Application of the ILO International Classification of Radiographs to Digital Chest Radiographic Images

A Scientific Workshop

March 12-13, 2008

American College of Radiology

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Chair
ACR Pneumoconiosis Committee

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- Objectives, organizational perspective
  - To implement digital acquisition and display for local x-ray facilities
  - To implement digital classification for readers who classify images

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- Stakeholder actions / challenges
  - Facilitate the development of technical guidelines for the acquisition and display of digital chest images suitable for ILO classification
  - Based on the above, transition established teaching methods of classification from an analog to digital format and environment

American College of Radiology The Beginning

- Collaboration with National Institute of Occupational Safety and Health & ILO
- An Integrated Mission
  - Education
  - Technical development and support

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The Beginning

- 1969 – Federal Coal Mine Health & Safety Act
  - Active miners: CXR within 18 mos, 3yr, 5yr
  - Retired miners
  - Disability / compensation benefits
  - Length of exposure / radiographic findings
  - International Union Against Cancer/Cincinnati system (based on 1958 ILO system)
- NIOSH / US Public Health Service requests assistance
- 1970 - ACR Pneumoconiosis Task Force

ACR Education

- Meeting the Instructional Challenge
- A crash program was developed
- Weekend Symposia for attendee convenience
- 6 courses in the first year
- > 30 meetings since 1970
- 4,000-5,000 physician attendees

ACR Education

- Viewbox teaching method
- Test-Teach-Test sequence of instruction*
- Compels active participation in the learning process
- Incorporated into other ACR subspecialty teaching seminars
- Remains the backbone of the current ACR Symposia on the Pneumoconioses

*Felson B, Jacobson G, Pendergrass E, Bristol L, Linton O, Harrington R. Viewbox seminar: A new method for teaching roentgenology. *Radiology* 1975; 116:75-78.

ACR Education

- Symposia restricted to physicians
- 6 Technical Symposia for radiographers on chest radiographic technique
- Special seminars for administrative judges & lawyers interpreting the law for state and federal programs

ACR Education

- Development of Home Study Syllabi
  - Classification for Physicians / B-reader candidates
  - Chest technique for radiographers
- Exhibits detailing proper radiographic technique and the ILO classification system
- Cinematic production explaining the law and the obligation of physicians

ACR Education

- Support for and validation of the “B reader” examination
- Implementation of the step wedge for improving radiographic technique*
- Development of a teaching module on asbestos related diseases

*E. DALE TROUT and JOHN P. KELLEY
A PHANTOM FOR THE EVALUATION OF TECHNIQUES AND EQUIPMENT USED FOR ROENTGENOGRAPHY OF THE CHEST

Am. J. Roentgenol., Apr **1973**; **117**: 771 - 776.

ACR Education

- ACR Pneumoconiosis Task Force consulted with various federal agencies conducting related programs:
  - Food and Drug Administration
  - Department of Labor
  - Social Security Administration
  - National Cancer Institute

