White Blood Cell Identification:
A Novel Trainer and Competency Assessment Tool

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Faculty/Author/Speaker Disclosure
The faculty/speakers for this live session do not have relevant financial relationships with commercial interests to disclose.
You will leave with the ability to:

Describe the need for tools that train and provide performance feedback in visual perceptual motor skills necessary for competent practice.

Discuss the elements of photography systems for collecting images and movies that can be used to create training modules.

Describe a system for training and assessing competence and apply the system to improve your staff's performance.
expertise
Giftedness and evidence for reproducibly superior performance: an account based on the expert performance framework

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*Florida State University, USA

Giftedness researchers have long debated whether there is empirical evidence to support a distinction between giftedness and attained level of achievement. In this paper we propose a general theoretical framework that establishes scientific criteria for acceptable evidence of superior reproducible performance, which any theory of exceptional performance must explain. We review evidence for superior reproducible performance, generally emerging only after extended periods of...
Deliberate Practice

and the Acquisition and Maintenance of Expert Performance in Medicine and Related Domains

10,000 hours

Academic Medicine, 79:10, October Supplement, 2004
“living in a cave does not make you a geologist”

“When most people practice, they focus on the things they already know how to do. Deliberate practice is different. It entails considerable, specific, and sustained efforts to do something you can’t do well—or even at all”

*Harvard Business Review, July-August, 2007*
Performance

Instruction and experience

Specialist

Resident

Generalist

Butterworth and Reppert, JAMA 1960
Competency improvement

- Compliance with policy and procedure
- Microscopy competency
- Clinical and procedural knowledge

Do you really want a “C” student working on your mother?
We need experts

and not just in flow cytometry and molecular pathology.
A Better Way To Assess WBC Differential Counting Skills

One evening in July 1996, a patient was transferred to our hospital from an affiliate site. The patient's WBC count was elevated (30,000/µL [30.0 × 10^3/µL]), and the platelet count was low (55 × 10^3/µL [55 × 10^3/µL]). Examination of the patient's peripheral blood smear revealed a predominance of small lymphoblasts. When the patient was admitted, however, our laboratory reported the lymphoblasts as normal lymphocytes. This was 1 of 7 documented failures that occurred in 1996.1

During that year we assessed technologist competence with color transparencies from College of American Pathologists proficiency surveys. According to that method, our laboratory performed competently.

"Are We Testing What We Think We Are Testing?" 

Lunz2 considers the "what we are testing" issue central to the validity of an assessment method that tries to measure actual performance. There are many kinds of validity—face validity, content validity, and criterion-related validity.3 Simply stated, a valid competency-assessment test has 4 characteristics: it (1) looks like the real thing, (2) has real-world content, (3) measures all aspects of tasks, and, most important, (4) predicts performance. When we apply these criteria to the color transparencies, they do not meet the criteria of validity.

ABSTRACT: Before 1996, we used color transparencies to assess skills in identifying morphologic characteristics associated with WBC differential counting. Although our technologists passed the tests, they failed in actual practice. To solve this problem, our competency team developed a slide-based test that revealed incompetence. After retraining, nearly all technologists passed the slide-based assessment and failed much less frequently in practice. We enhanced the measurement effectiveness with a set of simple validity-related questions.

Does the color transparency item have real-world content?

Somewhat, because experts select the content and tailor it to address a specific real-world skill. Participants, however, must make judgments on the basis of single events, and frequent interpretative disagreements arise within the proficiency testing community. When this occurs, the value of the content diminishes: if experts cannot agree, how can practitioners perform well?

Does the color transparency item assess all skills required to do the actual work?

No, because participants are not required to set up the microscope, move the stage, or focus the image. Nor do they have to find the cells they only
Results of Competency Assessment by the Slide Challenge Method

<table>
<thead>
<tr>
<th>Slide</th>
<th>Type of Identification</th>
<th>Failed (N = 75)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Lymphoblasts (ALL)</td>
<td>17  23</td>
</tr>
<tr>
<td>B</td>
<td>Reactive lymphocytes</td>
<td>1   1</td>
</tr>
<tr>
<td>C</td>
<td>Band neutrophils, myeloid precursors</td>
<td>4   5</td>
</tr>
<tr>
<td>D</td>
<td>Monocytosis</td>
<td>7   9</td>
</tr>
<tr>
<td>E</td>
<td>Normal</td>
<td>2   3</td>
</tr>
</tbody>
</table>

ALL, acute lymphoblastic leukemia.

Conclusion

We conclude that the slide challenge method for measuring competence in hematology is superior to color transparency methods and that competency measurements must be correctly designed to disclose incompetence and improve performance.
The use of CellaVision competency software for external quality assessment and continuing professional development

Yuki Horiuchi,¹ Yoko Tabe,¹ Mayumi Idei,¹ Hans-Inge Bengtsson,² Kiyoshi Ishii,³ Takashi Horii,³ Kazunori Miyake,¹ Naotake Satoh,⁴ Takashi Miida,¹ Akimichi Ohsaka³
Results  EQA results by the CCS proficiency testing program revealed a difference of performance levels of WBC differential and morphological interpretation and a discrepancy in the WBC differential criteria among laboratories. With regard to the utilisation of this proficiency program as a tool for CPD, this program successfully improved the performance of the low-scoring laboratories and less experienced individuals.

