Efficiency in your daily work

Automated Digital Cell Morphology is the process by which cells are automatically located on a stained peripheral blood smear, pre-classified, stored and transmitted for confirmation by a technologist. This technology improves the efficiency and proficiency of the historically subjective differential review.

Additionally, the advances in image analysis and network integration allow the cell image to finally become an integral part of the patient’s record.

- **The CellaVision DM96 is an** Automated Digital Cell Morphology System for the location, pre-classification, display, storage and transmission of red and white blood cell images.

  Using an Artificial Neural Network (ANN), WBCs are pre-classified and RBC morphology is pre-characterized, grouped, and stored to await technologist confirmation.

  ANNs are exceptionally good in pattern recognition and classification due to their ability to generalize and make decisions about imprecise data. The CellaVision DM96 analyzes over 250 specific characteristics for each cell during the classification process.

- **Quality assurance.** CellaVision DM96 allows different technologists to perform differentials at the same high level of consistency. The system provides traceability of results at the individual cell level.

- **Connectivity.** Multiple Remote Review Stations enable supervisory review, inter/intra-lab comparison and the opportunity for real-time collaboration with Pathology.

- **Efficiency.** Automatic cell-location and pre-classification, along with unique cell views, reduce the time spent performing differentials, training new technologists and monitoring proficiency.

- **Value to clinicians.** As a result of network integration, the CellaVision DM96 will provide new value to clinicians, saving them time with remote, real-time access to a patient’s image history.
Utility NCCLS guidelines in conjunction with a neural network trained on thousands of cells identified by a group of global experts, the CellaVision DM96 offers an opportunity to improve efficiency and consistency.

With continued cost constraints and the shortage of skilled technologists, especially in differential analysis, the CellaVision DM96 permits technologists to use their skills to the best benefit of the laboratory.

**Maintain high quality**
- Use of NCCLS guidelines standardizes performance across all technologists, shifts and locations.
- Viewing cell classes side by side.
- Access to on-board, customized, reference cell library.
- Access to a patient's image history, months or years back in time.
- Complete traceability of results at the individual cell level.
- Standardizes training and proficiency testing.

**Improve resource utilization**
- Automatic cell location and pre-classification performed at 35-60 slides per hour, including leukopenic samples.
- Allows confirmation of cell counter results in seconds.
- Networking allows centralized review and/or remote operation of multiple locations.
- Improved ergonomics increases employee satisfaction.

**Extensive database**
- Quick access to results and images for consultations, collaboration and education.
- Trace and compare patient progress over time.
- Permanently store images without degradation over long time periods.
- Unlimited number of results and images can be stored on the LAN.
- Export individual interesting slides to a separate database.
- Ability to search the database by 15 criteria including; Doctor, Technologist and Comments.

**Remotely share images via tele-hematology**
- Review images with experts regardless of location.
- Users anywhere on the network can open the same slide simultaneously for collaboration.
- Multiple Remote Review Stations enable supervisory review, inter/intra-lab comparison and the opportunity for real-time collaboration with pathology.

Ability to search the database by 15 different criteria. Order status, such as signed slide, sent to LIS, STAT sample, comments attached is clearly indicated by icons.
It is possible to quickly screen for abnormalities, allowing fast confirmation of the CBC analyzer’s results. When classifications need to be changed, cells can be dragged and dropped into the appropriate cell class.

- **The system analyzes between 35-60 slides per hour depending on the tests requested.**
  Slides are transported into the system and:
  - 10X dry objective finds monolayer and coordinates of nucleated events.
  - Oil is automatically added. 50X objective takes 35 HPF images in order to pre-characterize RBC morphology. 100X objective returns to each WBC, and captures a high quality image. An Artificial Neural Network evaluates 250 cellular characteristics and pre-classifies each cell. Results with images are stored and displayed for the technologist’s verification.

- **Proficiency.** The CellaVision DM96 provides the technologist with the ability to perform side-by-side comparison within different cell classes, by viewing similar cells together. Additionally, there is an on-board reference cell library for use by the technologist. This library is customized from the individual hospital’s own patient population. This process not only streamlines training but it also ensures consistency across technologists and shifts.

- **Easy access to powerful features:** Add pre-coded or free text comments to any slide, cell class or specific cell. Attach any number of cells and send them via email. Customize the coloration and brightness of cell images in your personal profile.

View cell classes side-by-side or compare one cell class with reference cells of the same cell class.

Slides are placed into a 12-position magazine; up to 8 magazines, containing a total of 96 slides, can be loaded at once.
WBC:
- Cells are grouped with like cells to facilitate verification.
- Cells are pre-classified into 18 classes:
  - Leukocytes: Segmented neutrophils, band neutrophils, eosinophils, basophils, lymphocytes, monocytes, blast cells, promyelocytes, myelocytes, metamyelocytes, variant lymphocytes, plasma cells and unidentified.
  - Non-leukocytes: Smudge cell, artifact, giant platelet, platelet clumps, erythoblasts (NRBC).
- Handling leukopenic samples is more efficient due to the ability to merge cells from multiple slides on a single patient.

RBC:
- RBC Morphology is automatically pre-characterized for polychromasia, hypochromasia, aniso-, micro-, macrocytosis and poikilocytosis as set by the lab, providing percentages of each type.
- Multiple fields can be scanned as if on a virtual microscope.
- A dynamic micrometer facilitates additional cell measurements.

Steve DeVine, UTMB, Galveston, Texas:
“We early on identified a number of key points with the DM96, like reduction in labor costs and increased quality of produced results. The software’s numerous options and high image quality make it a very user-friendly and efficient system to use with a minimum of maintenance.

