

## A Phantom study for optimization of radiation dose and evaluation of image quality for CT head in Pediatric Population

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### Abstract

Pediatric CT imaging have increased rapidly with advancement in CT hardware and soft wares but radiation pose major adverse effects, as children's are 2-3 times more vulnerable to effect of radiation. In order to optimize radiation dose in CT, we must select suitable scanning protocol such as kVp, mAs and Iterative Reconstruction techniques (IR) that corresponds to region of examination and patient age or size. With conventional reconstruction technique such as filtered back projection (FBP), excessive dose reduction results in increased noise and provides suboptimal image for diagnostic interpretation. Hence, CT manufacturers have introduced hybrid Iterative Reconstruction (IR) techniques to optimize radiation dose to patients without affecting image quality. Therefore, the objective of this study is to optimize radiation dose by developing and implementing low dose pediatric CT head protocol and to evaluate the image quality by using pediatric head phantom.

**Materials & Methods:** Pediatric head phantom was scanned using 128 slice Philips CT Scanner with different tube voltage and tube current - exposure time products setting with reconstruction mode iDose<sup>4</sup>. The radiation dose was measured based on Volumetric CT Dose Index (CTDI<sub>v</sub>) that was noted from the CT console. Signal to Noise Ratio (SNR), Contrast to Noise Ratio (CNR), Figure of Merit (FOM) was calculated to access the image quality.

**Results:** The radiation dose and image quality was assessed for different kV and mAs setting. For less than 1-year age, the CTDI<sub>v</sub> was 7.21mGy and noise was 5 for 80 kV and 150 mAs. For 1 – 5 years age, the CTDI<sub>v</sub> was 15.42 mGy and noise was 5 for 100 kV and 160 mAs.

**Conclusion:** The optimum protocols (kVp, mAs, IR) are derived based on image quality (SNR, CNR, FOM) and radiation dose (CTDI<sub>v</sub>). For pediatric CT head aged less than 1year 80 kV, 150 mAs and for 1- 5years age 100 kV, 160 mAs with reconstruction mode iDose<sup>4</sup> level-3 are found to be optimum scanning protocol.

**Keywords:** Diagnostic Reference levels (DRLs), Dose Length Product (DLP), Volumetric Computed Tomography Dose Index (CTDI<sub>vol</sub>)



### Biography:

Mrs. Priyanka is Assistant professor in Radiology and Imaging Sciences and currently pursuing PhD from Manipal Academy of Higher Education. She is doing research in radiation dose reduction strategies in pediatric CT examinations. She has more than 5 publications in reputed journals. She has expertise in mammography and Cardiac MRI

### Speaker Publications:

1. "Establishing Diagnostic Reference Levels (DRLs) for Computed Tomography of Head in Pediatric Population"

[2<sup>nd</sup> Global Meeting on Oncology and Radiology;](#)  
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