

## CALCULATION OF DOSE CONVERSION COEFFICIENTS FOR TWO TYPES OF CT SCANNER AND FOR PHANTOMS REPRESENTING PATIENTS OF VARIOUS AGES

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Computed Tomography (CT) is the single largest contributor to the dose to the general public due to radiology. As the quality of CT images increase, CT scans find more and more applications, to the point where voluntary preemptive CT scans (the so called “wellness CT”) are available for the public in the US and Europe. For adults the radiation dose due to CT scans is relatively well known. For children the dose can be expected to be higher but only limited information is available. Conversely, for CT children are expected to be more vulnerable to the effects of ionizing radiation. Calculations are presented of the radiation dose delivered to the patient. These calculations are extended to include children of various ages and both sexes on the Elscint CT Exel 2400 and the Siemens DRH CT scanner.

Both the Computed Tomography Dose Index free in air ( $CTDI_{air}$ ) and the organ doses per 10 mm slice of the total body scan of a set of sex and age specific mathematical phantoms were simulated using MCNP4c. Using these simulations and a measured value of the  $CTDI_{air}$  a conversion coefficient from  $CTDI_{air}$  to effective dose per slice can be calculated. These coefficients can be used to evaluate the dose to the patient of any given scanning protocol.

The calculated conversion coefficients were used to calculate the dose to the patient for several common scan protocols covering various parts of the body. If the protocol used for adults is not adapted to the age of pediatric patients, the dose can be up to a factor of 2 higher than would be expected if the dose were calculated using the information available for dose to adults. The results also show a variation of dose between the sexes of up to 50%.

The differences between the conversion coefficients for phantoms representing ages of 0, 1, 5, 10, 15 and 21 years and both sexes clearly show the need for a database of age and sex dependent conversion coefficients for all commercially available CT scanners.

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