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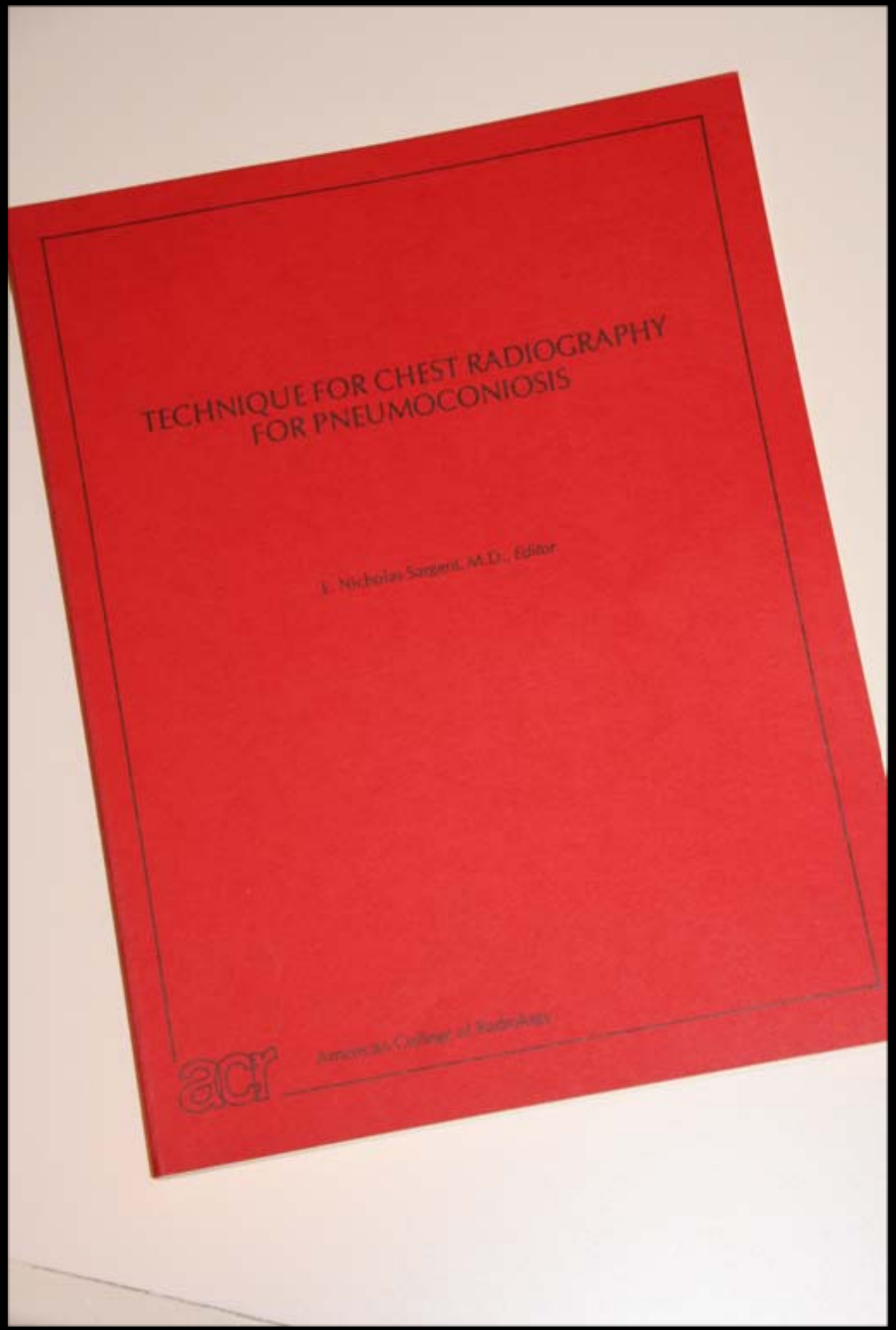
- Members of the Task Force have been or are members of ILO committees
- Participated in the development/revisions of ILO Guidelines 1971, 1980, & 2000
- ACR sponsored conferences in Washington, D.C. which subsequently led to the 1980 & 2000 Guidelines
- ACR instrumental in the production of the 1980 ILO Standard Radiographs & the subsequent quadrant standards
- Participated as consultants to NIOSH for the review of teaching materials including the transition to digital

ACR Education

- Development of Technical Guidelines prepared for NIOSH
- *Home Study Syllabus on Technique for Chest Radiography*
- *Technique for Chest Radiography for Pneumoconiosis*


TECHNIQUE FOR CHEST RADIOGRAPHY
FOR PNEUMOCONIOSIS
J. Nicholas Sargent, M.D., Editor
acr
American College of Radiology

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- *Technique for Chest Radiography for Pneumoconiosis*
  - Overview
  - Equipment
  - Technique guides
  - Scatter control
  - Quantum mottle
  - Screen/film combinations
  - Sensitometric monitoring
  - Radiation protection

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- 1982-84: ACR-NEMA collaboration
- ACR members requested non-proprietary format for image production from digital sources (CT, NM, US)
- National Electrical Manufacturers Association
- ACR-NEMA Digital Communication Standard
- Digital Imaging and COmmunication in Medicine standard - DICOM

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- DICOM
  - To promote communication of digital image information, regardless of manufacturer
  - To facilitate the development and expansion of PACS that can interface with other systems of hospital information
  - To allow the creation of information databases that can be accessed by a wide variety of devices distributed geographically

