Imaging Scientific Symposium

Patient Dose in CT: Calculating Patient Specific Doses in CT (Joint with Education)

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In light of recent events involving dose to patients undergoing CT exams, many efforts to record patient dose have been initiated. Many national and international groups (FDA, NIBIB, ACR, IAEA, and NIH intramural programs) have called for recording "dose", or required that CT equipment report dose. In California, a state law [SB1237] was recently passed that requires (as of July 1, 2012) the reporting of one of the following: "The computed tomography index volume (CTDIvol) and dose length product (DLP), as defined by the International Electrotechnical Commission (IEC) and recognized by the federal Food and Drug Administration (FDA); The dose unit as recommended by the American Association of Physicists in Medicine".

While these reporting/recording efforts are well-meaning, the only dose metrics currently available for reporting are CTDIvol and DLP. While CTDIvol values are highly standardized and recognized around the world, they actually are measures of scanner output, and as such ***they do not reflect the actual patient dose or the irradiation burden of the exam***. This misconception of CTDI is commonplace and has led to misinterpretation of the dosimetry values being reported at the scanner and recorded into patient records.

The purpose of this symposium is to describe methods to more accurately estimate the radiation dose to various organs, and ultimately the radiation risk, to patients undergoing CT exams. The symposium covers methods aimed towards more patient-specific estimates that take into account: (a) scanner related factors (CT manufacturer and model specifics), (b) exam related specifics (anatomic coverage, use of dose reduction methods such as tube current modulation) and (c) patient related factors such as age, gender, size, and shape.

The learning objectives of this symposium include the following:

1. To understand the limitations of current metrics (e.g. CTDIvol) and methods in estimating patient dose
2. To understand the methods to more accurately estimate radiation dose that take into account scanner, exam and patient specific factors
3. To understand the role of Computational Phantoms and Monte Carlo simulation methods in developing patient-specific organ dose estimates
4. To understand methods to estimate patient-specific organ doses , effective doses, and radiation risk for comparison and optimization purposes