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### **Report on estimated doses for the case-control study subjects**

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## Table of contents

1.	Status report on data collection in the Case-Control study .....	2
2.	Method implemented for dose reconstruction .....	3
2.1	Data sources .....	3
2.2	Doses from computed tomography examinations (EPI-CT coding system) .....	3
2.3	Doses from X-rays diagnostic examinations.....	3
2.4	Doses from mammographic examinations.....	4
2.5	Doses from fluoroscopic examinations .....	4
2.6	Doses from nuclear medicine examinations .....	4
3.	References .....	5
4.	Annexes .....	26
	Annex 1: Classification of CT examinations based on EU Report RP154 (European Commission Radiation Protection, 2008).....	26

## List of tables

Table 1:	Proportion of active marrow by age and applied ratios to adult. ....	7
Table 2:	Look-up table of doses for all procedures performed in the case-control study.....	10

## 1. Status report on data collection in the Case-Control study

The case-control study of haematological malignancies and central nervous system tumours nested within the French and Spanish EPI-CT<sup>1</sup> cohorts was set-up within MEDIRAD to improve cancer risk estimates following low doses of ionising radiation (IR) from paediatric CTs (considering potential biasing factors that cannot be collected in a full cohort study). In the course of the project, the study was extended to include cases and controls from the Swedish EPI-CT cohort implementing a slightly different approach: data was obtained directly from medical records at Karolinska University Hospital.

The EPI-CT Nested Case-Control study (EPI-CT NCC) is based on contacting cancer cases from the EPI-CT cohorts and their matched controls to obtain information, from participants and their parents, on socioeconomic status, individual and familial medical history (including cancer and cancer predisposing conditions), lifestyle factors, such as smoking and alcohol drinking habits, ionising radiation exposure and, where applicable, occupational exposure. An on-line version of the questionnaires was developed for self-reporting by the participants. In parallel, cases and controls are asked if they agree to provide biological samples (saliva samples) in order to study potential markers of radiation sensitivity (exome sequencing and methylation profiling).

Contact with cases and controls was made in France with first letters sent early in 2019. The response rate was low and six cases and controls were recruited after further contact by phone. Out of the six participants, three provided answers to the questionnaire.

The situation in Spain has been difficult with major delays in contacting participants, as the letters have to be sent via the Ministries of Health, where addresses of patients are recorded. The Department of Public Health in Catalonia finally agreed on May 2<sup>nd</sup>, 2021 to take the responsibility of contacting patients specifically for the project. Contact letters will be sent as a priority and we hope to include participants in the coming weeks. In Madrid, the Health Agency sent the letters to contact patients on April 22<sup>nd</sup>, 2021. No replies have been received to date.

To compensate for the difficulties in setting-up the study in Spain, we have been able to set-up a case-control study nested in the EPI-CT Swedish cohort. Medical records of cases and controls were analysed to extract information on patient medical history including cancer and cancer predisposing conditions and exposure to medical ionising radiation.

The present report describes the method implemented to reconstruct brain and bone marrow doses associated with the examinations performed on the 201 cases and controls from Sweden and the three French cases and controls. The data will be updated as required following inclusion of Spanish participants.

Results are provided in the form of a look-up table (Table 2) from which doses could be extracted and imputed to all exams performed on cases and controls.

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<sup>1</sup> European Epidemiological Study to Quantify Risks for Paediatric Computerized Tomography (EPI-CT) (see <http://epi-ct.iarc.fr/>)

## 2. Method implemented for dose reconstruction

### 2.1 Data sources

#### [Data from French questionnaire](#)

Three participants from France filled-in the online questionnaire. All three confirmed having been scanned with at least one head CT examination scan and one participant reported one scan of the thoracic spine.

Two participants reported X-ray diagnostic examinations of the head, orbits, thorax, thoracic spine and shoulder.

One patient reported one interventional radiology procedure in the head region.

#### [Data from hospital registry in Sweden](#)

Data collected in the radiology department of Karolinska University Hospital were grouped in the following categories: CT scans examination, X-ray diagnostic examinations, fluoroscopic examinations and nuclear medicine. They were coded by anatomical region to follow the coding strategy implemented within the EPI-CT study (See Annex 1) and they were grouped by time period. For nuclear medicine, information on tracers was also considered as the organ doses depends on injected activity of specific tracers.

### 2.2 Doses from computed tomography examinations (EPI-CT coding system)

For each CT examination type (corresponding to an anatomical region) and time period, doses to active/bone marrow and brain were extracted from the EPI-CT dataset (*Thierry-Chef 2021*). Doses for the period 2011-2015 were also used after 2015. Doses will be updated after we received recent data from the Catalan Health Agency. We estimated an overall average dose (Bone Marrow (BM) or Brain) by examination type, time period and for six ages categories as defined in EPI-CT:

- Newborn (0 to 3 months) with corresponding weight category (3-6 kg)
- 1 year (4 to 30 months) with corresponding weight category (7-13 kg)
- 5 years (31 to 90 months) with corresponding weight category (14-22 kg)
- 10 years (91 to 150 months) with corresponding weight category (23-42 kg)
- 15 years (151 to 210 months) with corresponding weight category (43-55 kg)
- adult (>210 months) with corresponding weight category (56+ kg)

### 2.3 Doses from X-rays diagnostic examinations

Our estimation of doses for the large number of X-ray procedures performed since the late 1980s relies on the work performed by Melo et al. (*Melo et al., 2016*). In her publication, Melo provides historical doses for a series of organs for 14 types of examinations covering a period of eight decades. Doses for combinations of exams were estimated as the sum of doses for each individual anatomical zone.

#### [Dose to the brain](#)

Complementary to the data provided by Melo et al., we extracted brain doses, mainly for paediatric examinations, from the work performed by Pasqual et al. (*Pasqual et al., 2020*). Brain dose from mandibula was obtained from on-phantom study (*Ngan et al., 2003*). Dose to the brain from shoulder and clavícula examinations were considered to be 20% lower than dose to the neck (ITC expert opinion).

Dose to the brain for examinations other than those located in the head, neck and shoulder of the patients was considered null.

#### [Dose to active marrow](#)

Data provided by Melo et al. (*Melo et al., 2016*), were completed by data published by Preston-Martin in her manuscript devoted specifically to bone marrow doses for a very inclusive set of medical ionising radiation procedures (*Preston-Martin and Pogoda, 2003*). Data published by Archer et al. (*Archer et al., 1979*) were used to report bone marrow dose from shoulder and clavicle examinations.

