AbstractID: 9334 Title: Open field normalization prevents a common error in MTF measurements

Purpose: To show that open-field normalization prevents a common error in measurements of the modulation transfer function (MTF) caused by zero-frequency normalization. **Method and Materials:** Models describing zero-frequency and open-field normalization are used to derive the resulting measured MTF obtained from a finite region of interest (ROI) of an edge image in terms of the true system MTF. Simulated edge images containing Gaussian blur, as well as images of a tungsten sheet acquired on a GE flat-panel detector in clinical use were used to calculate the MTF. Measurements were made using both zero-frequency and open-field normalization with ROIs ranging in size from 1-15 cm x 10 cm and 1-15 cm x 5 cm. **Results:** Use of a finite ROI results in truncation of the system line-spread function (LSF) causing the zero-frequency value of the measured MTF to be less than the true MTF value of unity. Subsequent zero-frequency normalization results in inflation of the MTF values at all non-zero frequencies. Data from the clinical system shows a 5% inflation of values for an ROI of 10 cm, increasing to 14% for an ROI of 1 cm. Open-field normalization accurately determines MTF values at all frequencies away from zero frequency. The open-field normalized zero-frequency value is equal to the area of the truncated system LSF, and is less than unity. **Conclusion:** Open-field normalization measurements provide a good estimate of the true MTF if the zero-frequency value is disregarded with the understanding that it is expected to have a value less than unity. This work should be used in MTF-measurement guidelines and recommendations on acceptable ROI sizes and normalization techniques.