

AbstractID: 13464 Title: When should we recalibrate the grayscale standard display function in different ambient lighting conditions?

**Purpose:**

Liquid-crystal display (LCD) monitors for medical use may not be always used under the same ambient lighting condition for calibration of the grayscale standard display function (GSDF). The purpose of this study is to clarify need for recalibration to the GSDF in different ambient lighting conditions.

**Method and Materials:**

An LCD monitor (two-mega pixels, Radiforce GS220, Eizo, Japan) was used in this study. The calculated diffuse reflection coefficient of this LCD monitor was  $0.0026 \text{ sr}^{-1}$ . This LCD monitor was calibrated to the GSDF including four ambient lighting conditions such as typical diagnostic reading stations (10 lx and 60 lx), hospital clinical viewing stations (250 lx), and operating rooms (400 lx) levels based on guidelines of the American Association of Physicists in Medicine task group (AAPM TG) 18. The maximum deviation from the contrast response was calculated at various tentative changes in ambient lighting conditions.

**Results:**

When the ambient lighting condition changed, the maximum deviation of contrast responses increased. The degree of the effect of the change of ambient lighting depended on the ambient lighting conditions used for the calibration to the GSDF. The darker the ambient lighting condition for calibration was, the greater the variation in the contrast response was. If 50 lx and 100 lx were added to typical diagnostic reading stations (10 lx), the maximum deviations of the contrast response were -10.3% and -18.5%, respectively. Those maximum deviations of the contrast response were beyond an acceptable range ( $\pm 10\%$ ) of AAPM TG18. Thus, the contrast in especially dark regions of medical images will be decreased.

**Conclusion:**

As the LCD monitor calibrated included typical diagnostic reading stations (10 lx), the need for recalibration to the GSDF with ambient lighting conditions increased over 50 lx to maintain image contrast.