

CT dose distribution of 10 cm (infants) and 16 cm (adults) by a head CT phantom

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Introduction

It is important to reduce X-ray dose in diagnostic radiology such as CT examination. The sheet roll CT dosimetry phantom (SRCT-P) with a radiochromic film (RF) was developed by Gotanda and others¹⁾. The dose of a center and the surface was measured using this phantom. In order to evaluate continuous dose distribution of the head CT of infants and adults. Two half cylindrical acrylic phantoms were developed. The diameters of the phantoms were 10 cm for infants and 16 cm for adults (Fig. 1).

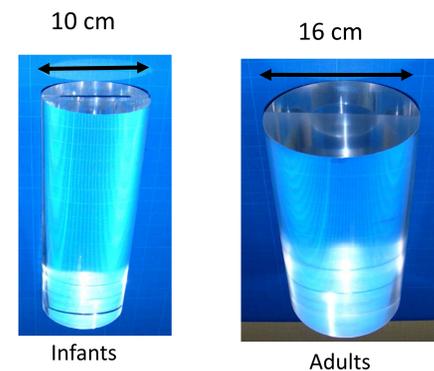


Fig.1 The two half cylindrical acrylic phantoms.

Methods

A Gafchromic film was sandwiched between the half of cylindrical acrylic phantoms (Fig. 2). The head CT scan parameters were single scan, 2 cm scan thickness, 120 kV tube voltage, 300 mA tube current, and 1 sec of a rotation. Phantoms with Gafchromic film are on the bed of the CT (Fig. 3).

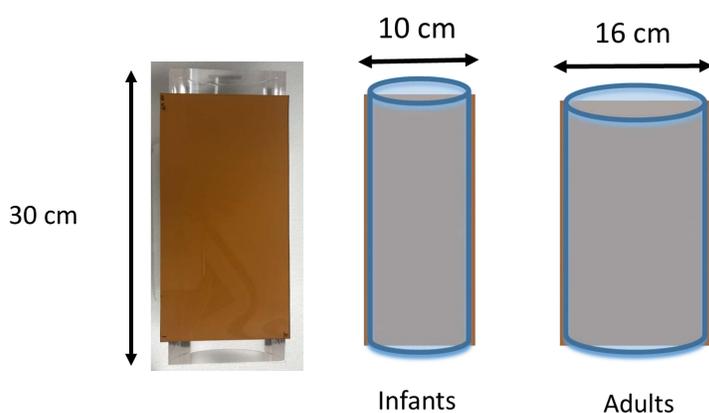


Fig. 2 The Gafchromic film was sandwiched between the half of cylindrical acrylic phantoms.



Fig. 3 Phantoms with Gafchromic film are on the bed of the CT.

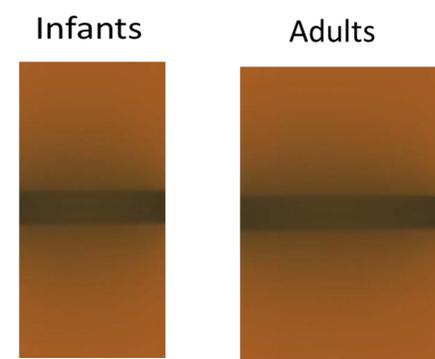


Fig. 4 The Gafchromic film after head CT exposure (Infants and Adults).

Results

The pixel values indicated the lowest value was at the center of the phantom, gradually increased the pixel value to the surface of the phantom continuously on the CT exposure area (Fig. 5). When the surface dose was made into 100%, the center dose was 94% for the infants, and was 83% for the adults (Fig. 6).

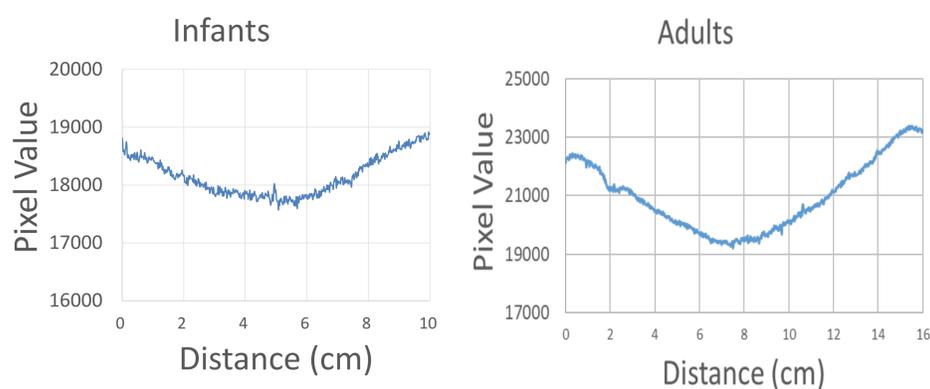


Fig. 5 The Profile curve of the Gafchromic film (Infants and Adults).

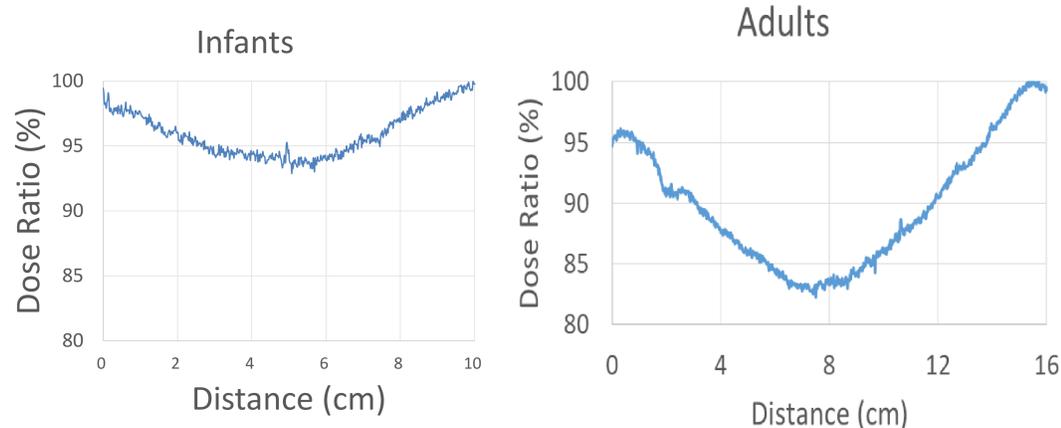


Fig. 6 The curve of the dose ratio (Infants and Adults).

Conclusions

The dose distribution in the head CT of infant's and adult's phantoms were evaluated using the half of cylindrical acrylic phantoms with Gafchromic film. Dose distribution from the center to the surface is able to evaluate using this method. The CT dose was increased contentiously from center to surface.

References

- 1) R. Gotanda, T. Katsuda, T. Gotanda et al. Computed tomography phantom for radiochromic film dosimetry. Australasian Physical & Engineering Sciences in Medicine, Volume30 Number 3, 2007.