XN Series
What's in it for me?

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Agenda

• XN Series Product Overview
  – A system to fit every lab’s needs
• Features and Functionality
  – Built for YOU!
• Technology
  – Making your life easier
Silent Design…

• The fusion of form and function
• Easy operator interaction
• Visually appealing

XN-Series

It all begins here....
Product Configuration Portfolio

XN-1000
XN-9000
XN
XN-3000
XN-2000
Single Module – Fully Loaded

• Every XN Configuration offers:
  – All the parameters
  – All the features
  – All the capabilities
**Taking up more space or taking up less space?**

**What's Better?**

**Space-saving Powerhouse**

**Less Space - XN-2000**

- **XN-2000**: 37.8" +1 IPU
- **2 x LH 500**: 50.2" (+25%)
- **2 x DxH 800**: 60" (+37%)
- **2 x LH 750**: 78" (+52%)

- **2 x XT**: 41.8" (+11%)
- **2 x XN-1000**: 50.8" (+34%)
- **2 x XE**: 55.6" (+47%)
- **+ 2 IPU**
Less Space - XN-3000

XN-3000: 78.7"

1 x XE-Alpha & 1 x XE-5000: 92.8" (+15%)

2 x DxH 800 & 1 x SMS: 96" (+18%)

1 x LH 755 & 1 x LH 750: 127" (+38%)

+1 IPU
+ 2 IPU
+ 2 IPU
+ 2 IPU

less is more

Software.....

Easy to use or hard to use?

What's Better?
Intuitive Software

Easy to Use
Flexible and Easy to Use

Simplified Software System
Work flow made simple……

XN-Series On-Board Rules

- 1st Level XN Decision Rules
  - Incorporates ISLH Consensus Rules and more
  - Rules pre-loaded with operator actions
  - Follow-up sample handling
  - Critical and moderate actions color coded
XN-Series On-board Rules

• Enhanced Walk-away Capabilities
  – Automated reflex or rerun testing
  – Slide making rules

Co-Primary System

• Fully Automated Workload Balancing
• Automatic re-run reflex testing
Flexible Sample Presentation

- Single Aspiration Pathway
  - Sampler Analysis (Rack)
  - Manual Analysis (Open or Closed)
- No mode-to-mode QC, Comparison, Documentation

Automated Slide making

- 4th generation, integrated product
**Slidemaker / Stainer**

- Improves smear TAT
  - Distinguishes STAT and routine smears
  - Non-batch staining
- Consistent smear quality
- Re-cycled reagent system
- Provides positive patient ID:
  - 3 slide print options available
- Low sample volume requirements:
  - Micro-sample port
  - Blood aspirated and slide made when indicated

**Flexibility and Easy of use**

- Designed with the user in mind
  - Flexible systems
  - Flexible software
  - Ease of use
**QC and Maintenance**

Time consuming, complicated maintenance and QC or simple, easy maintenance and QC?

**Maintenance**

- CELLCLEAN Auto
- Automatic shutdown/daily maintenance for the instruments
- One tube per XN Module or SP-10
Walk Away Maintenance

- Automated maintenance / QC rack system:
  - Cleaning rack for shutdown
  - QC rack for QC
- Automated QC rack
- Single button conveyor power switch

Simple, Easy, All Inclusive Quality Control

- All inclusive QC material
  - Three levels: CBC, Diff, NRBC, IG, Retic, IPF, Ret He, PLT-F
  - 50% less QC vials
- 84 day expiration dating
  - 65% Less time spent on lot to lot comparison
- Consolidated QC Reporting
- Single sample pathway
  - No mode to mode comparison and associated documentation

{less} is more
Efficient QC Management

- Fewer files to manage
  - Tri-level QC for all reportable hematology tests
  - 2-level BFQC for all reportable parameters
- Multi-module overlay
- Automated IQAP system
  - Automatic transmission of data after analysis
  - Prompt access to peer data via internet
- Documentation of out-of-range points
  - Within IQAP system
  - On-board XN software

Smart Reagent Management System

- Color coded Reagents
  - Easy to identify and change
- Clean, neat, easy storage
Smart Reagent Management System

- RU-20 Reagent Management System
  - 25% concentrate
  - Reduces reagent changes and instrument idle time
  - Increases free space in the lab.

