Spectral CT 7500 Delivers Cardiac Results Without Compromise

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In May 2021, Philips introduced the new Spectral CT 7500,* which provides spectral information without compromising image quality, dose or workflow. The fast, always-on spectral detector delivers rich results in a single scan without requiring any special protocols.

With spectral detector CT, photons add value by helping to salvage sub-optimal injection scans without the need to re-scan patients shortening the time to diagnosis. In a recent analysis, the Spectral CT 7500 reduced time to diagnosis by 34%, repeat scans by 25%, and the need for follow-up scans by 30%.[1]

Implementation at Utrecht University Medical Center

The Utrecht University Medical Center in Utrecht, Netherlands, installed the Spectral CT 7500 in April 2021 because spectral CT is always on, which improves clinical confidence in routine imaging without increasing radiation dose.

"Regardless of how you scan, you always get spectral information, which allows for more definitive characterization of expected, as well as unexpected, findings. The same information can be obtained with less scans and lower radiation dose than conventional CT," said Tim Leiner, MD, PhD, EBCR, FSCCT, FSCMR, FISMRM, professor of radiology at Utrecht University Medical Center.

In addition, spectral CT uses less contrast by leveraging high contrasted noise and low virtual monoenergentic reconstructions. In Dr. Leiner's experience, average attenuation contrast-to-noise ratio and dose-corrected contrast-to-noise ratio vary with each scan across different energy levels and iodine concentrations.

"If you move to lower monochromatic energy levels that you can create using spectral CT, there's a big boost in the attenuation of contrast agent, which potentially allows you to choose a much lower iodine dose but still get the same attenuation. So, this is a feature that's of high value," he said.

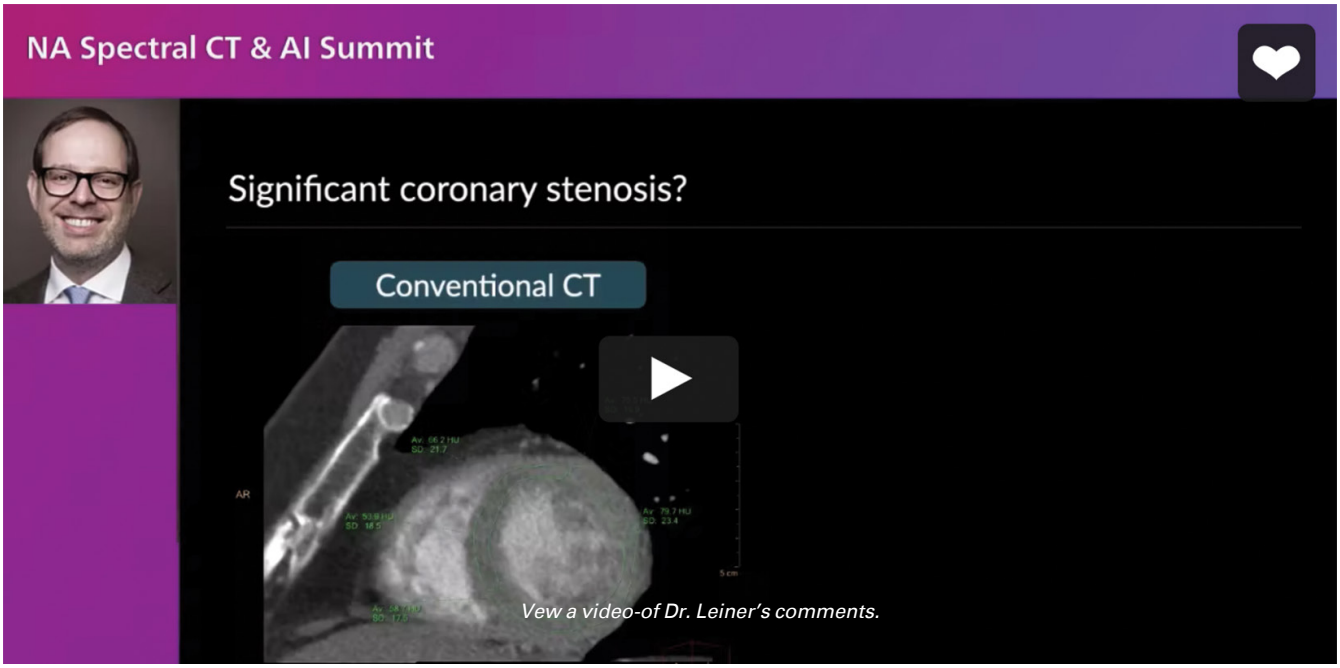
Utrecht also chose the 7500 for its advanced cardiovascular imaging features, including artificial intelligence-based motion correction. The 80-centimeter bore helps patients feel more comfortable, and the table's two-meter scan range with 60-centimeter-per-second table speed is well-suited for bariatric patients weighing up to 675 pounds. This also has positive implications for cardiac imaging.

