

Digital Radiology – “I totally do not know what that means, but I want it”

**John T. Hathcock, DVM, MS
Diplomate, ACVR
Auburn University**

Digital radiology may mean different things to different people and not all digital radiology is the same. Understanding how the digital image is made will help with interpretation and recognition or artifacts. Familiarity with the different types of digital radiology systems and all the associated equipment that is needed will allow the best decision when it comes time to choose what you need.

I. Types of Digital Radiography

A. Digitized conventional radiographs

B. Computed radiology - CR

1. cassette based system and uses CR reader
2. storage phosphor detector screen absorbs X rays and stores latent image
3. screen is scanned by a laser releasing latent image as visible light
4. photomultiplier tube produces signal that is digitized
5. screen is erased and then is ready for next exposure

C. Direct radiology – DR (sometimes termed direct digital radiology or even digital radiology)

1. flat panel detectors - FDP

- a. direct conversion - converts x-ray energy directly into an electrical signal
- b. indirect conversion - converts x-ray energy into light signal then into electrical signal

2. charge coupled device - CCD

- a. x rays interact with intensifying screen which fluoresces
- b. CCD captures emitted light and stores energy as ‘trapped’ electrons
- c. stored electrons are ‘read out’ and converted to digital signal

II. CR vs. DR

A. CR – more flexible, lower cost, portable (still have to use CR reader to process cassette, image available in 90 sec)

B. DR –

1. flat panel detector - higher throughput (images within few seconds), more expensive, portable – generally thought to have best quality image
2. CCD – higher throughput, not portable, less expensive than FPD

III. DICOM

- A. Acronym for Digital Image & Communication in Medicine
- B. Is the digital imaging standard that allows images to be shared or moved between different pieces of equipment from different manufacturers securely
- C. Essential for teleradiology and communication between other DICOM systems
- D. Images must be viewed with DICOM viewer
- E. DICOM images are embedded with specific patient information and cannot be altered

IV. PACS

- A. Acronym for Picture Archival and Communication System
- B. Used for storage of and distribution of digital images
- C. Allows one to have all others previous exams available for comparison
- D. Allows multiple simultaneous viewing

V. Monitors

- A. Important part of overall digital system
- B. Primary viewing station should have high quality monitor
- C. Considerations
 - 1. LCD vs. CRT
 - 2. luminance or brightness
 - 3. contrast ratio
 - 4. resolution

References:

1. Animalinsides.com
2. Matton, JS. Digital Radiography. Vet Comp Orthop Traumatol. 3: 123-132. 2006.
3. A Supplement to Veterinary Medicine. December 2006. (www.vetmedpub.com)
4. Veterinary Radiology & Ultrasound. Supplement. Volume 49:S1-S63. 2008.