

Update of FFDM Technology – Mark Williams, University of Virginia

Softcopy Display – Jerry Thomas, Uniformed Services University of the Health Sciences

A Clinician's Perspective of Digital Mammography – Claudia Galbo, Uniformed Services University of the Health Sciences

This session provides an overview of the technical aspects of digital detectors and soft copy displays used in Full Field Digital Mammography (FFDM) and the clinical requirements of digital mammography, from the viewpoint of a Mammographer. State-of-the-art digital detectors used in full field digital mammography machines differ in design and function. These design differences may require different performance and quality assurance tests. Industry has used three basic approaches to the design of FFDM detectors – Computed Radiography, CCD and Amorphous Silicon flat panels. Each design incorporates a different x-ray capture to electronic data pathway. Some are direct conversion of the absorbed x-ray to electrons while others require a light conversion step. Each of these methods used to generate a final digital image will be discussed and appropriate performance measurements and quality control tests for each type of digital system will be presented.

Softcopy display of mammography images requires an understanding of the requirements for monitor/video card calibration and conformance with the DICOM Part 14 Gray Scale Display Standard. System calibration requires setting of consistent maximum brightness levels and minimum black levels between display monitors. These calibration parameters and their relationship to voltage driving levels, just noticeable differences and perceptual linearization of the image will be described along with suggested limits for each parameter. Errors in measurements made at the system level versus the application, system calibration techniques, application of Look Up Tables to correct for monitor gamma variances and the impact of these factors on final displayed image quality will be discussed. Measurement software and test images will be described and made available to attendees on CD or via the WEB.

Clinical evaluation of digital mammography images via hard copy printout of digital image data and softcopy display requires different interpretational skills. Viewbox luminance levels are significantly brighter than those available on softcopy displays. Image contrast is fixed in hardcopy; but, may be manipulated on softcopy. A Mammographer will discuss the clinical advantages of FFDM over screen/film mammography and requirements of softcopy display.

Educational Objectives:

1. Understand the differing approaches to digital detector design used in mammography.
2. Understand differences in required performance measurements between different digital detector designs.

3. Understand issues relating to routine Quality Assurance of digital detectors used in digital mammography.
4. Understand basis of requirements for monitor calibration.
5. Understand reasons for systems to be calibrated in accordance with the DICOM Part 14 Gray Scale Display Standard
6. Understand differences between system level and application level measurements of soft copy display and test patterns used to evaluate soft copy display performance.
7. Understand the clinician's perspective and clinical requirements in digital mammography and soft copy display.
8. Understand the advantages and disadvantages of digital mammography as compared to screen/film mammography.