XS-Series – Outstanding X-Class technology

Sysmex Xtra Online | August 2012

Sysmex XS-series haematology analysers are tailored specifically to the requirements of small laboratories with low sample volumes, or as backup systems where users do not wish to compromise in terms of result quality. This is especially relevant in today's demanding haematology environment.

Fluorescence flow cytometry enhances analytical possibilities

The outstanding feature of the Sysmex X-Class is its unique system of fluorescence flow cytometry for white blood cell (WBC) differentiation. Individual blood cells labelled by fluorochromes are illuminated by a semi-conductor laser beam. This enables a sophisticated analysis based on RNA/DNA content, cell size and inner cell complexity. Looking into the cell and judging the metabolic activities with respect to cell replication and protein synthesis offers advanced possibilities for determining cell type and maturation stage.

Cells are identified through the collection and rapid processing of three optical signals obtained from each individual cell. Analysing the properties of the cell interior rather than cell size leads to reliable classification, also in older samples, and reduces interference.

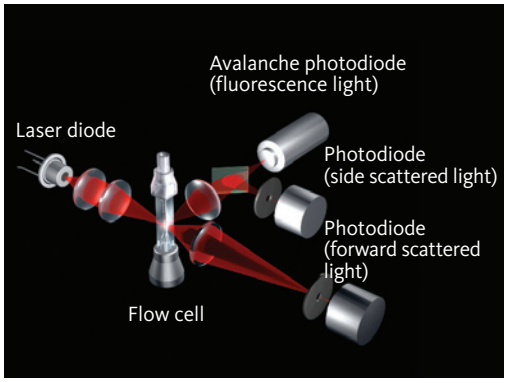

Fig. 1 *The Sysmex XS-series optical system*

Fluorescence flow cytometry – superior to optical measurement

The development of fluorescence labelling of blood cells was a milestone in routine white blood cell differentiation. This technology enables each cell to be identified and so leads to highly effective differentiation between pathological and normal samples. It is particularly beneficial for lyse-resistant RBC, especially in paediatrics. Looking inside the cell is far more effective than optical measurement and allows you to correctly differentiate cells of equal size and structured often found in abnormal samples. Using Sysmex's unique Adaptive Cluster Analysis System (ACAS) instead of fixed discriminators in scattergrams results in correct cell clustering. It therefore produces WBC differential counts in highly pathologic samples too and so reduces the false positive rate. The results are illustrated in scattergrams.

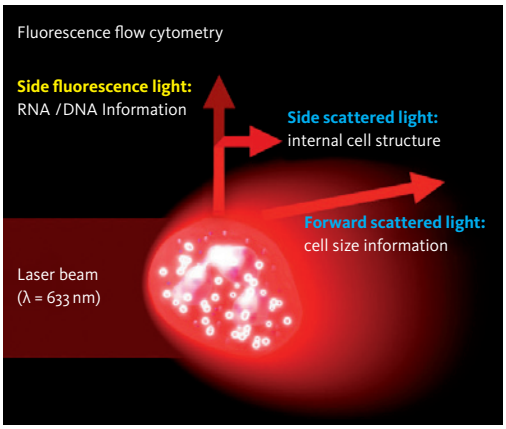

Fig. 2 *Optical signal properties of a cell*

The DIFF channel

The outstanding cluster resolution and separation of abnormal blood cells by fluorescence labelling in the XS-series reduces limitations and potential inaccuracies. With their increased cellular nucleic acid concentration, abnormal cells demonstrate a far higher fluorescence intensity than normal cells. As a result, atypical lymphocytes and immature granulocytes are detected by their characteristically high fluorescence intensity and are easily distinguishable in the DIFF scattergram. This analytical benefit is based on Sysmex's unique fluorescence reagent that specifically labels the nucleic acids of white blood cells. Lyse-resistant red blood cells, lipids or technical artefacts do not interfere with the WBC measurement. They have no nucleic acid components and therefore no detectable fluorescence signal. They are found in the scattergram's ghost area.

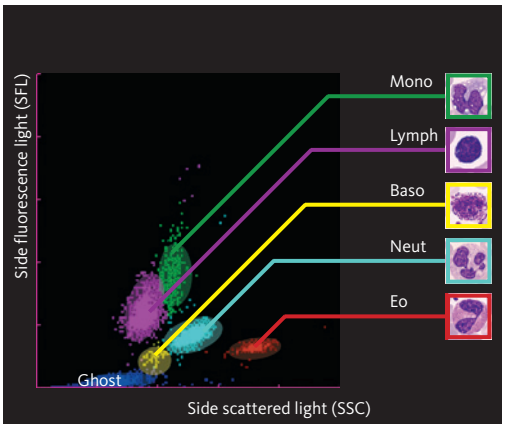

Fig. 3 *DIFF channel scattergram*

Suspect messages inform about abnormalities

The morphological modifications of pathological cells change the position of the various cell types in the scattergram and therefore trigger so-called suspect flags (interpretative messages = IP messages). These messages provide information about the possible occurrence of immature cells (immature granulocytes) or cell abnormalities e.g. reactive B-lymphocytes.

Q-flags for individual clinical sensitivity

Procedures differ from lab to lab, as do patient populations. This also means there are different review criteria in different labs around the world. In addition to the conventional nominal flagging system (yes/no), the adjustable Q-flag allows each lab to change the sensitivity of each flag while leaving its specificity untouched. The unique Q-flag system complements the instruments' flagging and adapts it to customer needs.