Bone marrow doses could only be retrieved for adult patients. Doses for paediatric patients were derived from doses to adults, using the ratio of the proportion of bone marrow in various body regions depending on age (*Bolch et al., 2020*). Ratios used in the study are provided in Table 1 below.

### 2.4 Doses from mammographic examinations

We have records of mammographic examinations for nine patients in total. Dose to brain was considered null. Dose to bone marrow was taken from Sechopoulos et al. (*Sechopoulos et al., 2008*).

### 2.5 Doses from fluoroscopic examinations

Doses to the brain were estimated from previous work performed on a cohort of paediatric patients treated in neuroradiology (*Thierry-Chef et al., 2008*). Doses used were those estimated for narrow fields focused on the centre of the brain, and sensitivity analyses could be performed as several conditions of exposure were simulated.

Doses to active marrow from fluoroscopic examinations were extracted from Von Boetticher et al. (*von Boetticher and Hoffmann, 2007*) and Preston-Martin et al. (*Preston-Martin and Pogoda, 2003*) for adults. Since doses to paediatric patients could not be retrieved easily, a strategy similar to the one implemented for X-rays, based on proportion of active marrow in various body region by age (Table 1), was applied as first estimation. For paediatric fluoroscopic procedures performed recently, we report doses extracted from Marshall et al. (*Marshall et al., 2019*) who published a database for organ dose estimation for paediatric fluoroscopic procedures.

### 2.6 Doses from nuclear medicine examinations

Our estimation of doses from nuclear medicine procedures is based on published guidelines on recommended injected activity per kg (*Harris et al., 2013; Jacobs et al., 2005; Lassmann et al., 2014, 2007; Stauss et al., 2008*) combined with published organ dose conversion coefficients (*ICRP, 1987, 1991, 1998, 2008; Mattsson et al., 2015*). We considered the average weight in each age category. Doses were estimated for the conditions of interest for the study – specific age for each examination (highlighted in grey in Table 2). Doses reported here will be summed up with doses from CT where appropriate.

Based on a comparison between adult activities recommended in Piepsz et al. (*Piepsz et al., 1990*) and those recommended by the EANM – European Association of Nuclear Medicine (*Lassmann et al., 2014, 2007*) which reported very similar activities and the statement that there were no standards for dose administered in children in the late 1980's, we also used the recommended values from EANM for the earlier period. Our assumption is also based on the statement by Piepsz et al. (*Piepsz et al., 1990*) that 3 models were in place depending on age, weight and body surface area.

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Table 1: Proportion of active marrow by age and applied ratios to adult.

BODY PART	PROPORTION OF ACTIVE MARROW BY AGE						RATIO OF ACTIVE MARROW BY AGE					
	0	1	5	10	15	Adult	0	1	5	10	15	Adult
<i>Cranium</i>	0,241	0,327	0,325	0,175	0,109	0,038	6,310	8,565	8,513	4,585	2,853	1
<i>Mandible</i>	0,043	0,017	0,021	0,011	0,009	0,008	5,152	1,987	2,526	1,288	1,053	1
<i>Scapulae</i>	0,032	0,034	0,040	0,045	0,033	0,079	0,410	0,430	0,513	0,569	0,417	1
<i>Clavicles</i>	0,012	0,004	0,008	0,009	0,008	0,010	1,251	0,448	0,821	0,941	0,774	1
<i>Sternum</i>	0,005	0,005	0,011	0,016	0,018	0,022	0,230	0,245	0,508	0,731	0,818	1
<i>Ribs</i>	0,163	0,151	0,085	0,095	0,099	0,109	1,493	1,381	0,779	0,869	0,911	1
<i>Cervical spine</i>	0,037	0,027	0,015	0,020	0,028	0,031	1,200	0,868	0,490	0,649	0,913	1
<i>Thoracic spine</i>	0,052	0,094	0,096	0,153	0,119	0,122	0,422	0,773	0,782	1,248	0,975	1
<i>Lumbar spine</i>	0,047	0,052	0,064	0,104	0,132	0,161	0,292	0,326	0,397	0,643	0,822	1
<i>Sacrum</i>	0,019	0,036	0,043	0,040	0,062	0,070	0,270	0,514	0,616	0,571	0,891	1
<i>Pelvis (or Os Coxae)</i>	0,063	0,101	0,114	0,181	0,233	0,247	0,256	0,408	0,461	0,734	0,945	1
<i>Femora, upper half</i>	0,045	0,021	0,035	0,049	0,081	0,064	0,706	0,333	0,557	0,776	1,276	1
<i>Femora, lower half</i>	0,045	0,024	0,033	0,028	0,007	0,000						0
<i>Tibiae, fibulae and patellae</i>	0,060	0,026	0,038	0,025	0,000	0,000						0
<i>Ankles and foot bones</i>	0,038	0,025	0,018	0,000	0,000	0,000						0
<i>Humeri, upper half</i>	0,026	0,019	0,023	0,030	0,058	0,039	0,658	0,484	0,587	0,779	1,491	1
<i>Humeri, lower half</i>	0,021	0,011	0,014	0,011	0,003	0,000						0
<i>Ulnae and radii</i>	0,027	0,008	0,012	0,007	0,000	0,000						0
<i>Wrists and hand bones</i>	0,024	0,017	0,004	0,000	0,000	0,000						0
<b>COMBINATIONS OF BODY PARTS</b>												
<i>Head and neck</i>	0,279	0,354	0,341	0,195	0,137	0,069	4,018	5,113	4,914	2,820	1,983	1
<i>Neck + chest</i>	0,200	0,178	0,100	0,115	0,128	0,140	1,428	1,267	0,715	0,821	0,911	1
<i>Neck + chest + abdomen</i>	0,247	0,230	0,164	0,219	0,260	0,301	0,820	0,764	0,545	0,726	0,863	1
<i>Chest + abdomen</i>	0,210	0,203	0,149	0,198	0,232	0,270	0,777	0,752	0,552	0,734	0,858	1
<i>Chest + abdomen + pelvis</i>	0,273	0,304	0,263	0,380	0,465	0,517	0,528	0,588	0,508	0,734	0,899	1
<i>Whole spine</i>	0,136	0,174	0,175	0,276	0,280	0,314	0,432	0,553	0,556	0,879	0,891	1
<i>Thoracic lumbar spine</i>	0,099	0,147	0,159	0,256	0,252	0,283	0,348	0,519	0,563	0,904	0,888	1