"This is great for acquiring very fast images of the entire torso, as well as aortic imaging," Dr. Leiner said. "Spectral coronary CT not only gives you a better view of the coronary arteries, but it also allows you to clearly see the myocardium and other cardiac structures."

Spectral coronary CT helps Dr. Leiner image patients with heavily calcified coronary arteries. High calcium burdens limit diagnostic accuracy and can make obstructions of the coronary lumen difficult to see. Spectral CT reduces blooming artifacts with iodine reconstruction, helping clinicians to determine if arteries are significantly stenosed or heavily calcified.

Spectral CT also visualizes the myocardium more clearly than does conventional CT. In one example, a conventional short access reconstruction of regular CT images showed slightly lower Hounsfield unit values in the septum than spectral reconstruction.

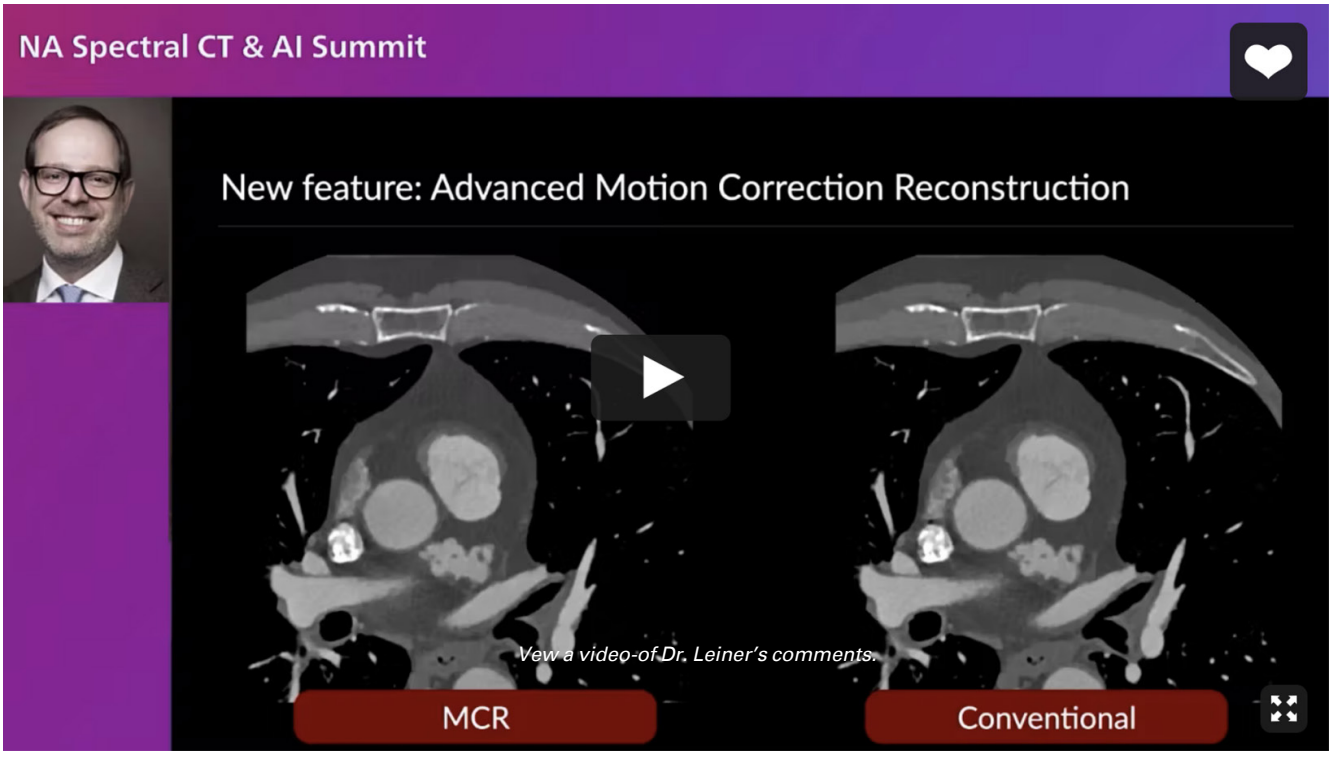
"The true power of spectral becomes obvious if you unmask profusion defects by looking at the iodine concentration in the myocardium," explained Dr. Leiner. "In this case, there's a profusion defect in the septum, which is clinically valuable and is much better recognizable using the spectral data versus the conventional images."



Another clinically useful feature is motion correction reconstruction, which significantly reduces blurring. "This is very helpful in patients whose heart rates don't go below 60 bpm," he explained.

In one example, the right coronary artery was much more sharply depicted with motion correction reconstruction than with conventional reconstruction. Motion correction reconstruction also more sharply delineated the lumen versus conventional reconstruction.

"Motion artifacts can make it difficult to recognize plaque or stenosis, but motion correction reconstruction ameliorates that problem," Dr. Leiner said.

