

**DIAGNOSTICS IN MODERN
HEALTHCARE
(RADIOLOGY + PATHOLOGY)**

**BECKER'S HEALTH IT + CLINICAL
LEADERSHIP 2019
SWISSOTEL, CHICAGO, ILLINOIS
MAY 2, 2019 11:25AM – 12:05PM**

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DISCLOSURES

- Nothing herein necessarily represents the views of the College of American Pathologists or the University of Mississippi Medical Center

“RADIOLOGY AND PATHOLOGY! YOU’RE KIDDING, RIGHT?”

- “That’ll upset a lot of people.”
- “They’re too different. They hardly talk to each other.”
- “That sounds interesting. But it’s not the time for that. There’s no need.”

BUT THE TIME IS NOW

- “The image centric disciplines of radiology and pathology (rad-path) are ripe for disruption.”
 - Merine D. Radpathology/Pathradiology: The Information Specialty of the Future? JACR blog; 12/28/2018. <https://jacrblog.org/radpathology-pathradiology-the-information-specialty-of-the-future>; accessed 03/12/2019.

THIS IS OLD NEWS

- “In 2006, Bruce Friedman, a prominent pathologist, made a compelling argument for unification and presented “Ten reasons for merging pathology/lab medicine with radiology.” ...A former executive of General Electric made a similar argument in 2007.”
 - Merine D. Radpathology/Pathradiology: The Information Specialty of the Future? JACR blog; 12/28/2018. <https://jacrblog.org/radpathology-pathradiology-the-information-specialty-of-the-future>; accessed 03/12/2019.
 - Friedman B. Ten Reasons for Merging Pathology/Lab Medicine with Radiology. LabSoftNews; 10/23/2006. https://labsoftnews.typepad.com/lab_soft_news/2006/10/merging_patholo.html; accessed 03/21/2019.

ALMOST A QUARTER CENTURY AGO

- “...[T]his [is] not a new idea. Richard Friedberg MD championed the idea as far back as 1997 when he created a unified Diagnostic Medicine Service (combining pathology, radiology, and nuclear medicine) within the Department of Veteran Affairs, known as the VA Southeast Network.:
- Merine D. Radpathology/Pathradiology: The Information Specialty of the Future? JACR blog; 12/28/2018. <https://jacrblog.org/radpathology-pathradiology-the-information-specialty-of-the-future>; accessed 03/12/2019.

TRADITIONAL THINKING

- Pathology and radiology are distinct specialties
- They don't know what each other does
- Turf
- Every department is its own fiefdom
- “We've always done it this way.”
- Uncoordinated!

NEW WORLD OF MEDICINE

- Cost conscious
- Efficiencies of scale
- Payment for quality
- Need for speed
- Coordinated care
- Team approach to patients
- Telemedicine
- Integrated!

“...FUNDAMENTALLY SIMILAR...”

- “Pathologists and radiologists are fundamentally similar because both extract medical information from images.”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22):2353-2354.

WE ALREADY PROVIDE INFORMATION

- “The primary purpose of radiologists [and pathologists] is the provision of medical information; the image is only a means to information.”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22):2353-2354.

WE WILL HAVE MORE IN COMMON

- “Because pathology and radiology have a similar past and a common destiny, perhaps these specialties should be merged into a single entity, the ‘information specialist,’ whose responsibility will not be so much to extract information from images and histology but to manage the information extracted by artificial intelligence in the clinical context of the patient.”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22):2353-2354.

EFFICIENCIES OF SCALE

- Artificial intelligence issues in pathology and radiology are similar, with a strong emphasis on pattern recognition
- Radiologists have become patient-facing; pathologists are becoming patient-facing
- Hospital-based physicians with similar administrative issues

PROCEDURAL COORDINATION

- **Guidelines for the Collection and Handling of Thoracic Small Biopsy and Cytology Specimens for Ancillary Studies** - soon to be published by the College of American Pathologists (open comment period has closed)
- Organizations involved (populating the Expert Panel Members and Advisory Panel Members):
 - American College of Chest Physicians (CHEST)
 - American Society for Cytopathology (ASC)
 - American Thoracic Society (ATS)
 - Association of Molecular Pathology (AMP)
 - College of American Pathologists (CAP)
 - National Cancer Institute (NCI)
 - Papanicolaou Society of Cytopathology (PSC)
 - Pulmonary Pathology Society (PPS)
 - Society of Interventional Radiology (SIR)
 - Society for Thoracic Radiology (STR)

