Cell Imaging Analysis: Our journey to Hematology Productivity

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Disclosure

• Receiving an honorarium for this educational presentation
Objectives

- Identify reasons for choosing Cell Imaging to streamline Hematology processes
- Compare manual differential to old/new Automated Differential Imaging systems
- Evaluate case studies using the CellaVision® Automated Differential Imaging System

Fast Facts

- 4,800 employees (region’s third-largest health system)
- 600-plus physicians in 35 specialties
- 654 licensed beds
- 800 volunteers and auxiliary members

Budgeted for FY 2011

- 1,945 births
- 31,000 inpatient admissions
- 122,682 emergency department visits
Our Hospitals

Westmoreland Hospital
Greensburg

Frick Hospital
Mount Pleasant

Latrobe Hospital
Latrobe

Catchment area population: 400,000

Our reach of care covers Westmoreland County and parts of Allegheny, Fayette and Indiana Counties.

Hematology

- Annual CBC's
- Annual Manual Differential Rate
- Annual Body Fluid Rate
- 2 CellaVision Imaging Systems
  - Westmoreland
  - Latrobe
Cell Imaging

- CellaVision DM96
  - Up to 35 slides/h
- CellaVision DM1200
  - Up to 20 slides/h
- CellaVision DM8 (discontinued by manufacturer 12/2010)
  - Loading capacity of 8 slides
  - No body fluid application
- MEDICA EasyCell assistant
  - 5.5 min/slide
  - No body fluid application

Cell Imaging Overview

- Locate cells on a glass slide
- Pre-classify WBC classes using an artificial neural network
- Cells grouped, sorted and displayed for Tech
- Historical archiving of all images
- Access to images through lab network
**Cell Imaging Technology**

- Starts at a fixed point in the thick area of the smear (33mm from end)
- Moves stepwise towards the thinner part of smear, continuously grabbing 10x image until the start and end points have been determined

**Cell Imaging Technology**

- Analyze the number of RBC contours and the average size of them
- When certain criteria are fulfilled, the end point is defined
- Move towards the thinner part and calculate the parameters continuously until the criteria for the start point is filled
Once the start and end points are determined, the mono layer is then scanned (10x) for cells according to the Battlement track pattern and the coordinates are stored.

When 3 x (number of cells ordered) objects have been found, or the end point is reached, it stops. (remember this!)

Using the 100x objective, the system returns to the previous coordinates and starts focusing and grabbing 100x images of the cells.

The scan direction is from thin to thick area.
When the cell is in focus, a classification algorithm is performed based upon cell features and characteristics.

EasyCell *assistant* by MEDICA
EasyCell assistant Overview

Designed with the smaller laboratory in mind
- Easy to use
- Compact
- Optimized for less than 50 slides per day
- Has virtually no maintenance

Flexibility to fit workflow practices
- Accepts up to 30 slides at a time for unattended operation
  - Capable of accepting a single slide, e.g. STAT capable
- Performs either 100 or 200 cell analyses
  - Displays images for RBC Morphology
  - Qualitative Platelet Estimate
- Bi-directional LIS communication
- Archives Images for long term Image storage
- Able to connect to remote network workstations

CellaVision DM96
CellaVision Software

- Peripheral Smear Imaging
- Body Fluid Applications
  - Access to a patient’s historical images and real-time collaboration
  - Ensures the accuracy and standardization of the analysis.
- Competency Software
  - Comparison to lab expert with statistics
  - Dynamic education opportunities
  - Decreases recordkeeping for QA
- Remote Review Software
  - Full functionality from other network connected PC’s
Cell Imaging Implementation

• Customizable software
  – WBC reportable cell lines
  – RBC morphology cell lines
  – PLT morphology comments
  – WBC morphology comments

• LIS interface
  – Autofiling
  – Exceptions are blast cells and sickle cells
Peripheral Smear Software

Settings

Customizable WBC Classifications
Peripheral Smear Software
Customizable RBC Classification

Peripheral Smear Software
Full Screen WBC
Peripheral Smear Software
RBC Morphology Tab

Peripheral Smear Software
PLT Estimate Tab
Peripheral Smear Software
Sign Out Tab

Peripheral Smear Software
LIS Acceptance WBC and RBC
Peripheral Smear Software
LIS Acceptance WBC/PLT Morph

Hematology Value

- Increased quality and consistency
  - Ability to review smears easily and cells classed
  - Identify issues with technicians and ability to educate
- Aging technician population
  - Better ergonomics
  - Cell Image adjustments
- Competency and Education
  - Students
  - Slide Review
  - Multiple Databases
- Decreases tech time
Technician Time Comparison

Table 4. Comparison of time taken to complete the 30 differentials on the CellaVision DM96 including reclassification of cells with time taken to perform the same differentials manually

<table>
<thead>
<tr>
<th>Operator</th>
<th>Time for analysis on DM96</th>
<th>Time for manual differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 h 5 min</td>
<td>1 h 45 min</td>
</tr>
<tr>
<td>2</td>
<td>1 h 10 min</td>
<td>1 h 40 min</td>
</tr>
<tr>
<td>3</td>
<td>1 h 30 min</td>
<td>3 h 45 min</td>
</tr>
<tr>
<td>4</td>
<td>1 h 40 min</td>
<td>4 h 10 min</td>
</tr>
<tr>
<td>5</td>
<td>1 h 14 min</td>
<td>3 h 10 min</td>
</tr>
</tbody>
</table>

Reference:

Technician Time Savings

- “The time saved when using the DM96 is greatest for the less experienced laboratory scientists. With increased instrument familiarity with the instrument there may be potential for even more time saved”

Reference:
Hematology Value

“The DM96 is reliable and certainly has a place in the haematology laboratory where it should improve workflow, make more efficient use of experienced laboratory scientists’ time and make training and monitoring of staff in blood cell morphology skills easier and more efficient.”

Reference:

Pathologists Benefits

- Pathologists
  - Email cell images for review
    - Specific cells emailed
    - Decrease time to search for abnormal cells
    - Electronic record of abnormalities
  - Remote review software
    - Pathologist complete review
  - Real time consultations
    - No need for microscope or oil lenses
Hematology Value
Pathologist Review via Email

CellaVision Body Fluid

- Prepare Cystospin slide
- Uses Blue magazines/cartridges to identify smear as a Body Fluid
- Same classification principle as peripheral blood software
CellaVision Body Fluid

Operational Benefits

- LEAN approach
- Barcoded specimen ID increases quality
- Multiple stations reading differentials without the need of a microscope
- Odd shifts increase productivity with remote review software
- Competency and education improve quality results
CellaVision Workstation

Financial Benefits

- Time savings
- Techs can perform other duties
- Decrease pathologists time on slide review
- Time available for new assays for additional revenue
Conclusion

- Cell Imaging provides
  - Increases in quality
  - LEAN approach
  - Education opportunities
  - Tech time savings
  - Accuracy and precision
  - Competency
  - Pathologist real time review
  - Pathologists time savings

References


Question and Answers

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