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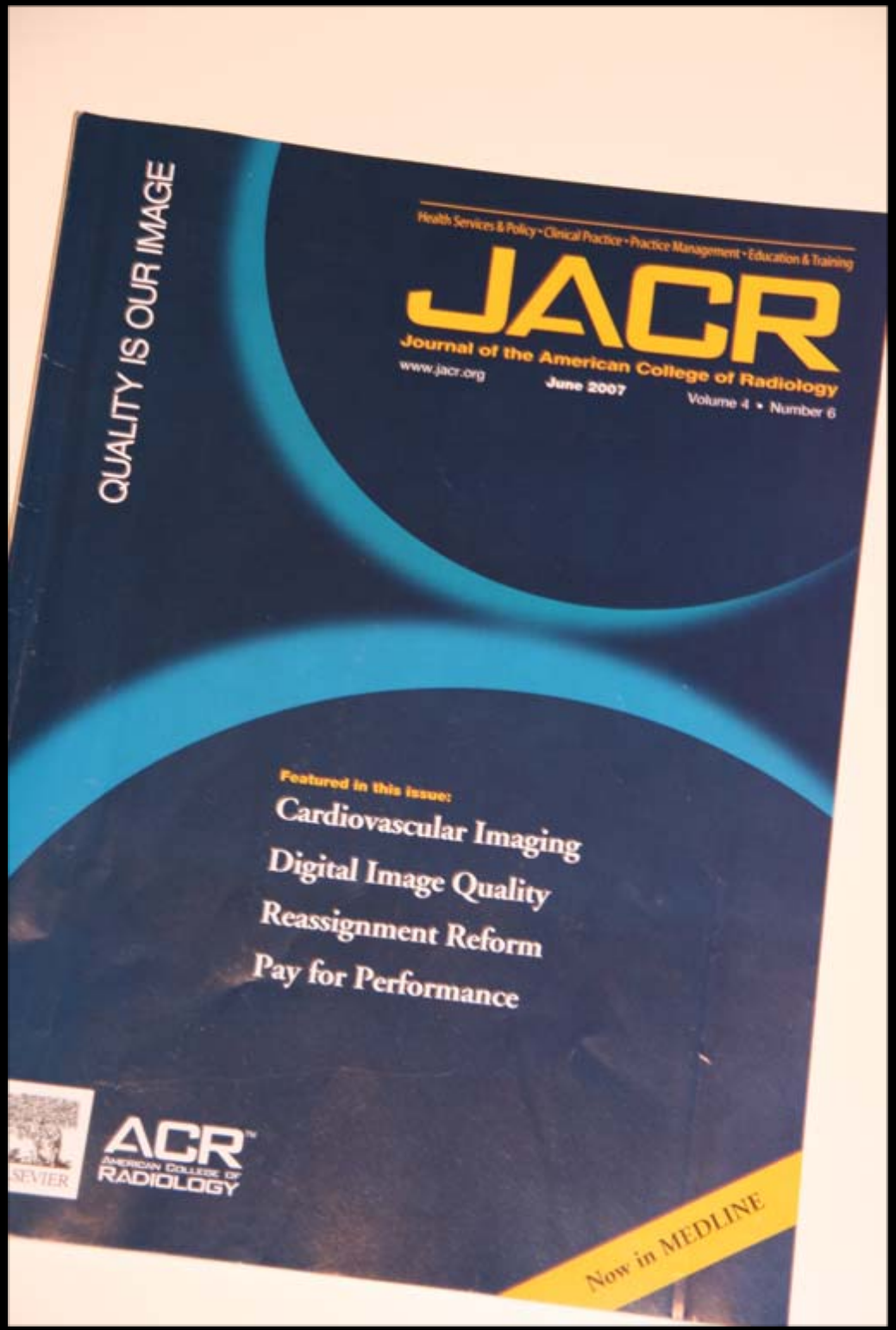
- DICOM
  - Used by other specialties utilizing digital imaging such as cardiology, GI endoscopy, pathology, dentistry, & dermatology
  - Consists of 13 layers or sections
  - Ongoing evolution
  - Critical to digital imaging and this transition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Digital Image Quality
Reassignment Reform
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Digital Radiography Image Quality: Image Acquisition