UNIFIED TRAINING, UNIFIED REPORT, UNIFIED BEHAVIOR

- “The same physician detects a lung mass, biopsies it, and reviews the specimen to make the diagnosis of squamous cell carcinoma. Soon thereafter, she calls the patient with the results and dictates a unified imaging and pathology report.”
 - Merine D. Radpathology/Pathradiology: The Information Specialty of the Future? JACR blog; 12/28/2018. <https://jacrblog.org/radpathology-pathradiology-the-information-specialty-of-the-future>; accessed 03/12/2019.

PRACTICAL CONSIDERATIONS

- Coordination of biopsies (too few, too many)
- Reduce misplaced, mislabeled, or lost specimens
- Time savings
- Research opportunities
- Ultimately, improved patient care!

CURRENT AND FUTURE TECHNOLOGY SUPPORTS UNITY

In Vivo and Ex Vivo Microscopy

Moving Toward the Integration of Optical Imaging Technologies Into Pathology Practice

Wendy A. Wells, MD; Michael Thrall, MD; Anastasia Sorokina, MD; Jeffrey Fine, MD; Savitri Krishnamurthy, MD; Attiya Haroon, MD; Babar Rao, MD; Maria M. Shevchuk, MD; Herbert C. Wolfson, MD; Guillermo J. Tearney, MD, PhD; Lida P. Hariri, MD, PhD

• The traditional surgical pathology assessment requires tissue to be removed from the patient, then processed, sectioned, stained, and interpreted by a pathologist using a light microscope. Today, an array of alternate optical imaging technologies allow tissue to be viewed at high resolution, in real time, without the need for processing, fixation, freezing, or staining. Optical imaging can be done in living patients without tissue removal, termed *in vivo microscopy*, or also in freshly excised tissue, termed *ex vivo microscopy*. Both *in vivo* and *ex vivo* microscopy have

tremendous potential for clinical impact in a wide variety of applications. However, in order for these technologies to enter mainstream clinical care, an expert will be required to assess and interpret the imaging data. The optical images generated from these imaging techniques are often similar to the light microscopic images that pathologists already have expertise in interpreting. Other clinical specialists do not have this same expertise in microscopy; therefore, pathologists are a logical choice to step into the developing role of microscopic imaging expert. Here, we review the emerging technologies of *in vivo* and *ex vivo* microscopy in terms of the technical aspects and potential clinical applications. We also discuss why pathologists are essential to the successful clinical adoption of such technologies and the educational resources available to help them step into this emerging role.

(*Arch Pathol Lab Med.* doi: 10.5858/arpa.2018-0298-RA)

Accepted for publication October 4, 2018.

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Optical imaging technologies have emerged as viable

