Sysmex XN Analysers – A Novel Modular Blood Cell Counting System

C Briggs, I Longair, P Kumar & SJ Machin
Department of Haematology, University College London Hospitals, 60 Whitfield Street, London W1T 4EU, UK

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.

Model flexibility, Basic Performance
- DFF 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 x 10⁹/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 below the numerical cut-off can be set by the user then a fluorescent 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 x 10⁹/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
380 normal 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 x 10⁹/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 x 10⁹/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 x 10⁹/L with no significant difference from undiluted blood (figure 2).
5. Correlation to the ICSH flow cytometric platelet counting method was impressive, particularly on counts at the platelet transfusion threshold (figure 3).

Workflow Study

<table>
<thead>
<tr>
<th></th>
<th>XE-2100</th>
<th>XN with WPC-ch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood films</td>
<td>199</td>
<td>101</td>
</tr>
<tr>
<td>Reflex analysis</td>
<td>75</td>
<td>112</td>
</tr>
<tr>
<td>TAT [min] analysis</td>
<td>611</td>
<td>553</td>
</tr>
<tr>
<td>TAT [min] analysis + SP</td>
<td>710</td>
<td>604</td>
</tr>
</tbody>
</table>

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.