

AbstractID: 3954 Title: Investigation of a method to adjust non medical grade monitors without the use of a photometer

Purpose: Computer monitors with luminance range less than the ACR recommended value of 220 cdm^{-2} for diagnostic monitors are increasingly being used for the viewing of clinical images. One of the reasons is the increased popularity of Web applications that make clinical images easily accessible from office and home computers. In this study we investigate a quick and easy method for radiologists/clinicians to set-up the brightness and contrast of such monitors without the use of a photometer.

Methods and Material: 17 commonly used flat-panel desktop monitors were visually optimized for low contrast resolution using the TG18-BR pattern. Since the monitors' low contrast resolution performance was found to be affected significantly less by the brightness setting than by the contrast setting, we fixed the brightness setting at 75% of maximum brightness and changed the contrast setting to further optimize the low contrast resolution. After optimization, the display function of each monitor was compared to the DICOM Gray Scale Display Function (GSDF). After forcing the minimum and the maximum luminance of the monitor to fall on the GSDF we calculated the RMS error between the monitor display function and the GSDF for the 20%, 50% and 90% gray-scale values of the SMPTE pattern.

Results: The mean value of the optimum contrast settings was 39.6% of maximum contrast with standard deviation of 21.8%, and a range of 0% to 63%. The RMS error ranged from 1.9 to 39 with an average of 17. The RMS error was poorly correlated with the contrast setting ($r=0.21$), 100% luminance ($r=0.27$) and 0% luminance ($r=0.12$).

Conclusion: Further ROC studies are needed to determine what RMS errors relative to the GSDF are acceptable for viewing images of different types (e.g. CT or chest) on these

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monitors and whether window and level adjustments can compensate for larger RMS errors.