School of Medicine and Public Health
UNIVERSITY OF WISCONSIN-MADISON

Department of Radiology

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To: New Users of University of Wisconsin-Madison CT Protocols

Re: Radiation Dose from the GE Bolus Tracking Feature—"Smart Prep"

We have encountered some sites not routinely using bolus tracking for CT exams. At the UW, we use bolus tracking for the majority of our with-contrast body exams and many neuro and cardiovascular exams. For users new to SmartPrep, the extra dose it delivers may appear too high to warrant its routine use. But the dose from SmartPrep is negligible relative to the total exam dose and, in our opinion, the increased accuracy in optimizing contrast dynamics is worth the slight dose increase.

The following dose data was computed using UW data from 4,676 medium-sized (anterior + lateral dimensions between 55 and 80 cm) abdominal/pelvis scans:

- The mean/median CTDIvol from the SmartPrep series was 17/17 mGy.
- The mean/median DLP from the SmartPrep series was 8/9 mGy*cm.
- The mean/median CTDIvol from the helical abd/pelvis was 10/9 mGy.
- The mean/median DLP from the helical abd/pelvis was 521/445 mGy*cm.

Making Sense of These Numbers – **On average, SmartPrep contributes only 1.9% of the total exam DLP**. In terms of deterministic effects coming from the slightly higher CTDIvol of the SmartPrep relative to the helical scan, 17 mGy is far below any deterministic threshold. For reference, the AAPM recommends a threshold of 1,000 mGy to alert users to possible damaging dose levels. The accepted threshold for deterministic effects (hair loss, skin reddening) is 2,000-5,000 mGy peak skin dose. CTDIvol actually overestimates the peak skin dose meaning that even if the CTDIvol was 2,000, the PSD would likely be below the deterministic threshold limit. **In other words, the dose from SmartPrep is ~200 times lower than known deterministic skin thresholds**. Consultation with your medical physicist should be scheduled if you need further explanation on this topic. Bolus tracking techniques are standard options on all modern CT scanners and are used routinely in medical centers across the globe. While it is not a good idea to disregard the dose from this feature, it is important to understand the relative magnitude of this component with respect to the rest of the exam and known deterministic dose thresholds.

If you have any questions, or would like to have any of the above clarified, please contact you GE applications specialist.

Sincerely,

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