Mark B. Williams, PhD[a], Elizabeth A. Krupinski, PhD[b], Keith J. Strauss, MS[c], William K. Breeden, III, MS[d], Mark S. Rzeszotarski, PhD[e], Kimberly Applegate, MD, MS[f], Margaret Wyatt[g], Sandra Bjork, RN, JD[g], J. Anthony Seibert, PhD[h]

This article on digital radiography image acquisition is the first of two articles written as part of an inte effort to establish image quality standards for digital and computed radiography. The topic of the othe s digital radiography image processing and display. The articles were developed collaboratively by the A American Association of Physicists in Medicine, and the Society for Imaging Informatics in Medicine. ngly, medical imaging and patient information are being managed using digital data during acqu ransmission, storage, display, interpretation, and consultation. Data management during each of the tions has a direct impact on the quality of patient care. These articles describe what is known to improv uality for digital and computed radiography and make recommendations on optimal acquisition, pro

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Elizabeth A. Krupinski, PhD[a], Mark B. Williams, PhD[b], Katherine Andriole, PhD[c], Keith J. Strauss, MS[d], Kimberly Applegate, MD, MS[e], Margaret Wyatt[f], Sandra Bjork, RN, JD[f], J. Anthony Seibert, PhD[g]

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- ACR practice guidelines
  - Performance of Adult Chest Radiography (10/06)
  - Digital Radiography* (10/07)
- ACR Technical Standard for Electronic Practice of Medical Imaging (10/07)

*Developed collaboratively by
American College of Radiology
American Association of Physicists in Medicine
Society for Imaging Informatics in Medicine

American College of Radiology "Dust to Digital"

- Collaboration with National Institute of Occupational Safety and Health
- An Integrated Mission
  - Education
  - Technical development and support

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Dust to Digital

- Transition to *digital* “viewbox” seminars
- Maintain the individual or registrant oriented approach for instruction
- Test – Teach – Test, interactive model
- What type of digital display devices will be necessary?
- Emulate the test and practice environment

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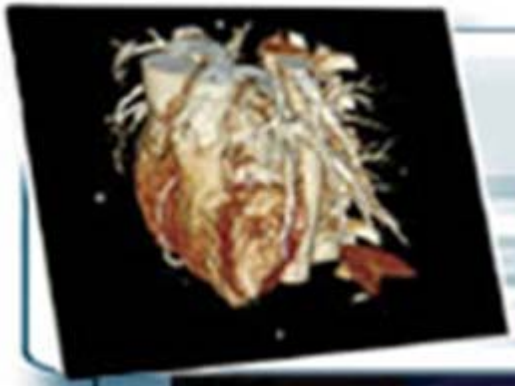
Dust to Digital

- The challenge for teaching
- Transition away from the viewbox
- Classroom of the future
- New logistical paradigm using digital media but maintaining the benefits of the viewbox seminar
- Converting analogue material



