

AbstractID: 3384 Title: Quantitative Assessment of Physical Characteristics of Laser and CCD Film Digitizers in PACS Applications

Purpose:

We quantitatively assessed the spatial resolution, contrast, and image uniformity of the laser and CCD film digitizers in PACS applications for our Hospital.

Method and Materials:

The modulation transfer function(MTF) was measured by using the created chessboard-pattern test film to obtain the edge spread function(ESF) for both of horizontal and vertical scanning direction. The line spread function(LSF) was obtained from the ESF results. A step wedge test film was created in order to evaluate the contrast characteristics. Optical densities(ODs) for each step-wedge region were measured using calibrated densitometer(x-rite, USA). Those values were grouped with the corresponding film OD values. To measure the accuracy of pixel value distribution in proportion to the distance from center of the film, we also created the uniformity test film which was quartered with different OD values for each quarter. All test films were digitized using both LASER (Model 2905, Array Corp.,Japan) and CCD-based unit (SEDAS Media Film Scanner,Kodak,Japan).

Results:

Spatial resolutions of the laser digitizer for both horizontal and vertical directions were 4.06 ± 0.32 cycles/mm and 4.24 ± 0.20 cycles/mm, respectively. However, those of the CCD digitizer were 2.06 ± 0.33 cycles/mm and 2.06 ± 0.19 cycles/mm at 10% of MTF. No differences in resolution were found with respect to location on the film. Contrast results were determined by means of useful OD range. Those values for the laser and CCD digitizer were 0.2~2.8, 0.8~2.8., respectively. The image uniformities of laser digitizer were 99.9, 99.4, 97.9, and 82.7%, where the corresponding ODs of the quarter were 0.2,0.7,1.4,and 3.1,respectively. However, those were 94.4,75.6,62.9,and 53.7% in CCD digitizer.

Conclusion:

In conclusion, laser digitizer can provide relatively higher resolution, wider useful OD range, and especially better image uniformity. Besides, because relatively low image uniformity of CCD digitizer may be caused by distribution of brightness of backlight, additional study for this aspect is necessary in further study.