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Translation. Original text in Finnish.

Holders of a safety licence in the field of healthcare

Reference levels for patient radiation exposure in computed tomography examinations of adults

The responsible party's (party running a radiation practice) duty to introduce reference levels for X-ray examinations is laid down in the Decree of the Ministry of Social Affairs and Health on the medical use of radiation (423/2000). The Decree also prescribes that the reference levels for the most common examinations shall be issued by the Radiation and Nuclear Safety Authority. The provisions concerning reference levels and introducing them into practice are laid down in sections 2, 16 and 17 of the Decree.

This decision provides the reference levels for computed tomography (CT) examinations of adults. The reference levels have been divided into generic reference levels concerning a specific imaging area, and other levels based on imaging indications and specific examination types. This decision repeals the reference levels set in the Radiation and Nuclear Safety Authority's decision 19/310/07 (27 March 2007).

Table 1 presents the reference levels for a specific imaging area, and Table 2 presents the reference levels based on imaging indications and concerning other specific examination types. The reference levels are presented as a volume computed tomography dose index ($CTDI_{vol}$) and as a dose-length product (DLP). The reference levels presented in the tables are based on patient dose collection. If an examination includes several image series, the reference levels presented in the tables refer to the radiation exposure caused by a single series of images. Furthermore, reference levels have been defined for examinations using a single scan only (for example, one scan used for entire body, no separate scans for the lungs and abdomen).

Responsible parties may introduce into practice the reference levels given in the decision or they may use stricter values of their own. When desired, responsible parties may determine reference levels for their own use for examinations which have not been given reference levels.

This decision is valid as of 1 June 2013 until further notice.

Director General Tero Varjoranta

Director Eero Kettunen

Appendix Instructions: Reference levels for patient's radiation exposure in computed tomography examinations of adults

Table 1. Examinations refer to conventional CT examinations in the body part in question, and examination indications have not been taken into account for any part of the body.

Body area	**$CTDI_{vol}$ * mGy**	**DLP ** mGy·cm**
Head (brain)	55	800
Paranasal sinuses	13	190
Lungs	9	290
Abdomen	12	560
Body	12	770
Aorta (imaging area: neck–groin)	10	630

* $CTDI_{vol}$ is equal to $MSAD_w$ used in the earlier decision (19/310/07).
** DLP is equal to DLP_w used in the earlier decision (19/310/07).

Table 2. Examinations refer to conventional CT examinations done using the imaging indication mentioned, or named specific examination types.

Imaging indication / examination type	**$CTDI_{vol}$ * mGy**	**DLP ** mGy·cm**
Suspicion of lung tumour	11	430
HRCT examination of the lungs	5	140
Suspicion of urolithiasis	7	330
Suspicion of lymphoma	11	970
Trauma CT (body)	17	1300
CT colonography (prone)	6,5	prone + on back total 930
CT colonography (on back)	12	

* $CTDI_{vol}$ is equal to $MSAD_w$ used in the earlier decision (19/310/07).
** DLP is equal to DLP_w used in the earlier decision (19/310/07).

Reference levels for patient radiation exposure in computed tomography examinations of adults

Definition of reference level

Reference level refers to a predetermined X-ray examination radiation dose level that is not presumed to be exceeded in a procedure performed according to the standards of good practice upon a patient of normal size.

Use of reference levels

Reference levels can be used for detecting X-ray devices and practices that cause exceptionally high radiation exposures. Reference levels are not intended for limiting the radiation exposure of any individual patients but for comparing the average radiation exposure of a group of patients, selected as explained below, to the exposure caused by standard good practice.

If reference levels are exceeded, this does not necessarily mean that the examination has been improperly conducted. Exposures exceeding the reference levels may be expedient in order, for example, to achieve image quality which is better than usual. On the other hand, even if no reference levels are exceeded, this does not necessarily mean that the examination has been optimised for radiation safety. It is still necessary to ensure that image quality is sufficient for a reliable diagnosis and that the radiation exposure is not excessive.

Determining radiation exposure

Radiation exposure is measured or analytically estimated at least every three years. The exposure is defined for the most common examination types of each equipment for which a reference level has been provided. Radiation exposure is measured or analytically estimated for a group of at least ten patients. The weight of the patients shall be between 60–90 kg, with the exception of examinations in the head and face area, where no weight limits exist. An average radiation exposure is calculated for this group and compared to the reference level. The radiation exposure shall be redefined and compared anew to the reference level, if any changes or repairs that affect the radiation exposure are made to the examination procedure or equipment.

For the intermediary years, it is enough to ensure that radiation exposure has not changed and the quality of the images has not reduced. The confirmation is performed for each appliance using at least one of the most common examination types performed using the appliance for which a reference level has been provided.

Assessment of results, and corrective action

The radiation exposure data shall be saved, and it shall be systematically compared to the reference levels. If it is discovered that a reference level has been exceeded, the reason for the exceeding shall be determined and necessary action shall be taken to reduce the radiation exposure of the patients when required.

In this decision, $CTDI_{vol}$ refers to a quantity that is calculated based on the time-weighted average of the variable current. If the appliance defines the quantity in some other way, the indication of the equipment's dose display and the $CTDI_{vol}$ presented in the decision are not mutually comparable.