Variation of Monitor Luminance on Radiologist Productivity in the Interpretation of Skeletal Radiographs Using a Picture Archiving and Communication System

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THE cathode ray tube (CRT) display used in picture archiving and communication system (PACS) workstations have been shown to have lower spatial resolution and luminance compared with conventional film-screen radiographs displayed on an illuminator. Laboratory observer studies indicate display brightness to be an important parameter in the interpretation of radiological images. This study was undertaken to evaluate the effects of varying monitor luminance on radiologist productivity and accuracy in the interpretation of skeletal radiographs with the hope of identifying the ideal monitor luminance for everyday practice.

One hundred randomly selected skeletal radiographs were evaluated prospectively by three board certified radiologists with extensive PACS experience. Each examination was reviewed independently on a four-monitor, high-resolution (2048×1536 pixels) workstation at three different levels of monitor brightness (40, 65, and 90 foot-lamberts). Ambient room light was maintained at a constant level throughout the study. Interpretation

times were recorded by an independent observer, and interpretation accuracy was assessed by comparing the individual radiologists' interpretations with those of an expert review panel. In addition, radiologists were asked to subjectively record level of fatigue and level of confidence in diagnosis for each of the different levels of monitor brightness used during the day.

The time requirements for image review and interpretation were greatest at the lowest level of monitor illuminance (40 foot-lamberts), independent of the radiologist. No significant time differences were demonstrated at 65 and 90 foot-lamberts. Although no statistically significant differences in interpretative accuracy were demonstrated among the three levels of monitor brightness, there was a subjective increase in observer level of confidence as monitor brightness increased. In addition, observer fatigue was reported to be inversely proportional to monitor illuminance, with maximal fatigue reported at 40 foot-lamberts, independent of the radiologist.

Monitor illuminance plays an important role in radiologist productivity in the interpretation of skeletal radiographs. Optimal efficiency is achieved at higher levels of illuminance as illustrated by objective reduction in interpretation time and subjective reduction in radiologist fatigue. A careful quality control program is necessary, however, to maintain optimal monitor brightness and reduce drift, which commonly occurs with high-resolution monitors.

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