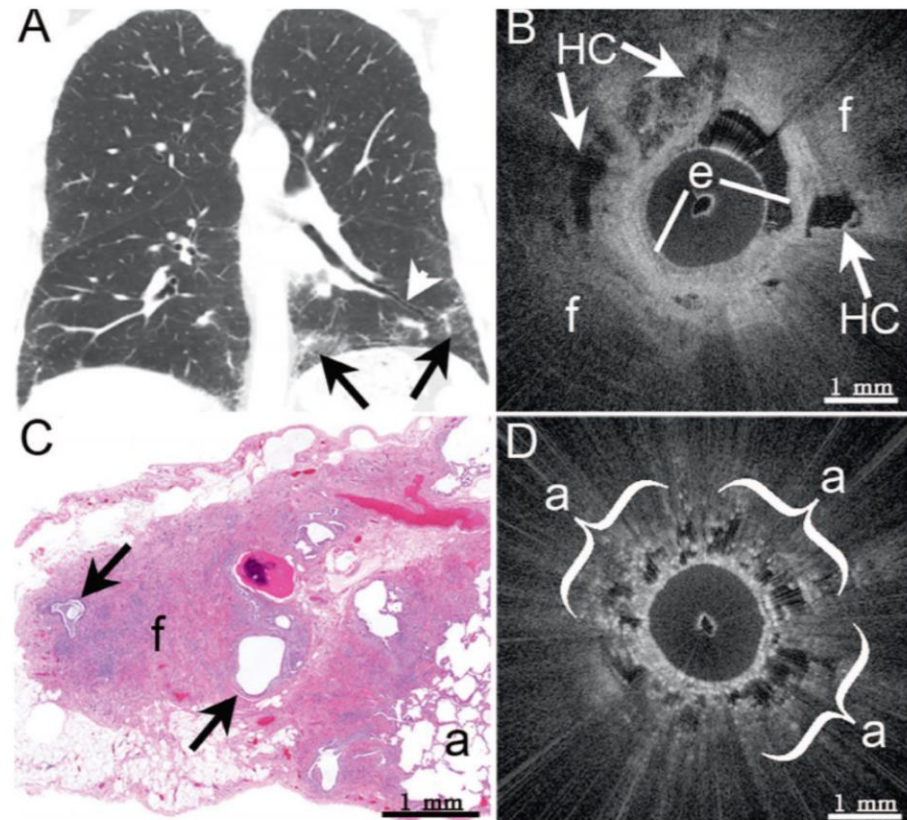


Figure 3. *In vivo* microscopy optical coherence tomography (OCT) for assessment of interstitial lung disease. A, High-resolution computed

IN VIVO MICROSCOPY

In Vivo Microscopy in Neurosurgical Oncology

Hany Osman¹, Joseph Georges², Deena Elshahy³, Eyas M. Hattab⁴, Steven Yocom², Aaron A. Cohen-Gadol⁵

Key words

- Glioma
- In vivo
- Microscopy
- Neurosurgery
- Oncology

Abbreviations and Acronyms

- 5-ALA: 5-Aminolevulinic acid
 CRM: Confocal reflectance microscopy
 CRS: Coherent Raman spectroscopy
 FLIM: Fluorescence lifetime microscopy
 ICG: Indocyanine green
 LSCE: Laser scanning confocal endomicroscopy
 OCT: Optical coherence tomography
 SRS: Stimulated Raman scattering

From the ¹Massachusetts General Hospital and Harvard Medical School, Wellman Center for Photomedicine, Boston, Massachusetts; ²Philadelphia College of Osteopathic Medicine, Department of Neurosurgery, Philadelphia, Pennsylvania; ³Indiana University School of Medicine, Indianapolis, Indiana; ⁴University of Louisville, Department of Pathology and Laboratory Medicine, Louisville, Kentucky; and ⁵Goodman Campbell Brain and Spine and Indiana University Department of Neurological Surgery, Indianapolis, Indiana, USA

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Citation: *World Neurosurg.* (2018) 115:110-127.
<https://doi.org/10.1016/j.wneu.2018.03.219>

Journal homepage: www.WORLDNEUROSURGERY.org

Intraoperative neurosurgical histopathologic diagnoses rely on evaluation of rapid tissue preparations such as frozen sections and smears with conventional light microscopy. Although useful, these techniques are time consuming and therefore cannot provide real-time intraoperative feedback. In vivo molecular imaging techniques are emerging as novel methods for generating real-time diagnostic histopathologic images of tumors and their surrounding tissues. These imaging techniques rely on contrast generated by exogenous fluorescent dyes, autofluorescence of endogenous molecules, fluorescence decay of excited molecules, or light scattering. Large molecular imaging instruments are being miniaturized for clinical in vivo use. This review discusses pertinent imaging systems that have been developed for neurosurgical use and imaging techniques currently under development for neurosurgical molecular imaging.

Increasing extent of resection must also aim to preserve eloquent brain as new postoperative neurologic deficits are correlated with increased patient morbidity and decreased survival.^{5,7} With detailed preoperative planning, postoperative neurologic morbidity may be insignificant with respect to the extent of surgery.^{4,7,8} The consensus leads us to believe that better techniques are required for improved surgical localization and removal of neoplastic tissue and avoidance of healthy tissue to maximize the benefit

benefits, and limitations of the current technologies for their application in neurosurgery. This review does not address functional brain imaging studies or studies examining basic tumor micro-environment and focuses on surgical oncology applications. Studies examining application of imaging technology by studying applicability in freshly resected and ex vivo specimens from brain tissues were also included.

