

The First Slide Preparation and Staining System to Be Fully - Integrated in One Routine Hematology Analyzer, the Pentra 120 Retic SPS

Pascal BERTHET*

*ABX S.A.

Abstract

The Pentra 120 Retic SPS is the top-of-the-range hematology analyzer from ABX-Horiba, associating high productivity and new analytical capabilities. With human intervention required only for setting a sample on the holder, the instrument automatically carries out samplings, measurements and slide preparation. It provides the perfect combination of productivity with high quality results of the 36 parameters with reticulocyte analysis. This paper explains the measurement principles and slide preparation and staining system.

1 Introduction

One strong trend outlines the high-end segment of hematology analyzers: the enhanced productivity for the laboratory. The Pentra 120 Retic SPS (Fig.1) is the first slide preparation and staining system to be fully - integrated in one routine hematology analyzer. This provides the laboratory with the most up-to-date hematological parameters, at a 120 samples per hour throughput. In addition to being able to count 5 types of white blood cells, the devices in the series can also form smears which are essential in examining the state of blood.



Fig.1 Pentra 120 Retic SPS.

2 Principles of Analysis

2.1 5DIFF Analysis

The ABX Pentra 120 Retic SPS carries out the 5DIFF analysis by using two different channels : the LMNE channel with the Eosinofix reagent for Lymphocytes, Monocytes, Neutrophils and Eosinophils, and the BASO channel with the Basolyse reagent for the basophil count. The enumeration of Large Immature Cells (LIC) and Atypical Lymphocytes (ALY) provided by the LMNE analysis increases the laboratory analytical capability, especially for the diagnosis of malignant hematological disorders.

From these two measurements, a matrix (cell volume = x-axis /cellular complexity = y-axis) is obtained which gives the quantification of Lymphocytes, Monocytes, Neutrophils and Eosinophils. This matrix is the LMNE matrix (Fig.2).

ABX's original DHSS™ technology allows the instrument to detect and quantify two additional and pathological leukocyte subsets : LIC (Large Immature Cells) and ALY (Atypical Lymphocytes).

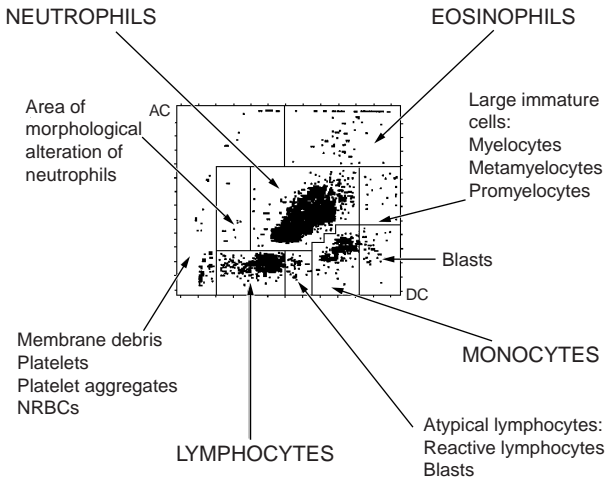


Fig.2 LMNE Matrix.

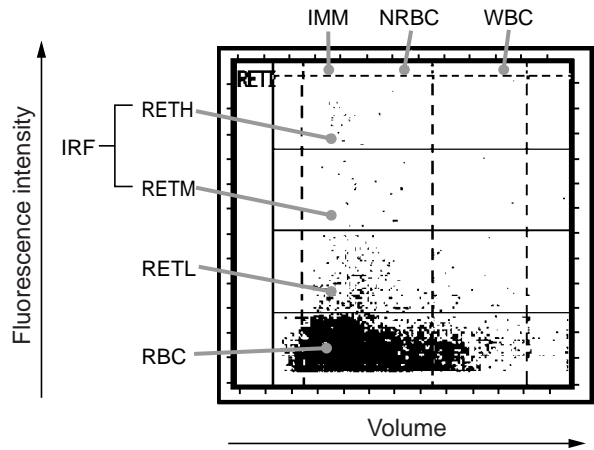


Fig.3 Reticulocyte Matrix.

2.2 Reticulocyte Analysis

Reticulocyte analysis is fully automated and performed in primary tubes by using the fluoro-flow cytometry reference dye : Thiazole Orange (TO). The Pentra 120 Retic provides 10 parameter reticulocyte analysis; including Reticulocyte counting parameters and Reticulocyte Maturation parameters. Fig.3 shows the Reticulocyte Matrix.

The new reticulocyte parameters Mean Fluorescence Index (MFI) and Mean Reticulocyte Volume (MRV) are interesting tools for the hematologist in the follow-up of patients undergoing chemotherapy and/or hematopoietic stem cell transplantation.

3 A Total Automated Slide Preparation and Staining System

Pentra 120 Retic SPS offers total automation and flexibility with proven wedge smear technology. The system optimizes all smearing parameters (drop size, wedge angle, smearing speed,) to obtain significant monolayer blood films every time with large optimal area for microscopic examination.

3.1 Smearing and Staining Principal

Fig.4 shows the smearing and staining procedure of the Pentra 120 Retic SPS.

