endothelium in the arteries, suggesting that MNPs would serve as an excellent delivery strategy for targeted atherosclerosis therapy.

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Utilization of Intra-Arterial Contrast for Computed Tomography Aortography in a Swine Model

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Background: Intraoperative computed tomography (CT) imaging with endovascular catheter delivery of intra-arterial (IA) contrast could potentially provide higher signal attenuation in directed anatomic locations with lower contrast volumes. We compared image quality and attenuation timing of IA versus intravenous (IV) contrast protocols for abdominal imaging.

Methods: Five anesthetized swine had internal jugular access and ascending aortic pigtails placed percutaneously via the brachial artery. The IV contrast protocol used 100 mL of iodinated contrast at 5 mL/second over 20 seconds. The IA protocol delivered 50 mL at 5 mL/second over 10 seconds. A 16-slice CT scanner with a 10-mm detector acquired static serial images at 1 image per second for 45 seconds. Region-of-interest markers were used to select the aorta and portal vein to capture arterial and venous attenuation via Hounsfield units (HU) per second. Attenuation curves were assessed using a Pearson’s correlation. Adequate attenuation was defined as more than 100 HU a priori and image quality assessed using contrast-to-noise ratio (CNR).

Results: Both contrast protocols achieved adequate image attenuation with an aortic peak of 665 ± 226 (mean HU ± SD) for IA and 414 ± 141 for IV. IA contrast achieved faster peak aortic attenuation compared with IV contrast (8 vs 20 seconds; P < .001) (Figure). Portal values (attenuation and time to peak) were similar for IA vs IV (146 ± 46 seconds vs 169 ± 39 seconds; 34 seconds vs 42 seconds; P < .05). IA administration achieved a superior CNR in less time compared with IV (10 seconds vs 23 seconds; P < .001). All curves were modeled using nonlinear least squares regression and achieved an R² of greater than 0.94 (P < .001).

Conclusions: IA contrast achieves adequate opacification and a superior CNR compared with IV contrast, while using a smaller volume for intraoperative directed imaging. The incorporation of intraoperative CT scans with IA contrast could radically change imaging protocols for endovascular aortic repair.