<table>
<thead>
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<th>Presenter:</th>
<th>Kalpana M. Kanal, PhD</th>
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<tbody>
<tr>
<td><strong>Title of Abstract:</strong></td>
<td>Impact of Incremental Increase in CT Image Noise on Detection of Low Contrast Hypodense Liver Lesions</td>
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<td>Authors:</td>
<td>Kalpana M. Kanal, PhD William P. Shuman, MD Jonathan H. Chung, MD Jing Wang, PhD Brent K. Stewart, PhD</td>
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<td><strong>Modality:</strong></td>
<td>CT</td>
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<td><strong>Organ System:</strong></td>
<td>GI</td>
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<td><strong>Purpose:</strong></td>
<td>To determine the impact of incremental increases in CT image noise on detection of low-contrast hypodense liver lesions.</td>
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<td><strong>Methods Used:</strong></td>
<td>We identified a group of 50 CT exams acquired at image noise index (NI) of 15 which had hypodense liver lesions and a group of 50 similar exams with no lesions. Using a software noise addition tool, three 100-image sets were assembled which had an image noise index of 17.4 (simulating 75% of the original patient radiation dose), 21.2 (simulating 50% dose), and 29.7 (simulating 25%). After randomization, three readers independently scored certainty of lesion presence using a 5-point Likert scale. Lesion detection was evaluated by sensitivity analysis against a 90% threshold and by receiver operator curve computation.</td>
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<td><strong>Results of Abstract:</strong></td>
<td>For original images (NI 15) plus images with NI of 17.4 and 21.2, sensitivity was above the 90% threshold (range 95-98%). For images with NI of 29.7, sensitivity was just below the threshold (89%). Reader Az values for ROC curves were good for original, NI 17.4 and 21.2 images (0.976, 0.973, and .96 respectively). For NI of 29.7 the Az decreased to 0.913. Detection sensitivity was less than 90% for both lesion size less than 10 mm (85%) and for lesion to liver contrast less than 60 HU (85%) only at NI of 29.7.</td>
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<td><strong>Discussion:</strong></td>
<td>For low contrast lesion detection in liver CT, image noise can be increased up to NI 21.2 – a 50% patient radiation dose reduction – without substantial reduction in sensitivity.</td>
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<td><strong>Scientific and/or Clinical Significance?</strong></td>
<td>This study suggests that there is little loss of detection sensitivity for low contrast liver lesion detectability of CT exams scanned with a NI at least up to 21.2 compared to a NI of 15 – a patient radiation dose reduction of 50%.</td>
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<td><strong>Relationship to existing work</strong></td>
<td>There are many publications exploring the effect of image noise on image quality. However, to our knowledge, very little has been done to explore the limit of lesion detection as a function of specific noise index.</td>
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