# Assessment of clinical image quality in paediatric abdominal CT examinations – dependency on level of Adaptive Statistical iterative Reconstruction (ASiR) and type of convolution kernel

J Larsson[1,2], M Båth[1,3], K Ledenius[4], H Caisander[5] and A Thilander-Klang[1,3]

[1]Department of Radiation Physics, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden
[2]Section of Diagnostic Imaging and Functional Medicine, NU-Hospital Group, Trollhättan, Sweden
[3]Department of Medical Physics and Biomedical Engineering, Sahlgrenska University Hospital, Gothenburg, Sweden
[4]Department Radiology, Skaraborg Hospital, Skövde, Sweden
[5]Department of Paediatric Radiology and Physiology, The Queen Silvia Children's Hospital, Gothenburg, Sweden

**Purpose:** The purpose of this study was to investigate the effect of combinations of convolution kernel and level of Adaptive Statistical iterative Reconstruction (ASiR) on diagnostic quality and visualisation of anatomical structures for paediatric abdominal CT examinations.

**Materials and Methods:** Thirty five patients (mean age 10 years-old, range; 2 to 15 years-old) undergoing routine abdominal CT on a 64 slice MDCT scanner (Discovery CT750 HD, GE Healthcare) were included in the study. Raw data was retrospectively reconstructed into 5 mm thick and interval 2.5 mm transaxial image stacks at levels of 30%, 50%, 70%, 90% and 100% ASiR, all in combination with three kernels; Soft, Standard and Detail. In a blinded randomized visual grading study, four paediatric radiologists with different experience rated a question of diagnostic quality and 6 questions related to anatomical structures, using a four point rating scale. Data were analysed in comparison with 30% ASiR with kernel Soft (the settings used clinically prior to the study) using a method for paired ordinal data that identifies and measures systematic shift in rating distributions. The shift is expressed as the Relative Position (RP).

**Results:** A clear dependency on type of convolution kernel was seen for the relationship between ASiR level and image quality. For the Soft and Standard kernels, the optimal diagnostic quality was obtained at 70% ASiR. For the Detail kernel, the diagnostic quality increased with ASiR level, but at no ASiR level for this kernel a better diagnostic quality than at 30% ASiR with kernel Soft was obtained. The visibility of the extra hepatic part of the portal vein was best delineated at 70% ASiR with kernel Soft (RP -0.12; 95% CI -0.20 to -0.04).

**Conclusions:** This study shows that for paediatric abdomen CT examinations the clinical image quality at a given ASiR level is dependent on the convolution kernel and that a more edge enhancing kernel can benefit from a higher ASiR level. For the acquisition settings used in the present work, the optimal combinations of ASiR level and convolution kernel was 70% ASiR with kernel Soft or Standard.