<i>Neck to pelvis</i>	0,310	0,331	0,278	0,400	0,493	0,548	0,566	0,604	0,507	0,729	0,900	1
<i>Skull and facial bones + clavicle</i>	0,253	0,332	0,333	0,184	0,117	0,048	5,281	6,914	6,949	3,844	2,430	1
<i>Cervical + thoracic spine</i>	0,089	0,121	0,111	0,173	0,148	0,153	0,580	0,792	0,722	1,127	0,963	1
<i>Cervical spine + chest/thorax + pelvic bones</i>	0,263	0,278	0,214	0,296	0,361	0,387	0,680	0,719	0,553	0,765	0,933	1
<i>Cervical spine + chest/thorax + leg</i>	0,388	0,274	0,224	0,218	0,216	0,204	1,902	1,345	1,098	1,069	1,059	1
<i>Cervical spine + chest/thorax + ankle</i>	0,238	0,203	0,118	0,115	0,128	0,140	1,695	1,448	0,840	0,821	0,911	1
<i>Cervical spine + chest/thorax + foot</i>	0,238	0,203	0,118	0,115	0,128	0,140	1,695	1,448	0,840	0,821	0,911	1
<i>Cervical spine + lumbar spine + pelvic bones</i>	0,147	0,180	0,193	0,305	0,394	0,439	0,336	0,410	0,440	0,695	0,898	1
<i>Cervical spine + lumbar spine + hand</i>	0,109	0,096	0,083	0,124	0,161	0,192	0,565	0,502	0,435	0,644	0,837	1
<i>Shoulder + cervical spine</i>	0,070	0,061	0,056	0,065	0,061	0,110	0,633	0,554	0,506	0,592	0,557	1
<i>Cervical spine + hand</i>	0,062	0,044	0,020	0,020	0,028	0,031	1,978	1,417	0,628	0,649	0,913	1
<i>Thoracic spine + chest/thorax</i>	0,214	0,245	0,181	0,247	0,219	0,231	0,927	1,059	0,780	1,069	0,945	1
<i>Thoracic spine + pelvic bones + lumbar spine</i>	0,162	0,248	0,273	0,437	0,485	0,530	0,305	0,467	0,516	0,825	0,915	1
<i>Chest+thorax + Pelvic bones</i>	0,226	0,251	0,199	0,276	0,333	0,356	0,635	0,706	0,559	0,775	0,935	1
<i>Chest/thorax + shoulder</i>	0,195	0,184	0,125	0,140	0,132	0,188	1,039	0,982	0,667	0,743	0,704	1
<i>Chest/thorax + arm</i>	0,261	0,205	0,139	0,144	0,160	0,148	1,759	1,385	0,936	0,969	1,082	1
<i>Wrist + Lungs</i>	0,187	0,168	0,089	0,095	0,099	0,109	1,714	1,537	0,818	0,869	0,911	1
<i>Lungs + thoracic lumbar spine</i>	0,261	0,297	0,244	0,351	0,351	0,392	0,666	0,758	0,623	0,894	0,894	1
<i>Lumbar spine + pelvic bones</i>	0,110	0,153	0,178	0,285	0,366	0,408	0,270	0,376	0,436	0,698	0,896	1
<i>Lumbar spine + pelvic bones + hand</i>	0,134	0,170	0,182	0,285	0,366	0,408	0,329	0,417	0,446	0,698	0,896	1
<i>Lumbar spine + leg</i>	0,197	0,124	0,170	0,206	0,220	0,225	0,877	0,551	0,756	0,919	0,981	1
<i>Lumbar spine + knee</i>	0,047	0,052	0,064	0,104	0,132	0,161	0,292	0,326	0,397	0,643	0,822	1
<i>Lumbar spine + foot</i>	0,085	0,078	0,082	0,104	0,132	0,161	0,525	0,483	0,506	0,643	0,822	1
<i>Pelvic bones + arm</i>	0,137	0,138	0,163	0,230	0,294	0,286	0,478	0,484	0,571	0,804	1,029	1
<i>Pelvic bones + hand + leg</i>	0,237	0,189	0,224	0,284	0,321	0,310	0,764	0,609	0,722	0,915	1,035	1
<i>Pelvic bones + leg</i>	0,213	0,172	0,220	0,284	0,321	0,310	0,686	0,554	0,708	0,915	1,035	1
<i>Pelvic bones + thigh</i>	0,108	0,122	0,149	0,231	0,314	0,310	0,348	0,393	0,481	0,743	1,013	1
<i>Pelvic bones + knee</i>	0,063	0,101	0,114	0,181	0,233	0,247	0,256	0,408	0,461	0,734	0,945	1
<i>Pelvic bones + foot</i>	0,101	0,126	0,131	0,181	0,233	0,247	0,408	0,511	0,532	0,734	0,945	1

<i>Whole spine + pelvic bones</i>	0,199	0,275	0,289	0,457	0,513	0,561		0,355	0,489	0,514	0,815	0,914	1
<i>Pelvic bones + thoracic lumbar spine</i>	0,162	0,248	0,273	0,437	0,485	0,530		0,305	0,467	0,516	0,825	0,915	1
<i>Shoulder + abdomen</i>	0,079	0,086	0,104	0,148	0,165	0,240		0,331	0,360	0,435	0,619	0,689	1
<i>Shoulder + clavicle</i>	0,045	0,038	0,048	0,054	0,040	0,089		0,503	0,432	0,547	0,610	0,456	1
<i>Whole spine + shoulder</i>	0,168	0,208	0,215	0,321	0,313	0,393		0,428	0,528	0,547	0,817	0,796	1
<i>Whole spine + leg</i>	0,286	0,245	0,281	0,379	0,368	0,378		0,756	0,649	0,743	1,003	0,974	1
<i>Whole spine + foot</i>	0,173	0,199	0,192	0,276	0,280	0,314		0,552	0,634	0,612	0,879	0,891	1

Table 2: Look-up table of doses for all procedures performed in the case-control study.

