

Deep Learning Spectral Confidently protecting kidney health

In our CT department, we see many patients with impaired renal function, in whom the total iodine load needs to be limited, making CT angiography examinations challenging.

To optimize visualization of the limited iodine contrast allowed for patients at risk of contrast-induced nephropathy, we use a Deep Learning Spectral acquisition protocol that provides the ability to enhance iodine conspicuity at low keV range (35-60 keV).

Deep Learning Spectral CTA achieves excellent image quality for vascular studies while confidently reducing iodine contrast load by up to 60%.



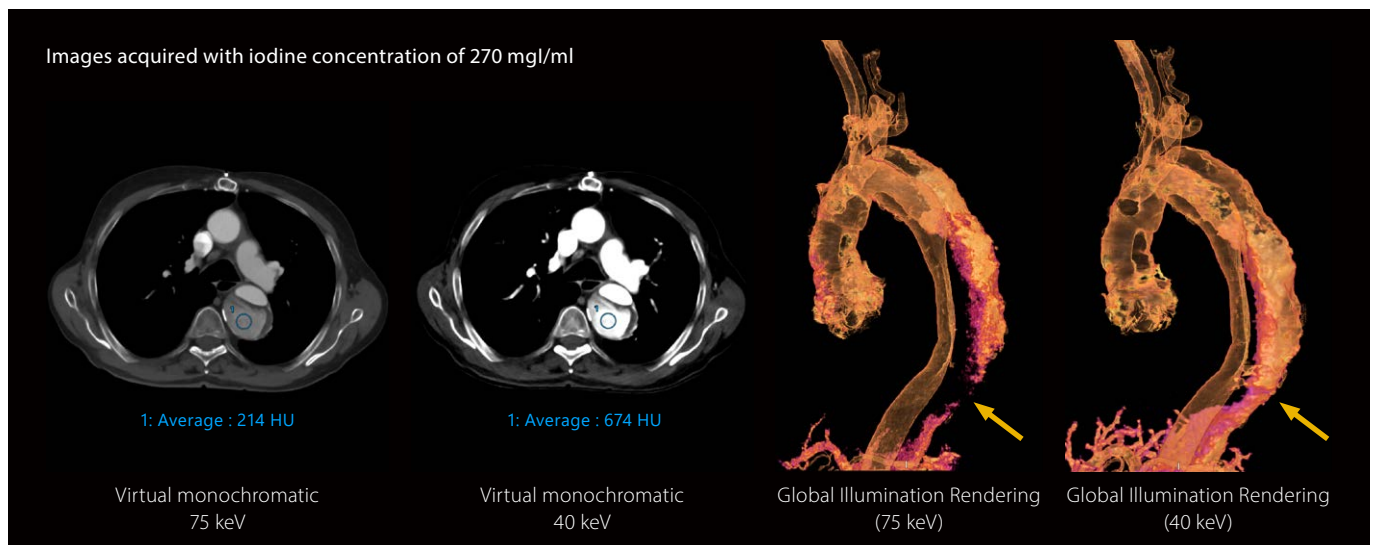
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Patient history

A 79-year-old patient with an aortic dissection that was treated by surgical replacement of the ascending aorta in 2006 and a Bentall procedure in 2015, presented for a follow up CT scan of the aorta.

Due to the patient's impaired renal function, a Deep Learning Spectral CTA scan of whole aorta was performed on an Aquilion ONE / PRISM Edition with 80 ml of 270 mgI/ml contrast media injected at 3 ml/s. This represented a 46% reduction of iodine load compared to the standard site protocol using 100 ml of 400 mgI/ml strength contrast.*

