Evaluation of an iterative model-based reconstruction of pediatric abdominal CT with regard to image quality and radiation dose

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Purpose: To evaluate the potential of a new, iterative, model-based method for reconstructing (IMR) pediatric abdominal CT at a low radiation dose and determine whether it maintains or improves image quality, compared to the current iterative reconstruction method (iDose^4).

Standard-dose
20 patients
$CTDI_{vol}$ = 2.7 mGy
iDose^4 5 mm

Low-dose
20 patients
$CTDI_{vol}$ = 1.9 mGy
iDose^4 5 mm
IMR 0.9 mm

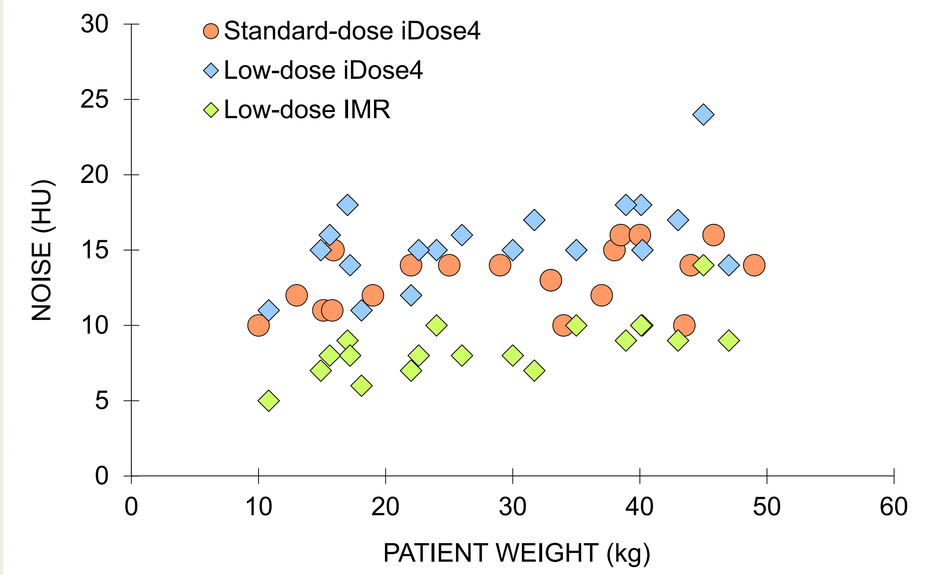
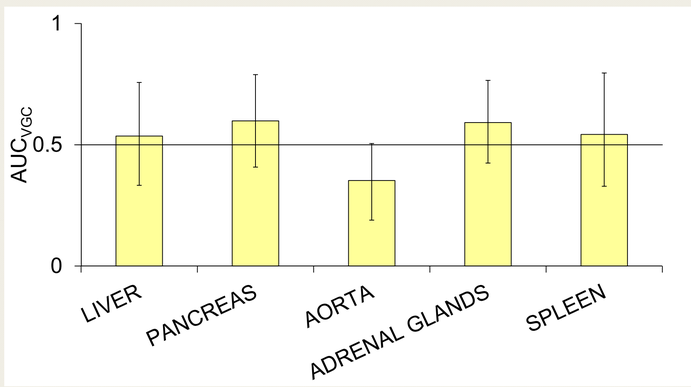


Image noise measured in the liver as function of patient body weight

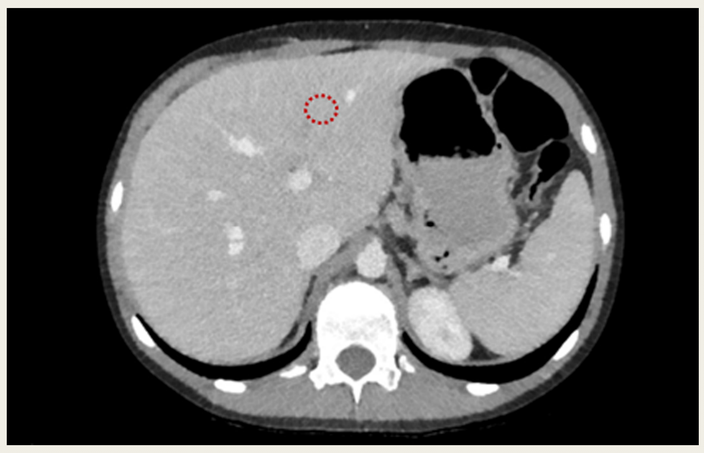
Objective image quality assessment:
- Image noise in liver

Subjective image quality assessment:
- Five anatomical structures (VGC analysis)
- Overall image quality
- Diagnostic confidence in the image appearance

