Lessons Learned in Life Sciences Imaging

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#TheVisionShow

Introduction

- Life sciences is a high profile sector
- Consistent market growth
- Long term involvement in life sciences as OEM camera supplier and microscopy camera supplier

- High stakes
- High costs of medical care
- Two examples
  - Pathology
  - Ophthalmology

What is Pathology?

- The examination of tissue in order to make a diagnosis of a disease

- Large number of labs in North America

- Part of an established medical process, interface with other medical sciences

- Digital pathology
  - Microscope vs whole slide scanner

Imaging in Pathology

- Brightfield imaging
- Vivid colors
- Detailed images
- Images used for consultation and for documentation
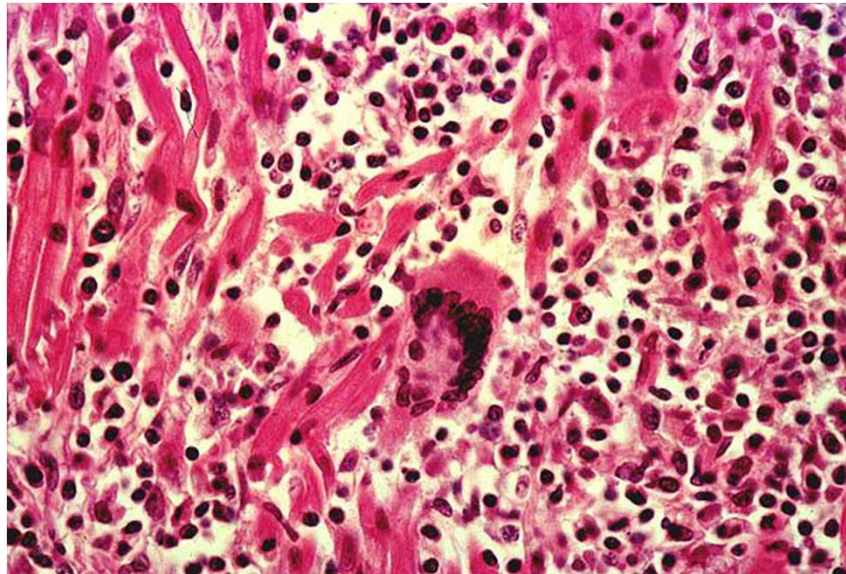
Performance Requirements

- Color accuracy and repeatability
- Low noise
- Ease of use – data interfaces
- Specialized application software

Digital Pathology

- Whole slide scanner
- Digital process allows reduced slide breakage, storage, transport, easy sharing
- Magnification vs. acquisition time
- Synchronization, I/O

User Environment

- Ultimately needs to connect to a PC
- USB is a user friendly interface for PC
- USB 2 sufficient for single pathologist
- USB 3 preferable for scanner or automated microscopes
- Emergence of tablets in the medical field

Emerging Trends in Pathology

- Intelligent image analysis
- Machine vision software
- Processing power of PC

Regulatory Environment

- Digital imaging equipment typically not approved for diagnostics
- Regulatory environment needs to evolve to catch up with digital technologies
- Professional associations
 - United States & Canadian Academy of Pathology - USCAP

- Branch of medicine that deals with the anatomy, physiology and diseases of the eye
- Historical records more than 3,000 years old with modern ophthalmology tracing back to the mid 19th century
- Photography and ophthalmology are intimately linked

Early Ophthalmoscope
Edouard Meyer 1873
(From NLM History of Medicine Collection)

- Low light imaging
- Orange, yellow and red colors are predominant
- Detailed images
- Images used for consultation and for documentation
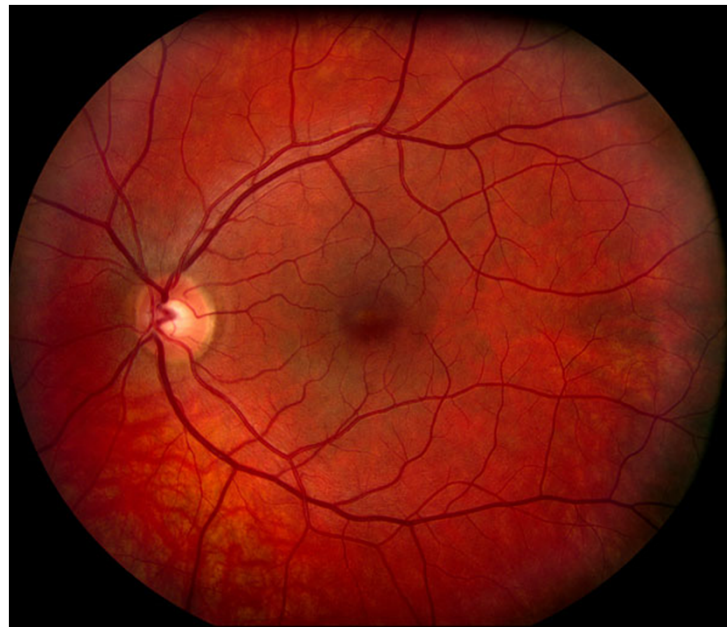
Performance Requirements

- Color accuracy and repeatability
- Sensitivity and low noise
- Ease of use – data interfaces
- Image capture

Ophthalmic Instruments

- Diagnostic equipment and surgical systems
- Need precise color resolution
  - 3-chip cameras
  - 3D imaging

Trends in Ophthalmology

- Rapidly evolving digital photography
- Smartphone and tablets

- FDA approval often required

- Lengthy approval process

- Emphasis on revision control and system documentation

- Different countries would have different systems

- Professional associations
  - American Academy of Ophthalmology - AAO

Conclusion

- Pathology and ophthalmology present challenges different than traditional machine vision applications but common to other life sciences applications

- Emerging opportunity for machine vision suppliers but need to understand the language and environment found in life sciences

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