Laser Scanning Confocal Endomicroscopy

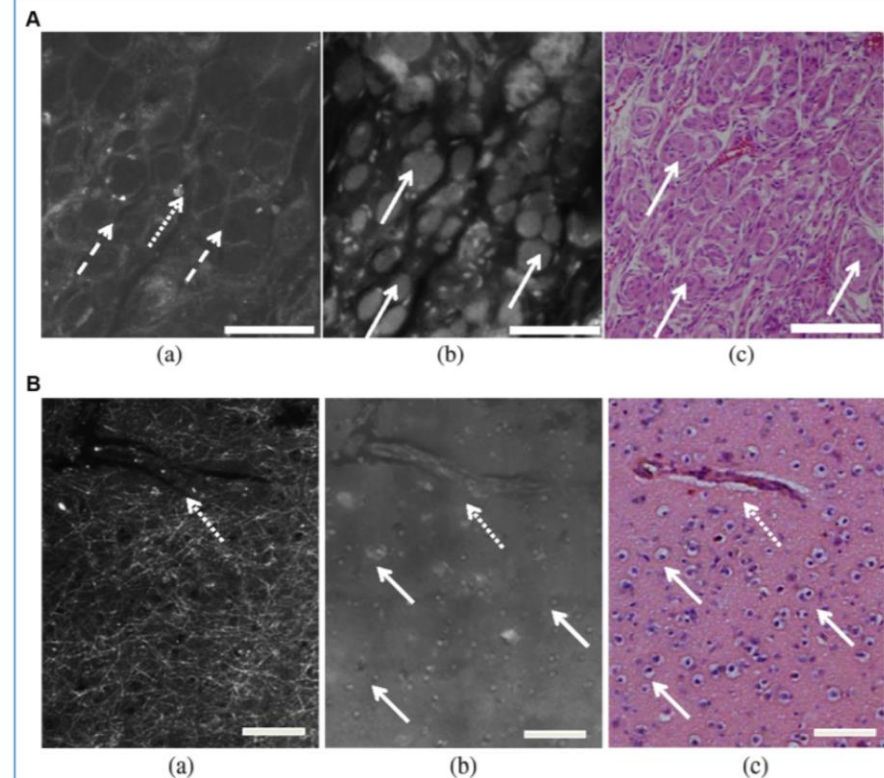


Figure 7. Multimodal confocal reflectance and fluorescence microscopy. **(A)** Intraoperative of meningioma. **(a)** Reflectance image shows meningeal layer (dotted arrow) and disrupted neural network pattern. **(b)** Fluorescence image shows meningeal layer (dotted arrow) and disrupted neural network pattern. **(c)** Histological image shows meningeal layer (dotted arrow) and disrupted neural network pattern.

WHAT'S IN A NAME?

WHAT TO CALL THIS?

- “Department of Diagnostic Imaging” – fancy name for radiology
- Department of Diagnostic Medicine?

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Department of Diagnostic Medicine

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The Department of Diagnostic Medicine, one of only a handful of similar medical school departments nationwide, operates in partnership with local clinical practices and community physicians to redefine how diagnostic testing is designed, delivered and leveraged to improve health.

Areas of Focus

— No. 1: Integrated Approach to Diagnostic Medicine

Most medical schools approach diagnostic medicine — the practice of diagnosing disease — through departments of pathology, radiology and laboratory medicine. At Dell Med, these specialties are integrated. This new approach has multiple benefits, including improved test accuracy, more convenient testing and lowered cost.

TOO BROAD?

- Is the name “Department of Diagnostic Medicine” too encompassing?



Join the discussion

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Posted by u/agginæ 3 years ago

12



Is there such thing as "Department of Diagnostic Medicine" in real life major hospitals?

If so, is it similar to the show's portrayal?

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[mrplatypusthe42nd](#) 1 point · 3 years ago

I'm pretty sure that at least once in the history of modern medicine there has been a doctor whose sole job was making difficult diagnoses.

Medical Diagnostics

Doctors

Existence Question

Medicine and Healthcare

Are there hospitals with a department of diagnostic medicine?

