

## AbstractID: 6024 Title: Tradeoffs in Image Quality and Radiation Dose for CT

In CT scanning, image quality has many components and is influenced by many technical parameters. While image quality has always been a concern for the physics community, clinically acceptable image quality has become even more of an issue as strategies to reduce radiation dose – to all patients, but especially to pediatric patients– has become a focus in many radiology practices.

The purpose of this presentation will be to first describe several of the components of CT image quality – noise, slice thickness (Z-axis resolution), low contrast resolution and high contrast resolution– as well as radiation dose and to describe how each of these may be affected by technical parameter selection. This presentation will pay particular attention to the tradeoffs that exist between different aspects of image quality, especially when the reduction of radiation dose is one of the objectives.

The presentation will then explore several mechanisms that can be used to reduce radiation dose in CT exams and the implications for the diagnostic image quality of the exam. Specifically, the implications of varying the tube current\*time product (mAs), pitch or table speed (or for axial imaging, the table increment), slice thickness, beam energy (kVp), patient (or phantom) size and dose reduction options (such as tube current modulation) will be described for both radiation dose and diagnostic image quality. Finally, this presentation will emphasize that the tradeoffs between radiation dose and image quality are clinical-task dependent; that is, the goals of the clinically indicated exam dictate what aspect of image quality may be emphasized for that exam (low contrast resolution or high contrast spatial resolution, etc.) and this will have implications for the amount of radiation dose reduction that is acceptable. This will be illustrated with examples from selected diagnostic imaging exams.

### **Educational Objectives:**

1. Understand key components of image quality in CT scanning as well as reinforce CT radiation dose concepts.
2. Understand the impact that technical parameter selection has on the various aspects of image quality and radiation dose.
3. Examine the tradeoffs between various aspects of image quality and radiation dose.
4. Examine the impact of these tradeoffs on a few clinical imaging protocols and illustrate the task-dependence of image quality requirements.