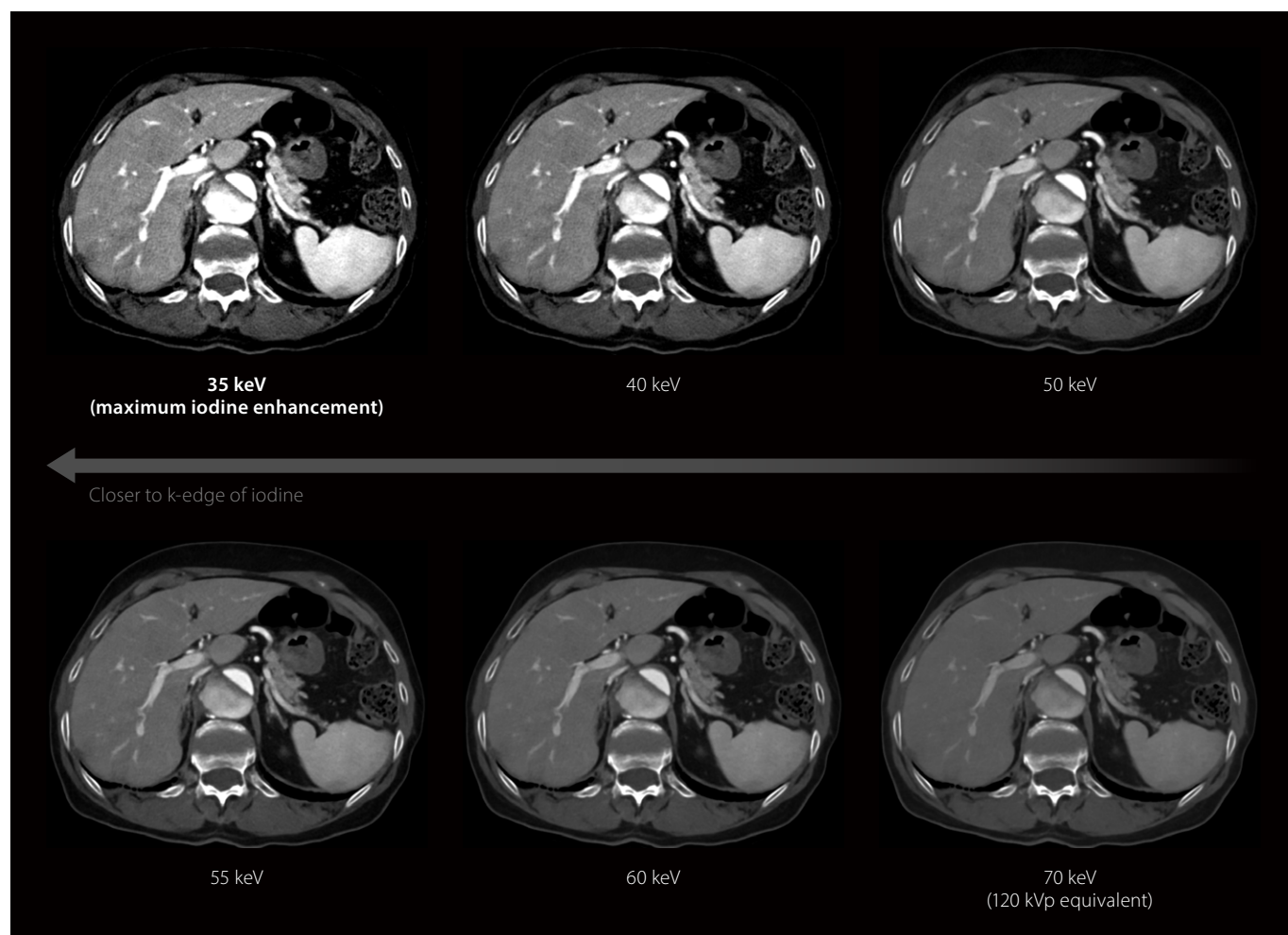
Results



Virtual monochromatic images generated at 75 keV demonstrate suboptimal vascular opacification for evaluation of the aorta due to both reduction in iodine concentration and amount of iodine used for this patient. However, the spectral images at 40 keV show excellent improvement in vascular contrast enhancement, particularly within the patent false lumen of this Stanford type B dissection. 3D Global Illumination rendering (GIR) images at 40 keV clearly demonstrate a stable type B dissection (arrow).

Technology

Deep Learning Spectral provides excellent low noise virtual monochromatic images (VMI) across the entire keV spectrum. This allows clinicians to fully benefit from the increased contrast enhancement in the low keV range (35-60 keV) improving vascular assessment without the usual high noise associated with the lower keV levels. As shown below the density of iodinated contrast increases as the VMI energy level approaches the k-edge of iodine at 33.2 keV.



Conclusion

Deep Learning Spectral CTA allows clinicians to achieve optimal contrast enhancement for a successful CTA study, while reducing the total iodine load in patients with impaired renal function. This is important to minimize the risk of contrast-induced nephropathy and hence, making high quality care more accessible to these patients.

* Optimization of contrast usage is only recommended within the dosing ranges that appear in approved iodinated contrast drug labeling.

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