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
<b>CT (see Thierry-Chef 2021) - values extracted from the data</b>															
Period of examination															
1996	2000	Chest/thorax (doseplan for radiotherapy)	32	16,000	1,930	12,700	1,060	10,200	1,080	10,600	1,110	9,390	0,720	8,490	0,520
2006	2010	Chest/thorax (doseplan for radiotherapy)	32	8,220	0,994	4,950	0,408	4,270	0,452	5,530	0,578	7,120	0,527	7,790	0,483
2011	2015	Brain (doseplan for radiotherapy)	12	13,400	32,600	14,200	32,500	14,500	42,600	9,650	46,500	5,810	43,700	3,510	43,300
2011	2015	Head + Neck (doseplan for radiotherapy)	12	13,400	32,600	14,200	32,500	14,500	42,600	9,650	46,500	5,810	43,700	3,510	43,300
2011	2015	Chest/thorax (doseplan for radiotherapy)	32	6,220	0,746	3,910	0,320	3,470	0,367	4,430	0,464	6,070	0,443	7,330	0,450
2011	2015	Limbs (doseplan for radiotherapy)	61	1,760	0,058	2,090	0,025	2,480	0,025	1,830	0,023	1,130	0,030	0,905	0,024
2016	2020	Brain (doseplan for radiotherapy)		13,400	32,600	14,200	32,500	14,500	42,600	9,650	46,500	5,810	43,700	3,510	43,300
1988	1990	Head and Neck	71	NA	NA	45,000	11,300	NA	NA	36,100	10,900	22,500	26,600	37,800	12,800
1991	1995	Brain	12	21,200	58,400	21,200	52,700	17,500	51,900	10,300	51,000	6,340	48,600	3,410	46,400
1991	1995	Sinus	131	13,900	27,500	14,500	34,500	9,970	36,400	6,370	38,900	4,460	40,800	2,150	37,900
1991	1995	Head + Neck	71	42,800	59,800	33,300	34,200	20,600	45,500	19,500	37,600	13,900	35,000	9,410	32,000
1991	1995	Chest/Thorax	32	25,300	3,020	21,300	1,760	14,100	1,500	12,700	1,330	11,700	0,800	12,200	0,700
1991	1995	Abdomen	42	9,480	0,300	11,800	0,200	10,500	0,190	10,400	0,100	10,600	0,050	11,600	0,040
1991	1995	Lumbar spine	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1991	1995	Limbs	61	NA	NA	2,500	0,100	2,810	0,070	2,140	0,080	1,940	0,060	1,340	0,050
1991	1995	Chest + Abdomen	75	31,000	3,320	29,800	1,960	23,500	1,690	20,000	1,430	18,500	0,850	21,200	0,740
1991	1995	Head to abdomen	782	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1991	1995	Not classifiable													
1996	2000	Brain	12	19,800	54,500	20,300	50,200	16,500	49,300	9,860	48,800	6,000	46,100	3,270	43,600
1996	2000	Skull & facial bones	11	21,400	60,300	21,900	52,400	19,700	54,700	11,900	53,300	7,350	50,500	4,090	47,300
1996	2000	Sinus	131	10,500	50,800	10,800	25,900	8,300	30,000	5,300	32,200	4,080	37,500	1,980	35,000
1996	2000	Internal auditory meatus	132	14,100	37,000	19,100	24,800	7,710	27,800	4,680	30,300	3,550	25,300	2,370	28,500

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
1996	2000	Head and Neck	71	34,000	36,200	28,500	38,900	24,000	38,700	21,100	35,400	18,800	35,100	12,200	30,900
1996	2000	Temporal/mandibular joint	114	NA	NA	12,300	21,300	10,900	24,700	8,700	43,500	5,330	31,100	2,750	24,600
1996	2000	Cervical spine	21	11,200	6,530	7,140	6,810	6,570	10,200	NA	NA	NA	NA	NA	NA
1996	2000	Limbs	61	4,370	0,200	2,160	0,050	2,500	0,090	1,860	0,070	1,410	0,050	1,060	0,040
1996	2000	Chest/Thorax	32	16,000	1,930	12,700	1,060	10,200	1,080	10,600	1,110	9,390	0,720	8,490	0,520
1996	2000	Thoracic spine	31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1996	2000	Abdomen	42	7,770	0,310	7,600	0,160	7,820	0,140	11,300	0,100	11,100	0,050	11,900	0,040
1996	2000	Limbs	61	4,370	0,200	2,160	0,050	2,500	0,090	1,860	0,750	1,410	0,050	1,060	0,040
1996	2000	Hip/Pelvic Bones	511	5,500	0,090	6,750	0,040	6,990	0,030	9,520	0,010	10,000	0,010	8,760	0,008
1996	2000	Neck + chest + abdomen	73	NA	NA	22,800	7,770	16,700	7,350	27,100	29,000	19,700	15,900	12,600	22,000
1996	2000	Neck to pelvis	74	NA	NA	24,000	4,390	NA	NA	NA	NA	NA	NA	13,300	25,600
1996	2000	Chest + Abdomen	75	27,600	2,240	26,200	1,220	34,400	1,220	23,000	1,210	20,000	0,770	19,900	0,560
1996	2000	Head to abdomen	782	NA	NA	44,500	42,800	36,200	39,100	30,400	38,000	29,200	37,500	NA	NA
1996	2000	Head to abdomen + Lower leg	79-782-619	10,400	6,390	7,960	5,360	5,840	3,220	3,670	2,700	1,970	1,550	7,340	9,280
1996	2000	Pelvic bones + Knee + Ankle	79-51-618-621	13,200	6,390	1,360	0,017	4,300	1,700	1,940	0,953	0,806	0,602	2,460	3,740
1996	2000	Pelvic bones + Lumbar spine	79-51-41	47,500	44,400	9,040	0,053	22,900	21,800	20,600	24,100	22,200	19,600	15,100	19,100
1996	2000	Head + Chest/Thorax	79-1-32	20,300	41,400	19,200	38,100	15,400	38,300	10,000	40,200	6,860	40,500	4,350	44,500
2001	2005	Brain	12	18,700	50,700	18,700	45,300	16,000	47,400	9,820	48,400	6,070	45,600	3,440	43,500
2001	2005	Skull & facial bones	11	22,300	66,200	22,100	53,600	19,300	54,200	11,900	54,300	7,040	50,700	4,560	48,200
2001	2005	Sinus	131	7,310	14,300	6,880	16,400	4,980	18,1	3,830	23,400	2,910	27,100	1,400	24,500
2001	2005	Neck	22	18,000	10,000	11,500	10,600	9,340	15,400	6,270	14,000	5,110	8,970	4,820	12,200
2001	2005	Head and Neck	71	24,900	27,500	23,500	28,800	20,000	33,400	18,100	35,100	18,300	32,900	16,300	23,000
2001	2005	Cervical spine	21	11,700	6,740	8,030	8,630	6,990	12,200	5,140	13,400	NA	NA	NA	NA
2001	2005	Limbs	61	3,920	0,060	2,410	0,040	2,730	0,040	2,130	0,050	1,500	0,040	1,240	0,040
2001	2005	Chest/Thorax	32	12,500	1,490	8,660	0,710	6,350	0,670	8,350	0,860	8,060	0,590	8,190	0,500
2001	2005	Abdomen	42	6,400	0,270	6,620	0,140	5,530	0,100	8,500	0,080	10,300	0,050	11,500	0,040
2001	2005	Hip/pelvic bone	511	4,540	0,800	5,610	0,040	5,700	0,020	8,400	0,010	9,510	0,010	7,820	0,007
2001	2005	Whole Body	78	29,000	43,000	27,500	35,100	24,100	37,500	20,900	40,000	18,800	35,500	16,100	30,200