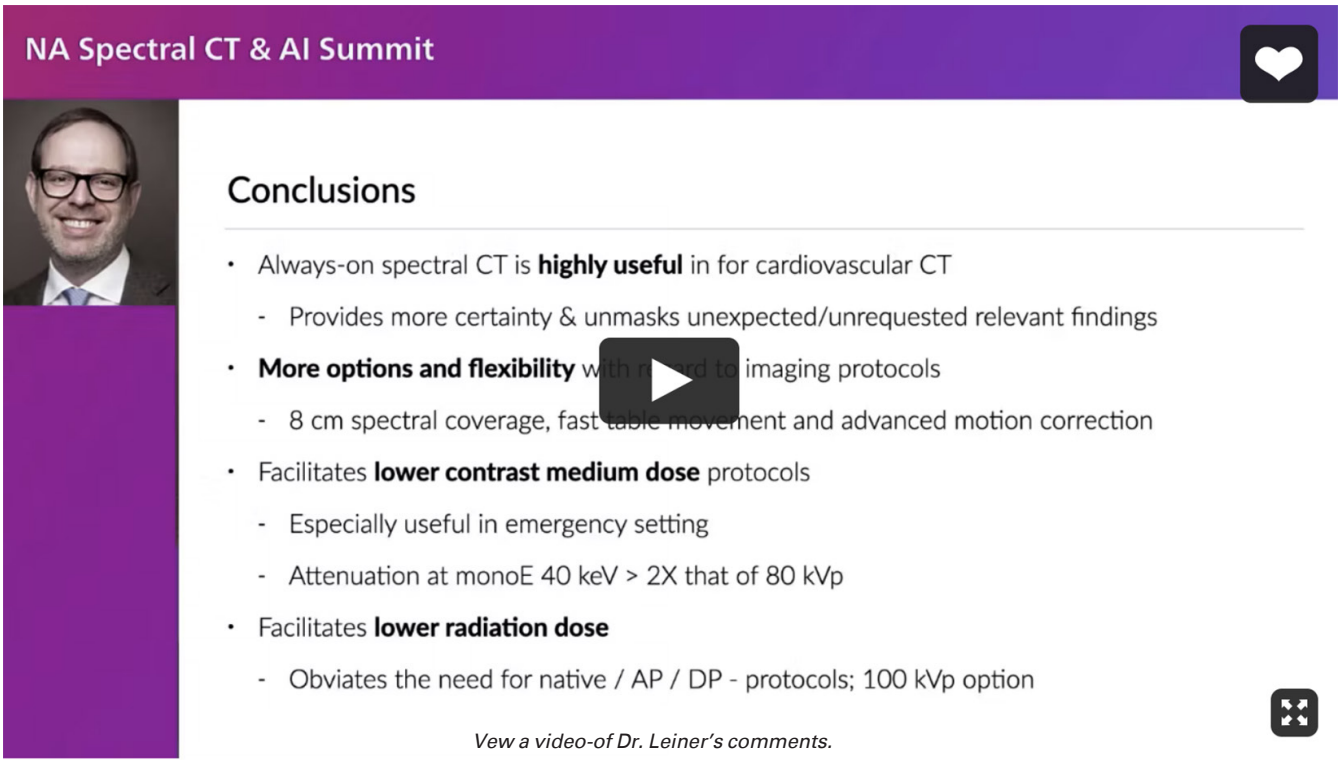


In addition, spectral CT with late iodine enhancement characterizes a scarred myocardium better than conventional CT.

In a trauma patient, conventional CT found pericardial fluid, a dilated coronary vein and dense pericardial effusion. However, it was unclear whether a bleed was present. Spectral CT showed the iodine density was zero, allowing Dr. Leiner to confidently rule out contrast leakage into pericardial space.

Spectral CT is also valuable in trans-catheter aortic valve implantation (TAVI) workups and has demonstrated improved readings of incidental findings. In one TAVI patient, spectral CT revealed a colon cancer metastasis. In another, it identified a hepatocellular carcinoma. "These are additional metastases that are unmasked by using the spectral CT information," he said.

To understand spectral CT's effect on radiation dose, Utrecht University Medical Center compared 4,500 spectral CT exams with 5,800 conventional CT examinations. "Spectral CT is lower in dose for most indications compared to the regular CT examination," Dr. Leiner said. "Although all scans were acquired at 120 kVp, adjusting the mAs levels allowed us to reduce dose to lower levels than we were used to."



View a video of Dr. Leiner's comments.

After nearly a year of using the Spectral CT 7500, Dr. Leiner concluded the technology is clinically valuable for cardiac imaging.

"Always-on spectral CT is highly useful for cardiovascular CT, provides more certainty and unmasks unexpected and unrequested relevant findings," he said. "We have more flexibility in imaging protocols because of the eight-centimeter spectral coverage, fast table movement and advanced motion correction. We can use lower contrast doses because of contrast behavior properties and, in many indications, we can lower radiation dose."

1. Analysis by CARTI Cancer Center in Little Rock Arkansas and University Hospitals of Cleveland - Results from case studies are not predictive of results in other cases. Results in other cases may vary.