Why it matters......

- Elephants are the largest living terrestrial animals
- Female African elephants can reach a weight of 7,900 lbs.
**Why it matters…….**

- 1 cube of diluent weighs ~50lbs
- At 300 samples/day you move about 156 cubes/year
- RU-20 = 1 cube/50 days
- ~7.2 cubes/year

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**XN system summary slide**

- Easy to use
- Designed with the operator’s needs in mind
- Improved workflow
- Automation for every lab
- Minimal maintenance
- Easy QC with more information at your fingertips
- Improved reagent management
XN-Series Technology

Sysmex XE vs. XN Technology
Sysmex Foundational Technology

RBC & Platelet DC Detection / Hydrodynamic Focusing

Hemoglobin Absorbance / Sulfolyser

RBC & Platelet

Reportable Parameters
- RBC
- Platelets

Reagents
- CELLPACK DCL
- CELLPACK DST*
  *Used with RU-20
Fluorescent Flow Cytometry

Side Fluorescent Light
DNA/RNA information

Side Scattered Light
Cell inside structure information

Forward Scattered Light
Cell size information

Dichroic Mirror

Laser Beam
wavelength=633nm

WNR Channel

XN-CBC
NMRC
Advantage of Fluorocell WNR

Correlation Coefficient (R) = 0.9179
N = 171

Data from the University of Iowa / Dec 2011

NRBC Correlation Data

Correlation Coefficient (R) = 0.9219
N = 171

Correlation Coefficient (R) = 0.9179
N = 171

Data from the University of Iowa / Dec 2011
WNR Channel

- Fluorescent Flow Cytometry Technology
- Maximized Efficiency
- NRBC the first time – all the time
  - No additional steps
  - Accurate WBC Counts in the presence of NRBCs
  - No additional reagent needed
- Virtually eliminates interference from:
  - Lyse resistant RBCs
  - Lipids

WDF Channel

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WDF Channel

- LYMPH
- MONO
- NEUT
- EO
- Atypical LYMPH
- Immature WBC

WDF Channel Scattergram - Normal Pattern

- MONO
- LYMPH
- NEUT+BASO
- Debris

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IG – XN DIFF Abstract

Automated Immature Granulocyte Counts on the new Sysmex XN Automated Hematology Analyzer
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Conclusion: The WDF Channel provides accurate automated IG counts as confirmed by a respectable correlation between the DM96, XE-5000 and the XN. These results were excellent considering the low levels of IGs observed and the well-known limitations of manual differentials and rare cell events. Reporting the automated IG count using a cut-off of <=5% would increase the number of auto-verified results by 30% on the XN analyzer and would improve productivity and efficiency in the laboratory.

So what’s different about the WDF?

Enhanced Flagging

XN flagging system improves work flow by reducing manual reviews
Enhanced Flagging Algorithms

**SAFLAS method**

(Sysmex Adaptive Flagging Algorithm based on Shape-recognition)

Detects abnormal cells - (with high sensitivity)

LDA (Linear Discriminant Analysis)

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**WDF SAFLAS Method**

<table>
<thead>
<tr>
<th>Normal</th>
<th>Abnormal (Blasts?)</th>
<th>Abnormal (Abn Lympho?)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>
WDF Channel

- Enhanced Flagging
- Better separation between lymphs and monos (SAFLAS)
- Better identification of platelet clumps (multiple channel detection)
- Auto-correction of lymphs when NRBCs are present
- 6-part differential (including IG)

Low WBC Analysis Mode

- Analysis Time extended to 3 times the Whole Blood WBC count time
Low WBC Analysis Mode

- Analysis time extended to 3 times WB WBC count time
- Better accuracy and precision on counts $< 0.50 \times 10^3$
- No Vote Outs – Differential results on all counts
- Increased reportable differentials

PLT-F Channel
PLT-F Channel

PLT performance

- Impedance platelet analysis (size) has limitations in the identification and discrimination of platelets from interfering particles with the same size.

