the Sysmex XN-2000 hematology analyzer.
Int J Lab Hematol; 37(5):715

http://onlinelibrary.wiley.com/doi/10.1111/ijlh.12393/abstract

Summary: Analysis of serous fluids on the XN-2000 performed in this study showed that the absence of highly fluorescent body fluid (HF-BF) cells can be used to exclude suspected malignant samples: The negative predictive value was 92 % at a cut-off value of 2.1 % and 95 % at a cut-off value of 17/µl.

Lippi G *et al.* (2013)

Evaluation of the Fully Automated Hematological Analyzer Sysmex XE-5000 for Flow Cytometric Analysis of Peritoneal Fluid.
J Lab Autom; 18(3):240

Free online: http://jla.sagepub.com/content/18/3/240.full.pdf+html

Summary: This evaluation of the XE-5000 for peritoneal fluid analysis showed excellent performance for all analysed parameters. The performance of the XE-5000 was slightly better than that of the XE-2100.

De Jonge R *et al.* (2006)

Automated analysis of pleural fluid total and differential leukocyte counts with the Sysmex XE-2100.
Clin Chem Med Lab; 44:1367

http://www.degruyter.com/view/j/cclm.2006.44.issue-11/cclm.2006.242/cclm.2006.242.xml?format=INT

Summary: The authors found that total and differential leukocyte counts in pleural fluid can be reliably determined with the XE-2100 with some limitations.

De Jonge R *et al.* (2004)

Automated counting of white blood cells in synovial fluid.
Rheumatol; 43:170

Free online: http://rheumatology.oxfordjournals.org/content/43/2/170.full.pdf+html

Summary: In this study, the XE-2100 determined the number of leukocytes in the synovial fluid more accurately and faster reliably compared to manual counting. The authors suggested that this could improve the low confidence clinicians currently have in these results.