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2001	2005	Chest + Abdomen	75	23,800	1,760	20,300	0,850	18,700	0,770	19,300	0,940	19,500	0,640	19,700	0,540
2001	2005	Neck + chest + abdomen	73	19,800	45,000	25,700	25,000	23,200	34,000	22,500	34,300	18,000	30,400	13,400	16,800
2001	2005	Head + Neck	71	24,900	27,500	23,500	28,800	20,000	33,400	18,100	35,100	18,300	32,900	16,300	23,000
2001	2005	Head to Thorax	781	NA	NA	29,600	38,800	24,600	37,000	19,200	38,400	19,800	43,200	NA	NA
2001	2005	Head to abdomen	782	34,100	42,200	37,600	37,300	30,200	35,600	30,100	38,600	28,200	38,800	25,100	37,900
2001	2005	Head to pelvis	783	24,900	26,700	19,900	20,100	13,400	15,200	27,400	32,600	30,900	39,600	22,000	27,600
2001	2005	Head to abdomen + Knee	79-782-618	24,000	32,500	18,500	17,100	12,800	14,300	5,960	5,220	3,570	3,240	7,480	6,570
2001	2005	Head + Abdomen	79-1-42	20,700	52,600	19,900	45,900	15,400	42,300	10,000	45,500	6,960	42,600	5,010	42,100
2001	2005	Head + Chest	79-1-32	18,000	33,800	15,900	29,400	11,900	25,800	9,610	34,600	6,980	33,900	4,820	39,500
		Head + Chest + Abdomen	79-1-32-42	17,400	31,900	15,400	27,700	11,300	23,500	9,540	32,200	7,260	31,100	5,530	35,300
2006	2010	Brain	12	14,100	36,500	15,100	35,700	14,600	43,500	9,370	46,300	5,870	44,400	3,500	43,600
2006	2010	Skull & facial bones	11	15,400	45,500	17,000	41,100	17,500	48,200	11,000	50,800	6,520	47,500	4,380	45,800
2006	2010	Sinus	131	5,510	11,000	5,760	13,700	3,980	14,700	3,110	18,900	2,210	20,800	1,090	18,400
2006	2010	Neck	22	12,800	7,240	9,180	9,170	8,780	14,600	6,280	15,000	5,210	9,560	5,100	12,800
2006	2010	Temporal/mandibular joint	114	12,100	17,900	10,000	16,300	7,500	18,700	7,040	33,800	4,670	29,100	3,100	27,400
2006	2010	Cervical spine	21	8,530	4,940	7,080	7,210	7,200	12,300	5,640	14,500	NA	NA	NA	NA
2006	2010	Chest/Thorax	32	8,220	0,994	4,950	0,408	4,270	0,452	5,530	0,578	7,120	0,527	7,790	0,483
2006	2010	Thoracic spine	31	NA	NA	NA	NA	3,920	0,398	7,540	0,852	6,100	0,487	7,250	0,450
2006	2010	Abdomen	42	6,460	0,277	5,150	0,113	4,620	0,084	7,200	0,073	10,600	0,052	11,200	0,040
2006	2010	Limbs	61	3,580	0,080	1,860	0,036	2,470	0,030	1,910	0,042	1,240	0,035	1,030	0,031
2006	2010	Head to abdomen	782	22,100	26,600	20,900	21,700	21,100	24,800	25,700	32,500	27,400	36,700	25,100	36,100
2006	2010	Head to Pelvis	783	14,200	15,900	15,600	15,100	14,300	16,500	18,800	23,600	27,500	36,700	24,800	34,400
2006	2010	Head + Neck	71	15,100	25,400	16,400	27,800	14,900	29,900	14,100	35,700	13,700	36,600	10,100	38,000
2006	2010	Chest + Abdomen	75	14,700	1,271	13,400	0,521	13,600	0,536	15,000	0,651	18,100	0,579	20,300	0,523
2006	2010	Neck + chest + abdomen	73	14,300	28,000	13,800	18,200	15,000	20,000	16,000	24,600	16,600	19,900	18,900	12,000
2006	2010	Missing values	9	13,200	24,400	13,000	25,100	12,300	60,500	9,620	33,500	7,030	33,600	5,120	33,300
2006	2010	Neck + Abdomen	79-22-42	8,690	3,130	7,100	4,320	6,570	6,250	7,650	5,070	9,890	3,360	1,500	2,990
2006	2010	Head + Chest/Thorax	79-1-32	11,000	17,200	10,000	17,700	8,340	16,300	7,690	24,800	6,660	26,000	4,930	32,400

