

Comparison Between Virtual Non-Enhanced And True Non-Enhanced Images In The Evaluation Of Suspected Renal Lesions

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This study compared the diagnostic value of virtual non-enhanced (VNE) images generated from dual-energy four-phase renal computed tomography (CT) with true non-enhanced images (TNE) and calculate the potential radiation dose reduction if VNE replaced TNE. Ninety-five patients (59 male, 36 female; aged 60.5 ± 12.6 years) underwent four-phase renal CT using a first generation dual-energy dual-source scanner with dual-energy acquisition of nephrographic phase images. Two nonblinded readers independently compared TNE and VNE images in terms of noise, quality, exclusion of lesion and contralateral kidney, artefacts and overall acceptability. Mean CT numbers in renal lesions, renal parenchyma, liver, aorta, psoas muscle and retroperitoneal fat were compared and contrast enhancement was evaluated. Using a five-point scale (1 to 5; none to severe), mean image noise was 2.0 ± 0.3 and 2.3 ± 0.6 for TNE and VNE, respectively. On a five-point scale (1 to 5; excellent to not interpretable), overall image quality was 1.1 ± 0.4 and 2.0 ± 0.9 for TNE and VNE, respectively. Exclusion of contralateral kidney and partial exclusion of lesion was seen in 12.6% and 15.8% of patients. On a three-point scale (1 to 3; acceptable to not acceptable), mean acceptance score of VNE images was 1.3 ± 0.5 . The mean CT numbers on TNE and VNE images for renal lesions were 10.4 ± 25.5 and 3.7 ± 24.2 Hounsfield Units respectively. Statistically significant difference ($p < 0.05$) was observed between TNE and VNE CT numbers in all regions except segment VI of the liver. In conclusion, VNE images were visually comparable to TNE images despite significant differences in CT numbers and was of diagnostic quality. Replacement of TNE with VNE images conferred a $21.9 \pm 4.5\%$ dose reduction.