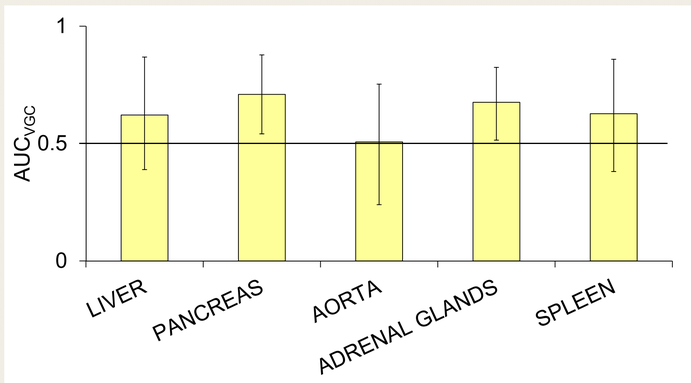


VGC analysis:
Standard-dose iDose^4 vs low-dose IMR

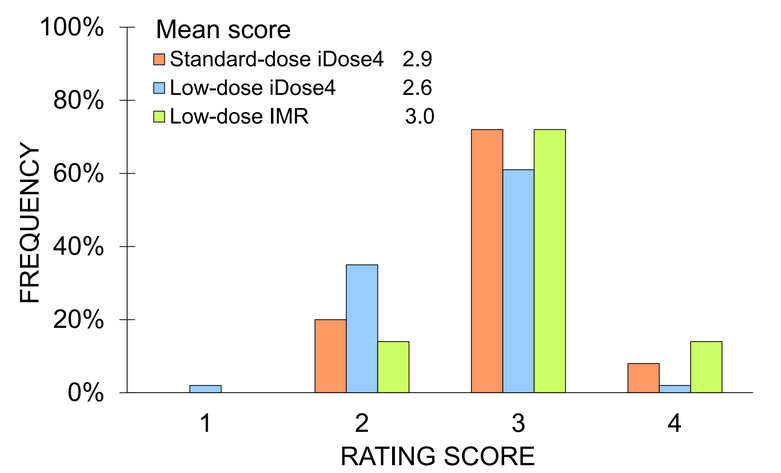
Low-dose iDose^4 reconstructed 5 mm slice



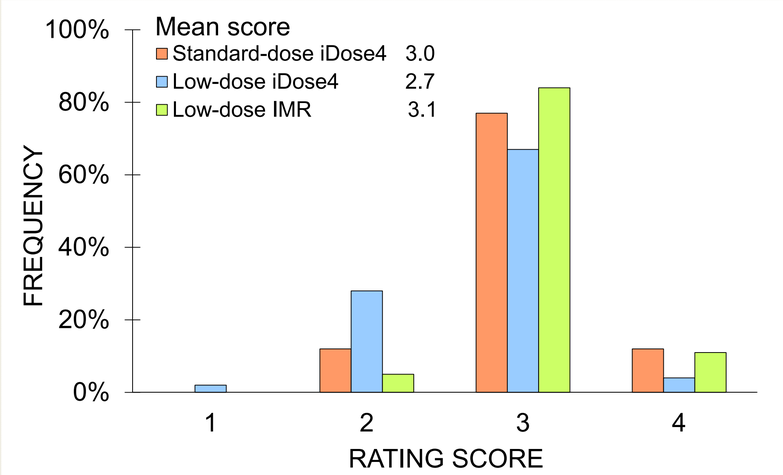
Low-dose IMR reconstructed 0.9 mm slice



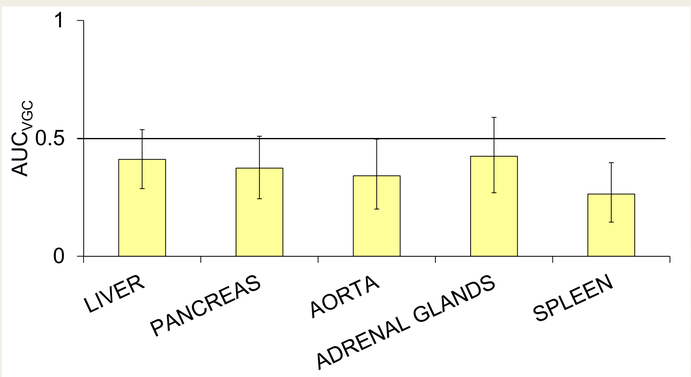
VGC analysis:
Low-dose iDose^4 vs low-dose IMR



Evaluation of overall image quality



Evaluation of diagnostic confidence in image appearance



VGC analysis:
Standard-dose iDose^4 vs low-dose iDose^4

Conclusion: Iterative model-based reconstruction (IMR) provided image quality equivalent or superior to the standard iterative reconstruction method (iDose^4) for evaluating pediatric abdominal CT with a 32% dose reduction.

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