Editorial comment

Cynthia H. McCollough

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In the paper “Maximizing dose reductions with cardiac CT” by Dr. Budoff (DOI [10.1007/s10554-008-9405-2](https://doi.org/10.1007/s10554-008-9405-2)), which recently appeared on Online First, the author makes the following statement on page 3: “Slower heart rates will lead to more effective use of dose modulation and lower radiation doses (with the exception of the dual-source scanner, where slower heart rates will increase radiation exposure)”. I believe this statement is potentially misleading for the readers and needs clarification.

The ECG-based tube current (mA) modulation does, indeed, work more efficiently for slower heart rates. This is true simply because, as heart rate decreases and the RR interval increases, the time period when the tube is operated at the full mA becomes a smaller and smaller percentage of the cardiac cycle. This is equally true for both single-source and dual-source scanners.

Another dose-reduction feature in cardiac CT angiography, which is unique to dual-source systems, is that the pitch value is affected by changes in heart rate. Single-source systems must maintain a relatively low pitch value (approximately 0.20), independent of the heart rate, and these lower pitch values have the effect of increasing dose to the patient. However, the

improved temporal resolution of dual-source systems allows for the pitch value to be increased as the heart rate increases. Using retrospectively gated scan techniques, pitch values up to 0.50 are possible (as the heart rate nears 100 bpm). This means that patients with higher heart rates (who benefit less from the ECG-based mA modulation) are scanned with higher pitch values and, hence, their dose is reduced.

In summary, for single- and dual-source CT, slower heart rates will lead to more effective use of ECG-based tube current modulation and lower radiation doses. For dual-source CT, dose reductions also can be achieved for patients with high heart rates due to dual-source CT’s ability to increase the pitch value with increasing heart rates [1].

Reference

1. McCollough CH, Primak AN, Saba O, Bruder H, Stierstorfer K, Raupach R, Suess Christoph, Schmidt B, Ohnesorge BM, Flohr TG (2007) Dose performance of a 64-channel dual-source CT scanner. *Radiology* 243:775–784

C. H. McCollough (✉)
Mayo Clinic, Rochester, MN 55905, USA
e-mail: mccollough.cynthia@mayo.edu