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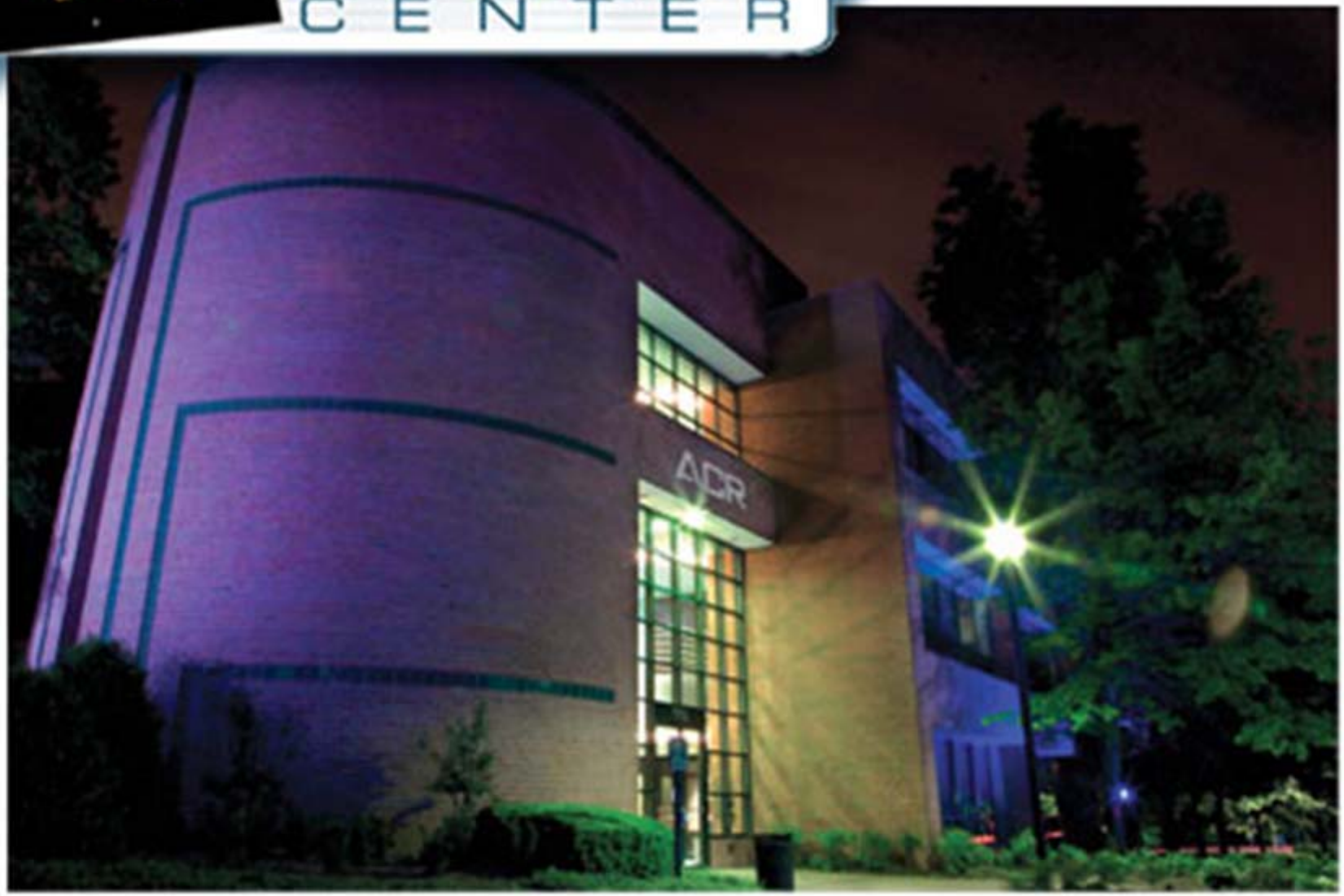

