AbstractID: 14417 Title: New Technologies for Image Quality Improvement and Dose Reduction in CT

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"New Technologies for Image Quality Improvement and Dose Reduction in CT"

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From 1998 onwards there has been evolutionary advances in multiple-row detector computed tomography (MDCT) technologies with demand for improved spatial and temporal resolution and three-dimensional imaging. This has led to rapid race to develop MDCT scanners that yield the highest number of slices per CT gantry rotation (4-16-64-128-320). At the same time, the number of CT examinations performed in the United States has been growing at an annual rate of approximately 10% with nearly 68 million procedures performed in 2007 alone. The apparent increase in the number of CT procedures, protocols and the associated radiation dose and risks has drawn considerable attention. It appears that the so-called 'slice wars' with regard to the number of slices provided per CT gantry rotation may be reaching a plateau and increasing concerns about radiation dose due to CT examinations are fueling the efforts to reduce radiation dose and leading to the beginning of the so-called 'dose wars'.

A number of radiation dose reduction strategies are been developed. At the same time, an effort to provide further improvement in image quality and image quantification at lower radiation dose is gaining ground. Dual energy CT (DECT) methods are slowly emerging from research and becoming a clinical reality. The dual x-ray source (Dual-source CT), fast tube voltage (kVp) switching, single x-ray source dual detection (sandwich detector), photon counting detection and dual-scanning approaches are few of the different approaches currently developed for performing DECT. In addition, new technologies are been developed to further improve image quality, enhance diagnostic information and at the same time yield low radiation dose.

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There is an increasing demand for the medical physicists to assist clinicians in developing, reviewing and recommending changes to the clinical protocols. Therefore, it is critical for the medical physicists to become familiar with the new technologies such as dual-energy CT and to understand strategies to reduce radiation doses in CT, image quantification methods and many other aspects.

In this lecture, new technologies that are currently developed, such as dual energy CT, image quantification method, radiation dose reducing strategies and others will be discussed.

Educational Objectives:

1. To become familiar with radiation dose reduction strategies in CT.
2. To understand various image quality improvements in CT.
3. To describe various technological approaches to perform dual-energy CT (DECT).