

Q.A. Collectible

*Sponsored by CRCPD's Committee on Quality Assurance
in Diagnostic X-Ray (H-7)*

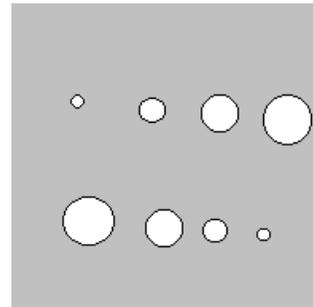
Quality Assurance Tips for Fluoroscopic Image Evaluation Low-Contrast Performance

Rationale

Low-contrast performance refers to the ability of a system to visualize low-contrast objects or structures. In clinical practice patient diagnoses are frequently made on the perception in the fluoroscopic image of small low-contrast anatomic structures.

Equipment Required

The test equipment necessary includes two approximately 7" x 7" x 3/4" type 1100 aluminum blocks, and a 1.0 mm type 1100 aluminum sheet with two sets of four holes with the following diameters: 1.0, 3.0, 5.0 and 7.0 mm (See diagram).



Measurement Protocol

- 1) Place the two aluminum blocks on top of the x-ray table. The low-contrast pattern (hole-drilled aluminum sheet) should be placed on top of the aluminum blocks. Place the image intensifier assembly 12" away from the tabletop. With mobile C-arms, it will be necessary to place the test tool and blocks directly on the image intensifier assembly. The fluoroscopic grid should be in the field. If the system is equipped with an automatic brightness control where kVp is fixed and mA varies to achieve proper brightness, select a kVp setting of 80 kVp.
- 2) If the system is fully automatic, whereby both kVp and mA vary to achieve proper brightness, the kVp should stabilize between 80 - 90 kVp. If the system has a manual only control, select 80 kVp and adjust the mA to give the best image. With any system, it is important to note the values (kVp and mA) used on the system for future reference. This will allow for consistent duplication of testing procedures should any problem be found.
- 3) This test is extremely dependent upon monitor adjustment (brightness and contrast). You will most likely have to adjust the monitor while performing fluoroscopy to achieve the best low-contrast performance. Both holes of the same size must be seen in order to

count them as one hole set. Record the minimum hole size that is seen. The minimum perceivable hole size should be as follows:

<u>Image Intensifier Size</u>	<u>Viewing</u>	<u>Film Recording</u>
12-14"	3 mm	1 mm
9-10"	3 mm	1 mm
6-7"	3 mm	1 mm
4-5"	1 mm	1 mm

4) Dual or tri-field image intensifiers should be expected to yield the same performance in a reduced size mode as a single-field image intensifier of the same size, e.g., a 9" - 6" - 4.5" in the 6" mode of operation should yield visualization of the 3.0 mm holes on the TV. Systems equipped with mirror-optic viewing may exhibit a higher low-contrast performance. In any system, the television chain is the limiting factor in terms of both high-contrast resolution and low-contrast performance. It is for this reason that the film-recording modes (cine and photospot) will generally exhibit better high-contrast resolution and low-contrast performance.

5) To evaluate cine or photospot systems, select the small focal spot with a low mA (100mA) and set the photospot or cine kVp at 80. Run a strip and process the film. When viewing the film, a magnifying glass may be necessary to visualize the holes.

Some systems have automatic exposure controls, which will automatically select the kVp and mA. In either case, note the technique factors that are utilized, as well as exposure time so the testing can be duplicated should any problem be found.

6) Systems that are used for chest fluoroscopy, angiography and other low-contrast procedures require that low-contrast performance be optimal. Digital subtraction angiography, by its very nature, mandates the necessity for excellent low-contrast performance. If the system is not used for the above procedures, then the lack of good low-contrast performance is a less important consideration.

For further information please see the Center for Devices and Radiological Health's FDA-80-8095, "Quality Assurance for Fluoroscopic X-Ray Units and Associated Equipment" or "Quality Control in Diagnostic Imaging" by Gray, Winkler, Stears and Frank, University Park Press.

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