

## The effect of Adaptive Statistical iterative Reconstruction (ASiR) on assessment of diagnostic quality and visualisation of anatomical structures in paediatric head CT examinations

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

**Materials and Methods:** Forty patients from infants to an age of 17 years-old undergoing routine head CT on a 64 slice MDCT scanner (Discovery CT750 HD, GE Healthcare) were included in the study and divided into age dependent sub groups (0-2, 3-5 and 6-17 years-old). Scanning raw data, acquired within tube current range 190 to 400 mA, was retrospectively reconstructed into 5 mm thick axial image stacks at levels of 0%, 20%, 30%, 40%, 50%, 60%, 70%, 80% and 100% ASiR with convolution kernel Soft. In a blinded randomized visual grading study, three paediatric radiologists with different experience rated a question of diagnostic quality (For what diagnostic situation is this image quality sufficient?) 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 ASiR level and kernel used clinically prior to the study) using a method for paired ordinal data that identifies and measures systematic shift in rating distributions.

**Results:** In all sub groups, 50%, 60% and 70% ASiR demonstrated a statistically significant negative Relative Position (RP) for diagnostic quality, indicating a higher diagnostic quality compared to 30% ASiR. All trends of the assessed anatomical structures, except the cerebrospinal fluid space around the brain, demonstrated enhancement in visibility with increased level of ASiR. The visibility of the cerebrospinal fluid space around the brain was degraded at ASiR levels above 60% ASiR. Diagnostic quality at 0% ASiR (100% filtered back projection) was significantly lower than 30% ASiR.

**Conclusion:** This study shows that the commonly used 30% ASiR may not always be the optimal level of ASiR. The investigated effect of ASiR showed, in this study, that 60% ASiR was the optimal ASiR level for a paediatric head CT examinations at the tube current range 190 to 400 mA, when reconstructing 5 mm thick images with convolution kernel Soft.