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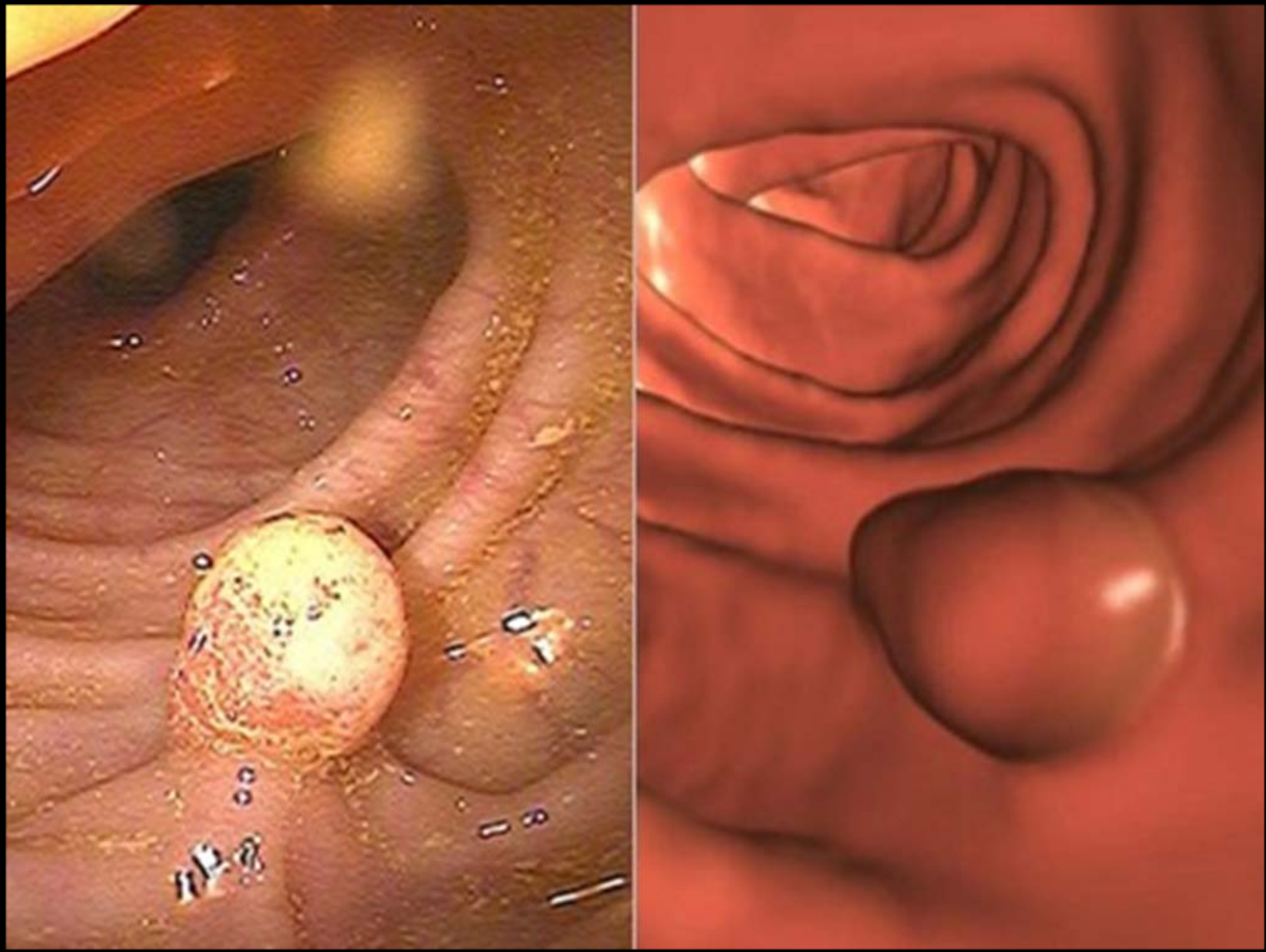
Dust to Digital

- New facility
- Site of future teaching seminars?
- Site of future b-reader testing?



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Dust to Digital

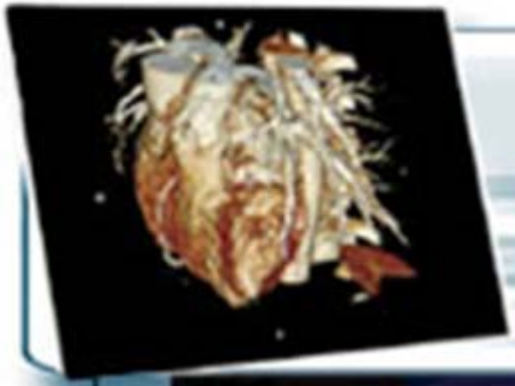
- Image processing driving display market
- Industry has moved to color LCD monitors
- More versatile for cross sectional imaging and CR/DR
- Color monitors generally load images faster
- Cheaper
- Can we use color monitors for B-reading?
- Will we require a B/W monitor?

ACR
Dust to Digital

- Established models for image acquisition
- Reestablish the primacy of high quality standard procedures in acquiring images regardless of modality
- Integrate digital acquisition and display guidelines with basic elements of chest radiography
- Reinvent the 1984 monograph as "*Technique for Digital Chest Radiography for Pneumoconiosis*"

ACR
Dust to Digital

- Use past experience as template
- Transition the current ACR Pneumoconiosis Committee to a Task Force, once again
- Draw from ACR Digital Guidelines authors & collaborators and members of this workshop
- Expand the Task Force's role and composition from primarily education to a more integrated and supportive posture with NIOSH & ILO to assist in the "dust to digital" technical *and* educational transition
- Explore accreditation/ QA function



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