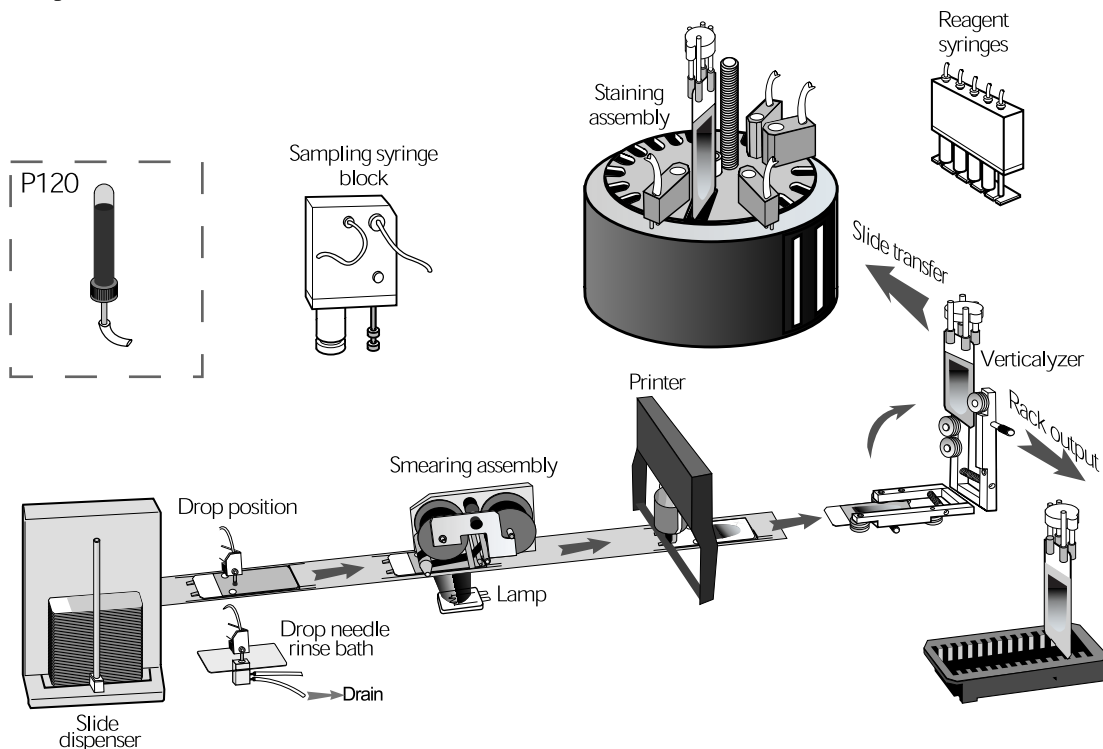


Fig.4 Smearing and Staining Procedure.

(1) Sampling

Aspiration of 50 microliters of whole blood with the sampling syringe of the SPS connected to a 3 channel needle within the Pentra120.

(2) Slide Dispenser Assembly

Provides new slides for the smearing operation.

(3) Drop Needle

The portion of the sample is rejected into the drop needle rinse bath, and the drop needle is externally rinsed by ABX diluent.

A drop of user predetermined adjustable volume is disposed onto the slide.

The slide is then moved to the next process.

(4) Drop Smearing Assembly

The smearing is performed in a classical way with a wedge.

The wedge is positioned on the slide before being brought into contact with the drop and allows time for the blood to migrate along the wedge.

Using a ribbon tape capable of processing 6000 slides smears. The ribbon replenished after smearing each sample, presenting a clean section for the next slide. The ribbon is dispensed from a wheel and passes around the smearing wedge, once used it is then wound onto the waste wheel.

The smearing speed can also be adjusted by the user.

(5) Printer Assembly

Either patient demographics, comments or pathologic parameters can be directly printed out onto the slide, as predefined by the user.

(6) Slide Transfer

The slide is transferred to the “Vertalyzer” device. This allows the “Slide Transfer Assembly” to grab the slide. The slide is thus either introduced into the staining well assembly or the rack, depending on whether the staining of the slide was requested.

(7) Staining Methods

The stainer is a rotating tray containing 32 staining wells. A needle plate supports needles at adjustable locations to dispense liquids (using short needles) into the well, and to aspirate the used liquid (long needles) from the wells.

Every 30 seconds, the tray rotates 1/32nd of the full circle. After each passage of a slide, the staining baths are emptied. Fresh reagent is used for each new slide.

Once completed the smeared and/or stained slides are collected in the Rack Collection Station awaiting visual analysis by the user. Fig.5 shows an example that are smeared and stained by the Pentra 120 Retic SPS.

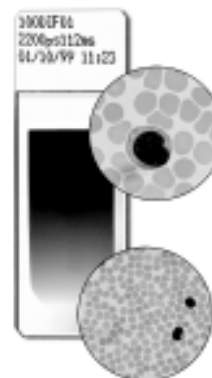


Fig.5 Smeared and Stained Sample.

3.2 Innovative Features

The Pentra 120 Retic SPS have a lot of innovative features as following.

- Microsampling of 50µL whole blood from primary tubes.
- Positive identification with automatic printing of patient demographics onto the slide.
- Choice of different staining protocols : May-Grünwald-Giemsa, Wright, Wright-Giemsa...
- Possible manual insertion of manually smeared slides for further staining by the SPS.
- Possible restricted smearing application for further manual staining protocols.
- 150 slides storage capacity + continuous feed capability.
- Up to 120 slides per hour.
- True reflex testing.

4 Conclusion

The Pentra 120 Retic SPS offers products that can provide 5-DIFF and reticulocytes analysis with slide preparation and staining system. Furthermore, with micro sampling and quiet operation, these products have been designed not only for co-medicals, but for the patient’s quality of life as well. We hope that our products can contribute to the medical treatment further more.



Pascal BERTHET
 Hematology Product Manager
 Marketing Department
 ABX S.A.