# AbstractID: 11234 Title: Quantitative analysis of low contrast image quality in fluoroscopic systems

**Purpose:**
Visual assessment methods lack the precision to detect subtle changes in the low contrast performance of portable fluoroscopes used for surgical guidance. The purpose of this study is to develop a simple and reproducible quantitative method for measuring the low contrast imaging capability of portable fluoroscopes for quality assurance purposes.

**Method and Materials:**
Images of a low contrast detectability phantom were captured using a portable fluoroscope routinely used for intraoperative imaging. The phantom consisted of a 2.5 cm acrylic sheet containing 6 circular holes of 1.9 cm diameter, each filled with a different concentration of iodine. Two different dose rate modes were employed, and copper filtration was varied between 0 and 3 mm to produce a set of images spanning a range of subject contrast and quantum noise. Fluoroscopic last-image-hold frames were saved in DICOM format and transferred to a computer for analysis. The absolute contrast, contrast-to-noise ratio (CNR) and signal-difference-to-noise ratio (SdNR) were calculated for each low contrast target. Five blinded human observers evaluated and scored the phantom images by counting the number of visible objects. The human observer scores were pooled and ranked, as were the quantitative metrics. The rankings were compared using the non-parametric Spearman rank correlation coefficient.

**Results**:
The rank correlation coefficients between human scoring and quantitative scoring were statistically significant for absolute contrast ($r_s$=0.869, $p<0.01$), CNR ($r_s$=0.940, $p<0.005$) and SdNR ($r_s$=0.940, $p<0.005$).

**Conclusion**:
The agreement with human observer ranking indicates that these quantitative image quality measurements may be suitable for use in the routine assessment of fluoroscopic systems for quality control purposes. This method eliminates the subjectivity, variability and bias inherent in quality control based on visual assessment by an individual observer.