The networking capability, like remote review and email functionality, adds new values to the laboratory and clinicians which in the end should provide better patient care. In addition to this, it is also a great training tool.”
Using the Remote Review software in conjunction with the CellaVision DM96 opens up exciting new possibilities for networking, collaboration and education. CellaVision Remote Review Software is an optional software product enabling remote access to a DM96 database.

Connectivity. Clinicians and pathologists save time by accessing their patients’ images remotely in real time. Technologists save time searching for the requested smear.

Collaboration. Should there be lack of personnel; slide review can be performed remotely from another hospital. Smears needing a second opinion can easily be reviewed remotely by a pathologist or clinician from within or outside the hospital.

Rational archiving. Archive images and results to CD-R/RW or LAN gives access to a patient’s image history, months or years back.

Education and training. Exporting individual interesting slides to a separate database and thereby create a “digital slide box” accessible from anywhere by anyone, making training and education of staff easier and more efficient.

Shared database. Multiple systems can be run from a central location, eliminating transportation problems and reducing turn-aroundtime (TAT). Morphology expertise can be centralized, resulting in staffing flexibility at remote locations.

Samples with a STAT flag are clearly indicated in the database view giving high attention to these slides for a quick TAT.
Quality of results

Pre-classification performance
During the evaluations of CellaVision™ DM96 the following results were collected at two of the hospitals, one in the US and one in Europe.

As shown by the results for these specific hospitals, the pre-classification agreement for the group, making up for the majority of the cells in a sample, segmented neutrophils, lymphocytes and monocytes is above 90% leaving few cells to be reclassified by the operator.

<table>
<thead>
<tr>
<th>Study data</th>
<th>US STUDY</th>
<th>EUROPEAN STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO OF SAMPLES</td>
<td>246</td>
<td>100</td>
</tr>
<tr>
<td>COUNTED CELLS/SAMPLE</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>STAINING PROTOCOL</td>
<td>WRIGHT</td>
<td>MGG</td>
</tr>
</tbody>
</table>

Agreement of preclassification for different groups of cells

<table>
<thead>
<tr>
<th>All Cell Classes</th>
<th>US STUDY</th>
<th>EUROPEAN STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL CELLS</td>
<td>87%</td>
<td>84%</td>
</tr>
<tr>
<td>ALL CELLS (SN=BN)</td>
<td>92%</td>
<td>92%</td>
</tr>
<tr>
<td>SEG, LYMF, MONO</td>
<td>93%</td>
<td>97%</td>
</tr>
<tr>
<td>SEG, LYMF, MONO EOS, BASO</td>
<td>91%</td>
<td>87%</td>
</tr>
</tbody>
</table>

Extract from a customer testimonial
“We quickly identified a number of values to our laboratory which met or exceeded our expectations including better quality of delivered results, increased service to our clinicians, significantly improved ergonomics, excellent educational tool, higher interest in morphological diagnosis in the laboratory and improved and easier quality assurance.

The Remote Review Station allows us to work parallell while verifying analyzed slides and to access stored information remotely.”

Linda Hilstedt, Dept. Clinical Biochemistry, Rigshospitalet, Copenhagen
**Technical Specifications**

**Supported smear methods (wedged)**
- Automated slide makers and/or stainers
- HemaPrep™/MiniPrep™ automated blood staining device
- Manual smears

**Supported stains**
Romanowsky stains (MGG/W/WG)

**Slide handling**
- Requires barcode labelled slides with clipped/round corners.
- Slides are loaded into magazines with the capacity of 12 slides each.
- Continuous feeding, with an initial load of 96 slides using eight magazines.
- Magazines are ideal for storage and retrieval of slides.

**Throughput**
- Approximately 35 slides/hour for complete differential (WBC+RBC+PLT).
- Approximately 60 slides/hour for RBC and/or PLT only.

**Archiving of results and images**
- Supported media: CD-R / CD-RW and LAN.

**Results storage capacity:**
- On hard drive: Approximately 20,000 slides, 100 cells/slide.
- On CD: Approximately 200 slides, 100 cells/slide.
- On LAN: unlimited

**Specific performance characteristics**
A clinical evaluation based on NCCLS standard H-20A showed equivalence to DiffMaster™ Octavia regarding accuracy, imprecision and clinical sensitivity/specificity.

**CellaVision DM96 automatically** preclassifies the following cell types. **WBCs:** Segmented and band neutrophils, eosinophils, basophils, lymphocytes, monocytes, blast cells, promyelocytes, myelocytes, metamyelocytes, variant lymphocytes, and plasma cells. **Non WBCs:** Smudge, artefacts, giant platelets, platelet clumps, erythoblasts (NRBC), unidentified.

**PLT estimate:** The graphical user interface allows manual estimation of the PLT concentration, based on eight high power fields (100x).

**System components**
- PC with Windows XP
- Slide scanning unit
- CellaVision Blood Differential Software

**Electronical Specification**
- Voltage input: 230 VAC (115 VAC for US)
- Current input: 4A (8A for US)

**Size (W × D × H)**
- 530 x 600 x 630 mm
- 20.9 x 23.6 x 24.8 inches

**Accessories**
- Label printer kit
- Barcode labelled slide magazines
- Immersion oil
- QC barcode labels

**System options**
CellaVision Remote Review Software
Recommended PC specifications
- 64 MB graphics RAM with Open GL 1.2 support
- Ethernet adapter 10/100 Mbps • 512 MB RAM
- 100 MB free disk space • CPU Pentium IV