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2006	2010	Neck+chest	72	21,020	8,234	14,130	9,578	13,050	15,052	11,810	15,578	12,330	10,087	12,890	13,283
2011	2015	Brain	12	13,400	32,600	14,200	32,500	14,500	42,600	9,650	46,500	5,810	43,700	3,510	43,300
2011	2015	Skull & facial bones	11	13,400	40,000	15,500	38,000	17,500	48,000	11,100	52,000	6,770	50,500	5,170	51,300
2011	2015	Sinus	131	4,080	8,260	4,210	10,300	3,720	13,700	2,470	15,300	1,610	15,400	0,959	15,700
2011	2015	Cervical spine	21	9,100	5,240	7,070	7,740	7,480	13,400	5,890	16,500	NA	NA	NA	NA
2011	2015	Limbs	61	1,760	0,058	2,090	0,025	2,480	0,025	1,830	0,023	1,130	0,030	0,905	0,024
2011	2015	Chest/Thorax	32	6,220	0,746	3,910	0,320	3,470	0,367	4,430	0,464	6,070	0,443	7,330	0,450
2011	2015	Thoracic spine	31	NA	NA	NA	NA	NA	NA	9,590	1,020	6,690	0,491	7,340	0,465
2011	2015	Abdomen	42	6,850	0,301	4,540	0,098	4,190	0,079	6,990	0,072	10,300	0,052	11,300	0,041
2011	2015	Limbs	61	1,760	0,058	2,090	0,025	2,480	0,025	1,830	0,023	1,130	0,030	0,905	0,024
2011	2015	Whole Body	78	14,700	20,000	14,800	16,000	13,800	25,300	13,900	30,200	21,000	30,700	22,300	16,400
2011	2015	Neck + chest + abdomen	73	10,700	NA	12,700	22,200	11,200	36,600	13,600	24,400	19,200	26,700	20,700	27,500
2011	2015	Head to abdomen	782	18,600	20,500	15,700	15,900	17,100	19,500	22,000	28,000	25,500	33,300	22,600	31,500
2011	2015	Missing values	9	13,000	26,600	13,900	26,800	13,200	31,800	11,000	35,900	8,130	33,100	5,830	31,300
2011	2015	Chest + Abdomen	75	11,400	1,047	12,000	0,418	13,100	0,446	12,800	0,536	14,800	0,495	18,600	0,491
2011	2015	Neck + Chest	72	8,680	4,810	12,200	10,400	12,200	11,800	13,200	18,900	16,800	18,300	19,400	7,430
2011	2015	Head + Neck	71	11,900	16,600	13,600	20,300	14,200	27,900	13,000	33,100	12,500	33,400	14,600	27,000
2011	2015	Head to pelvis	783	14,300	16,300	14,500	14,500	14,200	16,400	17,900	22,800	25,200	33,700	25,600	36,100
2011	2015	Whole spine	731	18,900	4,640	12,700	2,620	12,000	4,630	17,800	5,770	22,500	5,490	24,900	7,960
2011	2015	Head + abdomen	79-1-42	11,800	29,800	13,000	30,000	12,100	32,500	8,620	35,600	7,060	31,300	4,790	33,100
2016	2020	Brain	12	13,400	32,600	14,200	32,500	14,500	42,600	9,650	46,500	5,810	43,700	3,510	43,300
2016	2020	Sinus	131	4,080	8,260	4,210	10,300	3,720	13,700	2,470	15,300	1,610	15,400	0,959	15,700
2016	2020														
2016	2020	Temporal/mandibular joint	114	NA	NA	10,300	16,000	6,880	17,000	7,130	34,300	4,540	28,300	3,000	27,300
2016	2020	Cervical spine	21	9,100	5,240	7,070	7,740	7,480	13,400	5,890	16,500	NA	NA	NA	NA
2016	2020	Limbs	61	1,760	0,058	2,090	0,025	2,480	0,025	1,830	0,023	1,130	0,030	0,905	0,024
2016	2020	Chest/Thorax	32	6,220	0,746	3,910	0,320	3,470	0,367	4,430	0,464	6,070	0,443	7,330	0,450
2016	2020	Abdomen	42	6,850	0,301	4,540	0,098	4,190	0,079	6,990	0,072	10,300	0,052	11,300	0,041

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2016	2020	Lumbar spine	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2016	2020	Whole spine	731	18,900	4,640	12,700	2,620	12,000	4,630	17,800	5,770	22,500	5,490	24,900	7,960
2016	2020	Limbs	61	1,760	0,058	2,090	0,025	2,480	0,025	1,830	0,023	1,130	0,030	0,905	0,024
2016	2020	Whole Body	78	14,700	20,000	14,800	16,000	13,800	25,300	13,900	30,200	21,000	30,700	22,300	16,400
2016	2020	Chest + Abdomen	75	11,400	1,047	12,000	0,418	13,100	0,446	12,800	0,536	14,800	0,495	18,600	0,491
2016	2020	Neck + Chest	72	8,680	4,810	12,200	10,400	12,200	11,800	13,200	18,900	16,800	18,300	19,400	7,430
2016	2020	Head + Neck	71	11,900	16,600	13,600	20,300	14,200	27,900	13,000	33,100	12,500	33,400	14,600	27,000
2016	2020	Not classifiable													
2016	2020	Head to pelvis	783	14,300	16,300	14,500	14,500	14,200	16,400	17,900	22,800	25,200	33,700	25,600	36,100
2016	2020	Head to abdomen	782	18,600	20,500	15,700	15,900	17,100	19,500	22,000	28,000	25,500	33,300	22,600	31,500
2016	2020	Head to Thorax	781	18,120	17,346	17,510	20,620	17,670	28,267	17,430	33,564	18,570	33,843	21,930	27,450
2016	2020	Head + Chest/Thorax	79-1-32	19,620	33,346	18,110	32,820	17,970	42,967	14,080	46,964	11,880	44,143	10,840	43,750