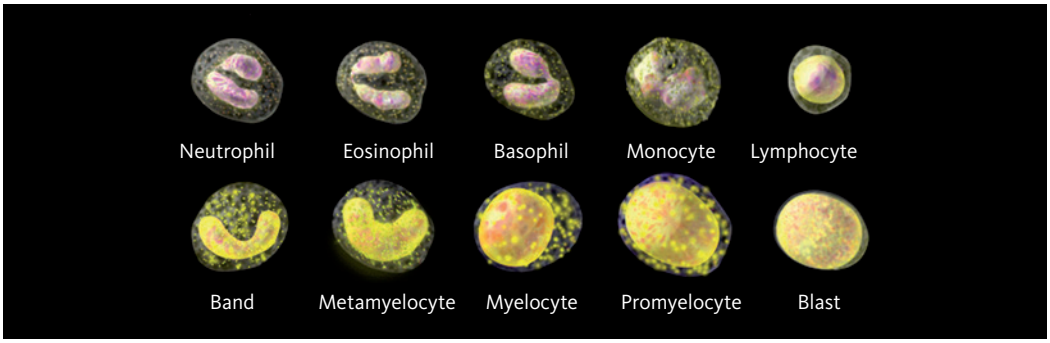

Fig. 4 *White blood cells after treatment with the Stromatolyser- 4DL and -4DS. Because of their higher nucleic acid content, precursors show a stronger fluorescence signal.*

The RBC/PLT channel

Sysmex's core technologies for precisely determining RBC, haemoglobin and haematocrit on XS-series yield RBC indices and size distribution parameters of clinical use. They describe changes in patients' red cell composition in peripheral blood – the essential basis for screening and classifying anaemic disease forms.

Accurate count of red blood cells and platelets

RBC and platelets are counted in a dedicated channel using DC detection with sheath flow technology. This hydrodynamic focussing circumvents side effects like particle coincidence or recirculation. Automatic discriminators based on complex algorithms separate the two cell populations. The XS-series analyses with uncompromised precision and accuracy; even samples with extremely low or unusually high numbers of RBC and platelets.

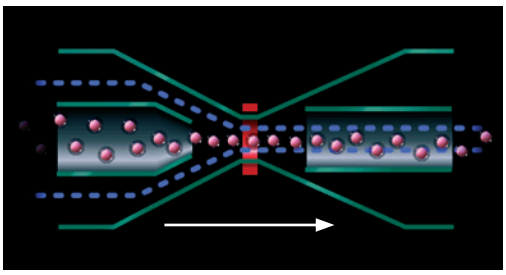

Fig. 5 *The Sysmex sheath flow principle for accurate RBC/PLT analysis in XS-series*

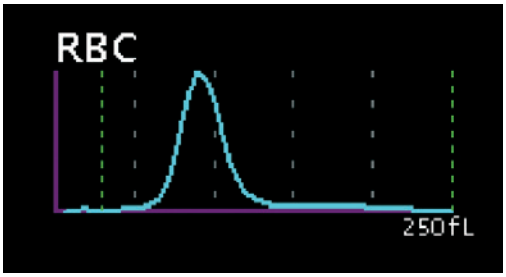

Fig. 6 *RBC histogram*

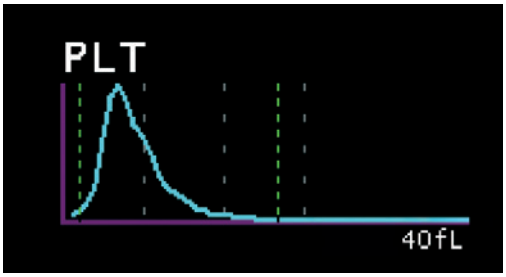

Fig. 7 *PLT histogram*

High quality haemoglobin analysis

The XS-series uses Sysmex's cyanide-free SLS method for haemoglobin analysis, which shows an excellent correlation with the reference method. As haemogobin is determined in a dedicated channel, interference with WBC in case of high white blood cell concentration is minimised.

Direct haematocrit measurement

Haematocrit measurement is based on precise RBC count and volume detection. This method is known as cumulative pulse height detection. The intensity of the electronic pulse of each analysed red blood cell is proportional to the individual cell volume. The addition of the analysed pulses of a defined sample volume provide the haematocrit value.

Full flexibility for integration into your laboratory solution

The XS-series is – except for the manual start button – completely operated via the Information Processing Unit (IPU). This unit has interactive menus and intuitively understandable icons on the Windows® graphic user interface. Patient data, test orders, Quality Control (QC) data and all analysis results are stored in the IPU database. All XS-series data management is performed on the IPU so that you can easily integrate the XS-series in your laboratory solution. You can maintain a selective sample analysis by using the work list function – even if the system is used offline and without bar code system.

Reagent management

Thanks to the reagent management function, it is easy to control and record all the essential steps in reagent handling. By using the hand-held bar code reader, all the necessary information is collected from the reagent bar code, including reagent name, lot number, expiration date and package volume. This information is stored together with the Logon name of the user. This ensures the traceability often required for accreditation procedures. The IPU reagent meter screen helps to check the reagent status of the analyser as it displays the approximate remaining volume of reagents.

Comfort of choice

The XS-series includes three models. The XS-500i and XS-800i offer manual aspiration while the XS-1000i also offers closed sample analysis, which can be extended by an optional sampler unit for walk-away automation. An innovative blood sensor controls the aspirated blood volume of only 20 µL and activates an alarm in case of an aspiration error. This ensures unreliable results are avoided.

An easy-to-use and reliable system requires more than just excellent hardware. Innovative reagents, smart software, reliable internal and external QC and minimum preventive maintenance are crucial factors for ensuring the quality of the system and its results. The XS-series was developed using Sysmex's 40 years of R&D expertise with one goal in mind: ensuring the highest quality.

Fig. 8 *XS-500i and XS-800i: Only 20 µL of blood are enough for 24 parameters, which perfectly fits the requirements of paediatric samples.*

Fig. 9 *XS-1000i: Closed sample position for piercing tube caps.*

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