

Commercial flat panels are primarily specified in terms of brightness and contrast. These two characteristics have driven LCD development for years. Special films and filters are added to the LCD module to focus more of the light toward the center of the display to improve brightness specs. New LCDs for televisions use active backlight technology to turn off the backlight in dark areas of the image to exaggerate contrast ratios. Does any of this matter for a medical imaging monitor?

High brightness is one of the defining characteristics of medical imaging displays. Displays capable of 400-500 cd/m<sup>2</sup> have become the standard of care in radiology. However, displays much brighter than this quickly move into the range where display glare interferes with diagnostic readings.

The value of additional brightness beyond 500 cd/m<sup>2</sup> is in extending the life of the diagnostics display system. Medical imaging displays are designed to hold the set brightness, so to maintain 500 cd/m<sup>2</sup>, the display must be capable of higher brightness. The brighter the LCD, the longer the target brightness can be achieved. For medical displays, it is the life of the display at the target brightness, not the maximum brightness, which matters. Dome displays are designed to maximize the backlight life, making Dome displays last longer than other displays.

Contrast ratio is another misleading specification. The difference between a 500:1 display and a 1000:1 display sounds huge, but let's take a closer look. A 500:1 display tuned to 500 cd/m<sup>2</sup> means that black brightness is 1 cd/m<sup>2</sup>. A 1000:1 display at 500 cd/m<sup>2</sup> has a black brightness of 0.5 cd/m<sup>2</sup>. The contrast ratio is twice as high, but this has only added 0.5 cd/m<sup>2</sup> to the dynamic range of the display.

For medical imaging displays, the dynamic range is actually determined by the number of Just Noticeable Difference (JND) steps. A dynamic range from 1-500 cd/m<sup>2</sup> yields 634 JNDs, great for diagnostic displays. If we double the contrast ratio, the resulting 0.5-500 cd/m<sup>2</sup> range yields 659 JNDs. That is more, but less than 4% more. For medical imaging displays, forget brightness and contrast, and focus on lifespan and at least 600 available JNDs.