1 Answer



Anonymous

Answered Aug 31, 2015

There's no such thing as Diagnostic Medicine.. Nor is there any need!

What every doctor does first is **diagnosis**.. that's *almost always* a prerequisite. Once a diagnosis is reached, treatment is all *textbook or experimental* (in case a novel technique is out recently).

So yes, your physician, surgeon and everyone else is essentially diagnosing you first.

There is no medical specialty in "**Diagnosics**." The closest one gets is "Diagnostic Imaging" (the new term for Radiology), which claims expertise mainly in imaging, and Internal Medicine, whose members take some pride in being acute diagnosticians over a broad range of diseases.



"department of procedural diagnostics"



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PATHORADIOLOGY

HOW TO DO THIS?

- Institutional buy in is imperative; who leads?
- Get the pathologists and radiologists in the same room
- Get them speaking to each other; what we do as a team; how we differ
- Talk about our similarities, working together
- Pair off the subspecialists; develop subspecialists where necessary
- Share the vision, goals, expectations; get buy in by the team
- Continue to develop a culture of direct communication; people get more comfortable
- Relationships develop; trust grows
- Start showing the efficiencies
- Organically grow the two departments into one department

IT HAS TO BE PRACTICAL

- There has to be real value

WHAT ABOUT TRAINEES?

- Both radiology and pathology have various subspecialty training fellowships
- Pathology residents can train solely in anatomic pathology or clinical pathology
- As such, training can be essentially unaffected
- But...
- There now exists the potential for new training pathways!
- Combined training?
- Novel specialty training?

IN TIME, RADICALLY DIFFERENT TRAINING, SO IT NEEDS UNIFORMITY

- “Information specialists should train in the traditional sciences of pathology and radiology. The training should take no longer than it presently takes because the trainee will not spend time mastering the pattern recognition required to become a competent radiologist or pathologist.”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22):2353-2354.

OVERCOMING RESISTANCE

- People don't fear change. They fear loss
- Acknowledge the loss, and emphasize the benefit
- Fear of loss of identity could be powerful
- Fear of the "other" taking over
- But the new identity is robust
- And good planning and strong leadership can make it a great partnership, not a take over

FEAR NOT

- “Jobs are not lost; rather, roles are redefined...”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22):2353-2354.

BREAK DOWN THE SILOS

- “Under the current paradigm, radiologists and pathologists work in a siloed environment, with no linkage between their reporting systems or workflows. Advocates of an integrated diagnostic service expect that unification will add value by increasing accuracy, speeding up diagnosis, and improving patient outcomes.”
 - Merine D. Radpathology/Pathradiology: The Information Specialty of the Future? JACR blog; 12/28/2018. <https://jacrblog.org/radpathology-pathradiology-the-information-specialty-of-the-future>; accessed 03/12/2019.

“...NATURAL FUSION...”

- “There may be resistance to merging 2 distinct medical specialties, each of which has unique pedagogy, tradition, accreditation, and reimbursement. However, artificial intelligence will change these diagnostic fields. The merger is a natural fusion of human talent and artificial intelligence. United, radiologists and pathologists can thrive with the rise of artificial intelligence.”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22):2353-2354.

“...IMPROVE PATIENT CARE.”

- “A unified discipline, information specialists would best be able to captain artificial intelligence and guide medical information to improve patient care.”
 - Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA* 2016;316(22)2353-2354.

THE REAL VALUE

- There will be some initial heartburn, but people generally adapt quickly
- This is not that big a change; the specifics of departments vary among institutions already
- Immediate, direct financial benefit, staffing, purchasing, other economies of scale
- Longer term, new approaches leading to an aligned, mutually-supportive institution
- Novel training opportunities to prepare trainees for a dynamic future

“...A REBORN PHOENIX...”

- “The information specialist is likely to emerge as a repurposed physician, a reborn phoenix that has risen from the fiery ashes of the individual predecessor specialties.”
 - Merine D. Radpathology/Pathradiology: The Information Specialty of the Future? JACR blog; 12/28/2018. <https://jacrblog.org/radpathology-pathradiology-the-information-specialty-of-the-future>; accessed 03/12/2019.

THANK YOU!