- Possible interferences
  - RBC fragments counted as platelets: falsely high
  - Microcytic RBCs counted as platelets: falsely high
  - Large platelets counted as RBC: falsely low

PLT-F Channel

Reagent Reaction

RBC  PLT  IPF
PLT-F Channel

Reportable Parameters
- PLT-F
- IPF

PLT-F separates platelets from RBC fragment by the differences in staining

- CD41/CD61 positive = Platelets
- Staining by PLT-F dedicated reagent
  - Platelets - Strong, especially within the cell
  - RBC fragments - Weak, only cell membrane
**Interference with Routine Impedance Count**

**ß-Thalassemia Major with numerous fragmented red cells**

**XE: PLT-I**
- PLT-I = 477*10^9/L
- IPF% = 13.9%

**XE: PLT-O**
- PLT-O = 111*10^9/L
- PLT-CD61 = 152.2*10^9/L

**XE: PLT-I**
- PLT-I = 514*10^9/L
- IPF% = 12.9%

**Microcytic RBC**

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**Improved Performance of PLT-F**

**Acute Promyelocytic Leukemia / chemo: white blood cell fragments**

**XE: PLT-O**
- PLT-O = 25*10^9/L
- PLT-CD61 = 24.2*10^9/L
- IPF% = 41.2%

**XE: PLT-F**
- PLT-I = 28*10^9/L
- PLT-F = 24.2*10^9/L
- IPF# = 74.6*10^9/L

**IPF**
- PLT-I = 514*10^9/L
- PLT-F = 160.8*10^9/L
- IPF# = 0.310^9/L
PLT-F Channel

- Second method of platelet
- Fluorescent Dye specific for platelet organelle
- Extended count time (6 times) for accurate platelet enumeration, especially in low platelet counts
- Good comparison with CD41/CD61
- Minimizes interference from RBC fragments, microcytic RBC’s and WBC fragments
- Automated Action message and reflex with on board rules

Reticulocyte Channel
Reticulocyte Parameters

- Reticulocytes
  - # and % of immature RBC's
- Immature Reticulocyte Fraction
  - Newly released from the marrow, a direct cellular measurement of erythropoiesis
- Reticulocyte Hemoglobin
  - Direct cellular measure of iron availability

Reticulocyte Channel

- Operational Efficiency
  - Reduced Interference From:
    - WBCs
    - Howell Jolley Bodies
    - Parasites
    - Sickle cells
  - Quick and automatic
- Monitor RBC development at the cellular level
  - IRF for Retic production
  - RET-He for iron incorporation in hemoglobin of the erythron
- Clinically relevant information for the management of anemia in conjunction with other available clinical information.
Body Fluid Analysis

Body fluid mode (target species)

Cerebrospinal fluid (CSF)
Pleural fluid
Peritoneal fluid
Synovial fluid

WDF Scattergram
**Body Fluid Analysis**

- No pre-analysis preparation
- No additional reagents
- Automated background counts
- Rapid analysis

**XN Technology Summary**

- WNR Channel
  - Maximized efficiency
  - NRBC the first time – all the time
  - Accurate WBC Counts in the presence of NRBCs
- WDF, Low WBC
  - Enhanced Flagging
  - 6-part differential (including IG)
  - Improved Sensitivity and Specificity
XN Technology Summary

- Low WBC
  - Better accuracy and precision on counts < $0.50 \times 10^3$
  - No Vote Outs – Differential results on all counts
  - Increased Reportable differentials

- PLT-F
  - Fluorescent Dye specific for platelet organelle
  - Extended count time (6 times) for accurate low platelet enumeration
  - Good comparison with CD41/CD61
  - Automated Action message and reflex with on board rules

XN Technology

Hematology Technology of the Future Today
Are you convinced?

Less where we want it, more where we need it.

THANK YOU!