

Sysmex XN Analysers – A Novel Modular Blood Cell Counting System

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Introduction

The newly released Sysmex XN haematology blood cell analyser offers a new concept of cell analysis using an integrated modular system which the user can design to their requirement. The instrument has a 34% smaller footprint than previous XE analysers. There is a novel sampler system which allows analysis of samples on both modules at the same time and automatic reflex testing.



Figure 1. XN-2000 system

Model flexibility. Basic Performance

- DIFF channel (WDF)
- WNR channel (**WBC plus NRBC on all samples**)
- RBC/PLT & HGB channels

Enhanced Options

- RET channel
- WPC channel
- PLT-F channel
- Body Fluid mode
- Low WBC mode, counts of less than $0.5 \times 10^9/L$ extended count for precision and a diff reported.

Automatic reflex testing

Low WBC, low or abnormal platelets, abnormal lymphs or blast flag can all be automatically re-tested, no intervention needed. Options include:

WPC – White Cell Precursor Channel

This further differentiates blasts and abnormal lymphs which were generated by the WDF channel, reducing false positive rate.

PLT-F – Platelet count

- Immature platelet count (IPF) percentage and absolute count.
- IPF is now only produced by PLT-F channel, no longer RET channel (as on XE-series).
- If the red cell or impedance platelet histograms are abnormal or if the platelet count is automatically performed. PLT-F is more accurate and precise (compared to the ICSH reference immunological platelet counting method).

Low white cell count mode

The setting used was $< 0.5 \times 10^9/L$ to trigger an extended count of three times longer provides more precise results with an accurate differential.

Aim

The aim of this study was to evaluate the performance of the new XN compared to the XE-2100 using both normal (one third) and abnormal specimens. Residual samples from the routine laboratory were selected after all testing had been complete.

Samples

390 samples were evaluated on both instruments and by the CLSI reference manual differential reference method.

30 normal samples were analysed on the XN and a manual differential performed and then diluted to a $WBC < 0.5 \times 10^9/L$ and reanalysed on XN using the WPC mode. The diluted blood counts were compared to the manual differential.

185 samples were used to compare the PLT-F count to the ICSH flow cytometric method (67 samples $< 20 \times 10^9/L$).

1000 samples were analysed on both instruments to determine the time taken for analysis and the number of blood films that would need to be examined, samples were selected to mimic our daily workload.

Results

1. Good correlation with the XE-2100 was found for all parameters.
2. The leucocyte differential and NRBC compared very well to the manual 400 cell differential.
3. False positive flags for blasts and abnormal lymphocytes are reduced significantly (20%) without an increase in false negatives. The atypical lymphocyte flag is also reduced by 20% even without the use of the WPC channel.
4. The low WBC mode produced differentials on $WBC < 0.5 \times 10^9/L$ with no significant difference from undiluted blood (figure 2).

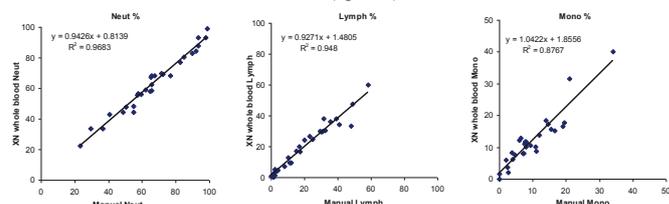


Figure 2. Correlation of leucocyte differentials from the XN compared to a 400 cell manual differential on samples with $WBC < 0.5 \times 10^9/L$

5. Correlation to the ICSH flow cytometric platelet counting method was impressive, particularly on counts at the platelet transfusion threshold (figure 3).

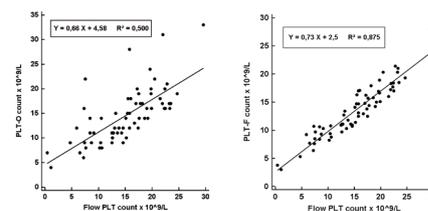
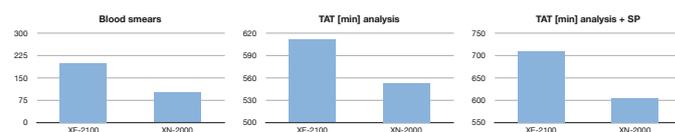


Figure 3. XN-Fluorescence platelet [PLT-F] Count Selected by initial Platelet Impedance Count $< 20 \times 10^9/L$ [n=67]
PLT-O = Optical Platelet count on the XE-2100

Workflow Study



(n=1002)	XE-2100	XN with WPC-ch
Blood films	199	101
Reflex analysis	75	112
TAT [min] analysis	611	553
TAT [min] analysis + SP	710	604

Table 1. Workflow statistics from 1000 routine samples.
TAT = turn around time. SP= Slide preparation unit.

Conclusions

- Excellent general performance, linearity, stability, carry over and reproducibility.
- PLT-F excellent correlation with ICSH flow reference method. Improved accuracy in thrombocytopenic samples, especially at platelet transfusion threshold values.
- Reduced analyser TAT time due to reflex operation.
- Reduced blood films (49%).
- The flagging on the XN for blasts, abnormal lymphocytes/lymphoblast and atypical lymphocyte flags show marked improvement with fewer false positives with no loss of sensitivity.