#### X-rays (Melo 2016, Pasqual 2020, Ngan 2003, Preston-Martin 2003, Archer 1979, ICRP-143)

1988	1990	Head and Neck	1071	2,009	2,430	2,556	1,530	2,457	1,150	1,410	1,060	0,991	0,970	0,500	3,400
1988	1990	Chest/thorax	1032	0,284	0,000	0,262	0,000	0,148	0,000	0,165	0,000	0,173	0,000	0,190	0,000
1988	1990	Thoracic spine	1031	0,177	0,000	0,325	0,000	0,328	0,000	0,524	0,000	0,410	0,000	0,420	0,000
1988	1990	Abdomen	1042	0,096	0,000	0,107	0,000	0,131	0,000	0,212	0,000	0,271	0,000	0,330	0,000
1988	1990	Limbs (not specified)	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1988	1990	Pelvis	1051	1,048	0,000	1,673	0,000	1,891	0,000	3,010	0,000	3,874	0,000	4,100	0,000
1991	1995	Head and Neck=head	1071	1,085	0,430	1,380	0,930	1,327	0,700	0,761	0,680	0,535	0,740	0,270	1,500
1991	1995	Skull and facial bones	1011	1,136	0,430	1,542	0,930	1,532	0,700	0,825	0,680	0,514	0,740	0,180	1,500
1991	1995	Sinus	1131	NA	0,150	NA	0,150	NA	0,150	NA	0,210	NA	0,350	0,130	0,480
1991	1995	Neck	1022	0,360	0,010	0,260	0,010	0,147	0,010	0,195	0,010	0,274	0,010	0,300	0,010
1991	1995	Cervical spine	1021	0,060	0,020	0,043	0,020	0,024	0,020	0,032	0,020	0,046	0,030	0,050	0,030
1991	1995	Arm (includes multiple)	1612	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1991	1995	Leg (includes multiple)	1616	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
1991	1995	Chest/thorax	1032	0,134	0,000	0,124	0,000	0,070	0,000	0,078	0,000	0,082	0,000	0,090	0,000
1991	1995	Abdomen	1042	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
1991	1995	Lumbar spine	1041	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
1991	1995	Pelvis	1051	0,028	1,000	0,045	1,000	0,051	1,000	0,081	1,000	0,104	0,000	0,110	0,000
1991	1995														
1991	1995	Cervical spine + lumbar spine + pelvic bones	1079-21-41-51	0,275	0,020	0,337	0,020	0,361	0,020	0,570	0,020	0,736	0,030	0,820	0,030
1991	1995	Chest + abdomen	1075	0,225	0,000	0,218	0,000	0,160	0,000	0,213	0,000	0,249	0,000	0,290	0,000
1991	1995	Foot + ankle	1079-621-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1991	1995	Hand + leg	1079-614-616	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1991	1995	Lumbar spine + leg	1079-41-616	0,579	0,000	0,363	0,000	0,499	0,000	0,606	0,000	0,647	0,000	0,660	0,000
1991	1995	Neck to pelvis	1783	0,396	0,010	0,422	0,010	0,355	0,010	0,511	0,010	0,630	0,020	0,700	0,020
1991	1995	Pelvic bones + leg	1079-51-616	0,076	0,000	0,061	0,000	0,078	0,000	0,101	0,000	0,114	0,000	0,110	0,000
16	1995	Shoulder + abdomen	1079-611-42	0,086	0,008	0,094	0,008	0,113	0,008	0,161	0,008	0,179	0,008	0,260	0,008
1991	1995	Thoracic lumbar spine	1751	0,233	0,000	0,347	0,000	0,377	0,000	0,606	0,000	0,595	0,000	0,670	0,000
1991	1995	Whole spine + pelvic bones	1079-51-731	0,397	0,020	0,548	0,020	0,576	0,020	0,913	0,020	1,024	0,030	1,120	0,030
1991	1995	Wrist + Lungs	1079-32-614	0,154	0,000	0,138	0,000	0,074	0,000	0,078	0,000	0,082	0,000	0,090	0,000
1996	2000	Skull and facial bones	1011	1,136	0,430	1,542	0,930	1,532	0,700	0,825	0,680	0,514	0,740	0,180	1,500
1996	2000	Cervical spine	1021	0,060	0,020	0,043	0,020	0,024	0,020	0,032	0,020	0,046	0,030	0,050	0,030
1996	2000	Arm (includes multiple)	1612	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1996	2000	Leg (includes multiple)	1616	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1996	2000	Chest/thorax	1032	0,134	0,000	0,124	0,000	0,070	0,000	0,078	0,000	0,082	0,000	0,090	0,000
1996	2000	Abdomen	1042	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
1996	2000	Lumbar spine	1041	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
1996	2000	Pelvis Bones	1051	0,028	2,000	0,045	2,000	0,051	2,000	0,081	2,000	0,104	0,000	0,110	0,000
1996	2000														
1996	2000	Cervical + thoracic spine	1079-21-31	0,203	0,020	0,277	0,020	0,253	0,020	0,394	0,020	0,337	0,030	0,350	0,030
1996	2000	Cervical spine + chest/thorax + pelvic bones	1079-21-32-51	0,170	0,020	0,180	0,020	0,138	0,020	0,191	0,020	0,233	0,030	0,250	0,030



		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
1996	2000	Chest + abdomen	1075	0,225	0,000	0,218	0,000	0,160	0,000	0,213	0,000	0,249	0,000	0,290	0,000
1996	2000	Foot + ankle	1079-621-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1996	2000	Hand + knee	1079-615-618	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1996	2000	Hand + wrist	1079-614-615	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1996	2000	Neck + chest + abdomen	1073	0,484	0,010	0,451	0,010	0,322	0,010	0,428	0,010	0,509	0,020	0,590	0,020
1996	2000	Pelvic bones + arm	1079-51-612	0,053	0,000	0,053	0,000	0,063	0,000	0,088	0,000	0,113	0,000	0,110	0,000
1996	2000	Pelvic bones + foot	1079-51-622	0,045	0,000	0,056	0,000	0,059	0,000	0,081	0,000	0,104	0,000	0,110	0,000
1996	2000	Pelvic bones + leg	1079-51-621	0,076	0,000	0,061	0,000	0,078	0,000	0,101	0,000	0,114	0,000	0,110	0,000
1996	2000	Thoracic lumbar spine	1751	0,233	0,000	0,347	0,000	0,377	0,000	0,606	0,000	0,595	0,000	0,670	0,000
1996	2000	Whole spine	1731	0,437	0,020	0,559	0,020	0,561	0,020	0,888	0,020	0,899	0,030	1,010	0,030
1996	2000	Whole spine + pelvic bones	1079-51-731	0,397	0,020	0,548	0,020	0,576	0,020	0,913	0,020	1,024	0,030	1,120	0,030
2001	2005	Head and Neck=head	1071	0,723	0,570	0,920	0,420	0,885	0,650	0,508	0,790	0,357	0,670	0,180	1,050
2001	2005	Skull and facial bones	1011	1,136	0,570	1,542	0,420	1,532	0,650	0,825	0,790	0,514	0,670	0,180	1,050
2001	2005	Neck	1022	0,360	0,010	0,260	0,010	0,147	0,010	0,195	0,010	0,274	0,010	0,300	0,010
2001	2005	Cervical spine	1021	0,060	0,020	0,043	0,020	0,024	0,020	0,032	0,020	0,046	0,030	0,050	0,030
2001	2005	Arm	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Leg	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Chest/thorax	1032	0,104	0,000	0,097	0,000	0,055	0,000	0,061	0,000	0,064	0,000	0,070	0,000
2001	2005	Abdomen (kidney, liver, intestine)	1042	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
2001	2005	Kidneys/supra-renal glands	1432	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
2001	2005	Lumbar spine	1041	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
2001	2005	Pelvis Bones	1051	0,023	3,000	0,037	3,000	0,042	3,000	0,066	3,000	0,085	0,000	0,090	0,000
2001	2005														
2001	2005	Cervical spine + chest/thorax + foot	1079-21-32-622	0,203	0,020	0,174	0,020	0,101	0,020	0,098	0,020	0,109	0,030	0,120	0,030
2001	2005	Cervical spine + chest/thorax + pelvic bones	1079-21-32-51	0,143	0,020	0,151	0,020	0,116	0,020	0,161	0,020	0,196	0,030	0,210	0,030
2001	2005	Cervical spine + chest/thorax + leg	1079-21-32-616	0,228	0,020	0,161	0,020	0,132	0,020	0,128	0,020	0,127	0,030	0,120	0,030

