

Purpose: Purpose in this study was to investigate variations of the chromaticity in gray-scale images displayed on different liquid-crystal display (LCD) monitors at different illuminance.

Method and Materials: Four color LCD monitors (RX210, 240 cd/m², two-megapixel, Eizo Nanao), and four monochrome LCD monitors (G31, 450 cd/m², three-megapixel, Eizo Nanao) were used in this study. These LCDs have various operating hours ranging from 4,000 hours to 23,000 hours. The chromaticity in gray-scale images with 18 different luminance levels was measured by use of the BN test patterns (JESRA X-0093-2010) and a chromameter (CS-200:KONICA MINOLTA). Distances in CIE u'v' color space, delta u'v', for all possible pairs of LCD monitors were calculated based on AAPM TG-18 guideline. The chromaticity of the LCDs was measured at different illuminance (0, 30, and 560 lux). Variations of the chromaticity at different illuminance compared to 0 lux were examined using delta u'v'.

Results: Delta u'v' for all possible pairs of LCD monitors did not exceed 0.01. Delta u'v' of the monochrome and the color LCDs indicated greater differences than those for different color LCDs or different monochrome LCDs. There was no difference of chromaticity depending on the operating hours. When illuminance increased, the chromaticity varied on every LCD. Although delta u'v' between 0 lux and 560 lux exceeded 0.01 at low-luminance levels of 30 cd/m² or less, delta u'v' between 0 and 30 lux did not exceed 0.01.

Conclusions: Variations of the chromaticity for all possible pairs of LCD monitors used in this study were less than 0.01. We found that the chromaticity varied on every LCD with increasing illuminance.