Conclusions  The CCS proficiency testing program was useful for the quality assessment of laboratory performance, for education, and for the storage and distribution of cell images to be utilised for further standardisation and education.
The use of digital ‘virtual slides’ in the quality assessment of haematological morphology: results of a pilot exercise involving UK NEQAS(H) participants


1 Department of Clinical Haematology, Central Manchester and Manchester Children’s University Hospitals, Manchester, 2 Department of Biological Sciences, Manchester Metropolitan University, Manchester, 3 School of Environment and Life Sciences, University of Salford, Salford, and 4 UK National External Quality Assessment Scheme for General Haematology, Watford, UK

Summary

We report the results of a pilot study assessing the use of digital ‘virtual slides’ in haematological quality assessment. Conducted together with the UK National External Quality Assessment Scheme for General Haematology, the study involved 166 separate participants, using the format of a typical assessment exercise. The results revealed substantial concordance of observations made using digital slides with those reported in previous glass slide surveys that used identical cases. Participant feedback strongly supported the use of electronic slides in teaching and assessment roles. Our results suggest roles for this new electronic resource in external quality assessment (EQA), education and continuing professional development.

Keywords: external quality assessment, digital morphology, virtual slide, UK National External Quality Assessment Scheme, morphology.
iPhone Application for hematology competency

CellVision presents you with the perfect way to learn the basics of cell morphology. We now introduce an Application for the Apple iPhone and iPod Touch devices to complement our digital cell morphology portfolio. The Application, CellAtlas® is an educational tool to assist in the recognition and classification of blood cells.

CellAtlas contains mini lectures in English written by experts in hematology. The Application gives you access to high resolution classified cell images complemented by a written description.

What is your cell asking?
The Application includes the game, CellQuiz, where you can test your cell morphology skills by matching cell clues to the right cell image.

The CellAtlas Application is available at the iTunes App Store in the Medical and Education categories.

Download your CellAtlas Application today!
Modern compound microscopes are designed to provide a magnified two-dimensional image that can be focused axially in successive focal planes, thus enabling a thorough examination of specimen fine structural detail in both two and three dimensions.
ADVC
Analog to Digital Video Converter
IEEE 1394

"Firewire" redirects here. For other uses, see Firewire (disambiguation).

The IEEE 1394 interface is a serial bus interface standard for high-speed communications and isochronous real-time data transfer, frequently used by personal computers, as well as in digital audio, digital video, automotive, and aeronautics applications. The interface is also known by the brand names of FireWire (Apple), i.LINK (Sony), and Lynx (Texas Instruments). IEEE 1394 replaced parallel SCSI in many applications, because of lower implementation costs and a simplified, more adaptable cabling system. The 1394 standard also defines a backplane interface, though this is not as widely used.

IEEE 1394 is the High-Definition Audio-Video Network Alliance (HANA) standard connection interface for A/V (audio/visual) component communication and control.[1] FireWire is also available in wireless, fiber optic, and coaxial versions using the isochronous protocols.

Nearly all digital camcorders have included a four-circuit 1394 interface, though, except for premium models, such inclusion is becoming less common. It remains the primary transfer mechanism for high-end professional audio and video equipment[citation needed]. Since 2003, many computers intended for home or professional audio/video use have built-in FireWire/i.LINK ports, especially prevalent with Sony and Apple's computers[citation needed]. The legacy (alpha) 1394 port is also available on premium retail motherboards[citation needed].

### Contents
1 History and development
2 Technical specifications

### IEEE 1394 Interface

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial</th>
</tr>
</thead>
</table>

#### Production history

<table>
<thead>
<tr>
<th>Designer</th>
<th>Apple Computer (now Apple, Inc.)</th>
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<tbody>
<tr>
<td>Designed</td>
<td>1995</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Various</td>
</tr>
<tr>
<td>Produced</td>
<td>1995—present</td>
</tr>
<tr>
<td>Superseded by</td>
<td>143</td>
</tr>
</tbody>
</table>

#### General specifications

| Length          | 4.5 meters maximum               |
| Width           | 1                                |
| Hot pluggable  | Yes                              |
| Daisy chain     | Yes, up to 63 devices            |
| External        | Yes                              |
QuickTime Player
Case Studies from LSUHSC
A podcast for Clinical Laboratory Scientists

Increased WBC with atypical basophils
25/06/09 11:20 Filmed in: leukemia | thrombocytosis

This is a 67 year-old female with an elevated WBC and a significantly increased platelet count with a few giant platelets and some large megakaryocyte cytoplasmic fragments. The differential indicates nearly 50% basophils and few myeloid precursors. An occasional blast is seen. The RBC morphology is normal. The patient has been treated for some years for CML and shows signs of entering the “accelerated phase” of the disease.

Podcast
Find the datasheet
Adobe Reader Version (requires Adobe Reader 9)
help me decide which file type

Infection with schistocytes
29/04/09 11:18 Filed in: anemia | infection

This is a 36 year-old female with anemia, an elevated WBC and
Case Studies
THURSDAY, JANUARY 26, 2010

Increased WBC with atypical b...

Infection with schistocytes

Normal blood picture but febrile

Marked anemia and elevated WBC

Anemia, high WBC and low platelets

Case Studies
THURSDAY, JANUARY 26, 2010

Normal blood picture but febrile

This is a 47 year old Asian male who is a seaman. The patient is febrile and is currently on a ship in port.

Scan this case with the instructors and find four closeup topics.

Learning Objectives:

- Recognize cloths on a low power scan.
- Recognize ring forms of Plasmodium species.

Done 11:28