

AbstractID: 5630 Title: Does Display Bit-Depth Influence Observer Performance?

Purpose: The display a radiologist reads images from represents a crucial link in the information chain. There has been much debate recently on what bit-depth is necessary for optimal reading. Greater bit depth permits more gray levels to be displayed initially, possibly obviating the need for the observer to window/level the image during viewing. This project compared an 8-bit with 11-bit LCD display in terms of observer performance.

Method and Materials: Two Totoku LCD displays (3 Mpixel, grayscale) were used that were identical in every way except for the bit-depth. One was 8-bit and the other 11-bit. Max luminance was set to 500 cd/m² and min luminance was set to 0.6 cd/m². The displays were DICOM calibrated and room lights were set to the average display luminance with an image displayed. A set of 100 DR chest images, half with nodules and half without, were shown to 6 radiologists in a counter-balanced Receiver Operating Characteristic study. They reported whether a nodule was absent or present and rated their confidence.

Results: Performance (ROC Az values) was essentially equivalent for the two bit-depth displays. There were no significant differences in viewing time or how often the readers used the window/level functions.

Conclusion: For chest images with nodules it appears that having greater than 8-bit depth does not significantly enhance observer performance. It is not clear whether the results would be the same with different types of images or lesions.

Conflict of Interest (only if applicable): Totoku provided the displays, software and funds to reimburse the radiologist observers.