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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Diagnostic reference levels for adults in X-ray computed
tomography
(English Translation)**

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed by the National Health Standards Committee Radiological Health Standards Committee.

This standard was drafted. Beijing Tongren Hospital affiliated to Capital Medical University, Union Hospital of Tongji Medical College, Huazhong University of Science and Technology, China Peking Union Medical College Hospital of the Chinese Academy of Medical Sciences, Radiation Protection and Nuclear Safety Medical Institute of China Center for Disease Control and Prevention, Beijing Municipal Center for Disease Control and Prevention.

1 Scope

This standard gives a diagnostic reference level for radiation doses of common examination items in medical X-ray computed tomography (CT).

This standard applies to routine CT scans in adults and does not apply to adult health checkups and children's CT scans.

This standard does not apply to all types of cone beam CT scans.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document.

For undated references, the latest edition (including all amendments) applies to this document.

GB 17589 X-ray computed tomography device quality assurance test specification

3 Terms and definitions

The following terms and definitions apply to this document.

Diagnostic reference level, DRL A survey level used to optimize patient radiation protection, indicating that a CT test item is given to a medium-sized patient under normal conditions Whether the dose is abnormally high or abnormally low. Usually refers to a certain percentage of the radiation dose distribution of a patient in a country or region, generally as a non-A warning of normal high radiation dose levels (usually using 75% digits) can also be used as an abnormal low dose level (usually 25%) A hint of the number).

Weighted CT dose index weighted CT dosimetry index, CTDI_w the CTDI 100 collected at the center of the phantom is weighted and summed with the average value of the CTDI 100 collected at each peripheral point. The phantom refers to GB 17589.

$p_{100c}, 100w_3$

1 CTDI_{CTDI}CTDI = (1) in the formula.

CTDI_w-weighted CT dose index in milliGyre (mGy);

CTDI₁₀₀, c--CTDI₁₀₀ measured at the center point of the phantom, in milligrams (mGy);

CTDI₁₀₀, p--the average value of CTDI₁₀₀ measured at each point on the periphery of the phantom, in milligrams (mGy).

Volume CT dose index volume CT dosimetry index, CTDI_{vol} the average dose over the entire scan range in a CT scan. defined as.

$W_{vol} CTDI_d$

$TNCTDI$

In the formula.

CTDI_{vol}-volume CT dose index in milligrays (mGy);

CTDI_w-weighted CT dose index in milliGyre (mGy);

N -- the number of detectors selected;

T -- the width of each row of detectors, in millimeters (mm);

d -- The distance the bed is moved when the tube is rotated one revolution, in millimeters (mm).

Dose length product, Dose length product, DLP the volumetric CT dose index is the product of the scan length along the long axis of the human body. The formula is.

$LCTDI_{DLP} \times vol = (3)$

In the formula.

DLP - the dose length product in milligrain cm (mGy·cm);

CTDIvol-volume CT dose index in milligrays (mGy);

L -- The length of the scan along the long axis of the human body in centimeters (cm).

4 CT reference diagnostic reference level

The radiation dose and diagnostic reference level of common CT examination items in adult patients are shown in Table 1.

Table 1 Radiation dose and diagnostic reference level of common CT examination items in adult patients

Check item

25% digits a	50% digits b	75% digits c	CTDIvol mGy	DLP mGy·cm	CTDIvol mGy	DLP mGy·cm
Skull d	40	550	50	690	60	860
Sinus	15	170	25	330	40	520
Neck	10	260	15	370	25	590
Chest	6.200	8	300	15	470	Abdomen
10	330	15	500	20	790	Pelvic
10	320	15	480	20	700	Lumbar vertebrae (layer by layer)
15	70	25	130	35.200	Lumbar vertebrae (helical)	12
290	15	410	25	580	Urinary tract imaging	10
870	15	1780	20	2620	Coronary CTA (Foresight)	15
210	25	360	40	600	Coronary CTA (Review)	30
490	45	750	60	1030	Brain CTA	15
420	20	710	40	1390	Neck CTA	10
390	15	690	30	1130	Chest and abdomen CTA	10
450	15	870	20	1440	Note. CTA is an abbreviation for CT angiography.	

a 25% of the data of the survey, ie the level of abnormal low doses;

b 50% of the survey data, which may reach the level;

c 75% of the survey data, ie the diagnostic reference level;

d The head is CTDIw

5 Application of diagnostic reference level

5.1

In radiodiagnostic activities, the primary objective is to obtain acceptable image quality or adequate diagnostic information. Use diagnostic reference level Auxiliary management of the patient's radiation dose, matching the radiation dose with the purpose of clinical diagnosis, reducing the frequency of unjustified too high or too low dose.

5.2

Depending on the medical imaging task, each province or city may formulate the region according to the medical equipment conditions in the region and the conditions of the staff.

Diagnostic reference level.

5.3

Diagnostic reference levels provide a reasonable dose indication for a moderately sized patient population, not for doses in specific body types the test does not apply to individual patients.

5.4

The use unit shall perform a dose check of not less than 20 person-times for each common inspection item of each CT equipment.

5.5

In clinical practice, if the patient's dose often exceeds the corresponding diagnostic reference level, the medical procedure and equipment should be performed.

Check to determine if radiological protection is optimized; otherwise, it should be as low as possible while ensuring access to the necessary diagnostic information the dose of the person. If the patient's dose is generally less than 25% of the survey data, it is necessary to check if the CT scan can provide useful diagnosis.

Disrupt information and bring expected medical benefits to patients. Significant reduction in patient dosage if advanced imaging equipment or reconstruction algorithms are used Quantity (less than 25% of the survey data), image quality can meet the diagnostic needs, you can continue the medical task, otherwise it should be as needed Take corrective action.

5.6

Units with advanced imaging equipment technology or reconstruction algorithms and high level of radiological staff's business capability can be achieved according to possible levels (50% digits) Further measures to reduce radiation dose were taken to optimize the radiation protection of patients.

5.7

The diagnostic reference level should be revised periodically according to the technical level of the imaging equipment and the level of radiation protection knowledge of the operator. It is not Dosage limits cannot be used for legal, regulatory, and commercial purposes.

references

[1] European Commission (EC). Radiation Protection 109.Guidance on diagnostic reference levels (DRLs) for medical exposures.Directorate-General, Environment, Nuclear Safety and Civil Protection, 1999 [2] IAEA/RPOP.Information for health professionals. diagnostic reference levels (DRLs) in CT.

https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/1_Radiology