

Radiation Doses from Medical Diagnosis

Type of examination	Diagnostic reference levels ^{*1}	Actual exposure dose ^{*2}	
		Dose	Type of dose
General imaging: Front chest	0.4 mGy (less than 100 kV)	0.06 mSv	Effective dose
Mammography (mean glandular dose)	2.4 mGy	Around 2 mGy	Equivalent dose (Mean glandular dose)
Fluoroscopy	IVR (Interventional Radiology): Equipment reference fluoroscopic dose rate 17 mGy/min	Gastric fluoroscopy: 10 mSv/min (25 to 190 sec, varies depending on operators and subjects) ^{*3}	Effective dose
Dental imaging (Intraoral radiography)	From 1.0 mGy at the frontal teeth of the mandible to 2.0 mGy at the molar teeth of the maxilla (In either case, incident air kerma (Ka,i) [mGy] is measured)	Around 2 - 10 μSv	Effective dose
X-ray CT scan	Adult head simple routine: 77 mGy (CTDivol)	Around 5 - 30 mSv	Effective dose
	Child (age 5 - 9), head: 55 mGy (CTDivol)		
Nuclear scanning	Value for each radioactive medicine	Around 0.5 - 15 mSv	Effective dose
PET scan	Value for each radioactive medicine	Around 2 - 20 mSv	Effective dose

*1: "National Diagnostic Reference Levels in Japan (2020) (Japan DRLs 2020)," J-RIME, July 3, 2020 (partially updated on August 31, 2020) (<http://www.radher.jp/J-RIME/>)

*2: "Q&A on Medical Exposure Risks and Protection Regarding Medical Exposure from CT Scans, etc.," National Institutes for Quantum and Radiological Science and Technology (<https://www.qst.go.jp/site/qms/1889.html>)

*3: "Gastric Fluoroscopy" in "X-ray Medical Checkup" in "Basic Knowledge on Medical Radiation," Kitasato University Hospital, Radiology Department Prepared based on materials *1, *2 and *3 above

Exposure doses from radiological examinations vary by the types of examinations. Some examinations, such as dental imaging, only involve very slight, local exposure, while some other examinations, such as X-ray CT scans and nuclear scanning, involve relatively high exposure doses. Even with the same type of examination, doses could vary widely depending on the medical institution. It is therefore recommended to use diagnostic reference levels as criteria for determining whether doses might be too high for diagnosis. If the average radiation dose of a medical institution greatly deviates from the diagnostic reference levels, the International Commission on Radiological Protection (ICRP) recommends that irradiation conditions for the examination be reconsidered.

Some countries are already using the diagnostic reference levels. In Japan, the Japan Association of Radiological Technologists issued a medical exposure guideline (reduction targets) in 2000, in which they compiled values equivalent to the diagnostic reference levels. It was updated in 2006 as the 2006 medical exposure guideline. The Japan Network for Research and Information on Medical Exposures (J-RIME)^{*1} established Japan's first diagnostic reference levels based on the results of surveys conducted by participating organizations. For the latest diagnostic reference levels, the "National Diagnostic Reference Levels in Japan (2020) (Japan DRLs 2020)" was published on July 3, 2020 (partially updated on August 31, 2020).

*1: The Japan Network for Research and Information on Medical Exposures (J-RIME) started in 2010 as a base for establishing a medical exposure protection system that matches Japan's circumstances, by gathering expert opinions through cooperation from academic societies and associations, and collecting and sharing domestic and international research information on medical exposures. J-RIME's activities include collecting data on medical exposure, such as exposure doses from radiation therapy and risk assessment, to get a picture of medical exposures in Japan, and building an appropriate protection system for medical exposure in Japan while taking international trends into account (source: prepared based on <http://www.radher.jp/J-RIME/index.html>).

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