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2001	2005	Cervical spine + lumbar spine + hand	1079-21-41-615	0,401	0,020	0,357	0,020	0,309	0,020	0,457	0,020	0,594	0,030	0,710	0,030
2001	2005	Cervical spine + chest/thorax + pelvic bones + knee	1079-21-32-51-618	0,143	0,020	0,151	0,020	0,116	0,020	0,161	0,020	0,196	0,030	0,210	0,030
2001	2005	Chest + abdomen	1075	0,210	0,000	0,203	0,000	0,149	0,000	0,198	0,000	0,232	0,000	0,270	0,000
2001	2005	Chest/thorax + arm	1079-32-612	0,123	0,000	0,097	0,000	0,066	0,000	0,068	0,000	0,076	0,000	0,070	0,000
2001	2005	Clavicle/collar bone	1721	0,031	0,008	0,011	0,008	0,021	0,008	0,024	0,008	0,019	0,008	0,025	0,008
2001	2005	Elbow + Thigh	1079-613-617	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Foot + ankle	1079-621-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Hand + knee	1079-615-619	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Hand + wrist	1079-614-615	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Hand + wrist + knee	1079-614-615-617	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Limbs (not specified)	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2001	2005	Lumbar spine + pelvic bones	1079-41-51	0,202	0,000	0,282	0,000	0,327	0,000	0,524	0,000	0,672	0,000	0,750	0,000
2001	2005	Missing values	1009												
2001	2005	Neck + chest	1072	0,528	0,010	0,469	0,010	0,265	0,010	0,304	0,010	0,337	0,010	0,370	0,010
2001	2005	Pelvic bones + arm	1079-51-612	0,043	0,000	0,044	0,000	0,051	0,000	0,072	0,000	0,093	0,000	0,090	0,000
2001	2005	Pelvic bones + hand + leg	1079-51-615-616	0,069	0,000	0,055	0,000	0,065	0,000	0,082	0,000	0,093	0,000	0,090	0,000
2001	2005	Pelvic bones + knee	1079-51-618	0,023	0,000	0,037	0,000	0,042	0,000	0,066	0,000	0,085	0,000	0,090	0,000
2001	2005	Pelvic bones + leg	1079-51-616	0,062	0,000	0,050	0,000	0,064	0,000	0,082	0,000	0,093	0,000	0,090	0,000
2001	2005	Pelvic bones + thigh	1079-51-617	0,031	0,000	0,035	0,000	0,043	0,000	0,067	0,000	0,091	0,000	0,090	0,000
2001	2005	Thoracic lumbar spine	1751	0,233	0,000	0,347	0,000	0,377	0,000	0,606	0,000	0,595	0,000	0,670	0,000
2001	2005	Whole spine	1731	0,437	0,020	0,559	0,020	0,561	0,020	0,888	0,020	0,899	0,030	1,010	0,030
2001	2005	Whole spine + shoulder	1079-611-731	0,443	0,028	0,547	0,028	0,566	0,028	0,845	0,028	0,823	0,038	1,035	0,038
2001	2005	Wrist + knee	1079-614-618	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Sinus	1131	NA	0,150	NA	0,150	NA	0,150	NA	0,210	NA	0,350	0,130	0,480
2006	2010	Neck	1022	0,360	0,010	0,260	0,010	0,147	0,010	0,195	0,010	0,274	0,010	0,300	0,010

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2006	2010	Head and Neck	1071	0,723	0,570	0,920	0,420	0,885	0,650	0,508	0,790	0,357	0,670	0,180	1,050
2006	2010	Skull and facial bones	1011	1,136	0,570	1,542	0,420	1,532	0,650	0,825	0,790	0,514	0,670	0,180	1,050
2006	2010	Temporal-mandibular joint	1114	0,021	0,010	0,022	0,010	0,026	0,010	0,028	0,010	0,021	0,010	0,050	0,010
2006	2010	Cervical spine	1021	0,060	0,020	0,043	0,020	0,024	0,020	0,032	0,020	0,046	0,030	0,050	0,030
2006	2010	Arm (including multiple)	1612	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Leg (including multiple)	1616	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Chest/thorax	1032	0,104	0,000	0,097	0,000	0,055	0,000	0,061	0,000	0,064	0,000	0,070	0,000
2006	2010	Thoracic spine	1031	0,135	0,000	0,247	0,000	0,250	0,000	0,399	0,000	0,312	0,000	0,320	0,000
2006	2010	Abdomen (kidney, liver, intestine)	1042	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
2006	2010	Lumbar spine	1041	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
2006	2010	Pelvis Bones	1051	0,023	4,000	0,037	4,000	0,042	4,000	0,066	4,000	0,085	0,000	0,090	0,000
2006	2010														
2006	2010	Cervical spine + chest/thorax + ankle	1079-21-32-621	0,203	0,020	0,174	0,020	0,101	0,020	0,098	0,020	0,109	0,030	0,120	0,030
2006	2010	Chest + abdomen	1075	0,210	0,000	0,203	0,000	0,149	0,000	0,198	0,000	0,232	0,000	0,270	0,000
2006	2010	Chest + abdomen + pelvis	1076	0,190	0,000	0,212	0,000	0,183	0,000	0,264	0,000	0,324	0,000	0,360	0,000
2006	2010	Chest/thorax+ Hand + wrist + knee	1079-32-614-615-617	0,120	0,000	0,108	0,000	0,057	0,000	0,061	0,000	0,064	0,000	0,070	0,000
2006	2010	Chest+thorax + Pelvic bones	1079-32-51	0,102	0,000	0,113	0,000	0,089	0,000	0,124	0,000	0,150	0,000	0,160	0,000
2006	2010	Foot + ankle	1079-621-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Hand + foot	1079-614-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Hand + knee	1079-615-618	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Hand + wrist + knee	1079-614-615-618	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Limbs (multiple, not specified)	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2006	2010	Lumbar spine + foot	1079-41-622	0,346	0,000	0,319	0,000	0,334	0,000	0,424	0,000	0,542	0,000	0,660	0,000
2006	2010	Lumbar spine + pelvic bones	1079-41-51	0,202	0,000	0,282	0,000	0,327	0,000	0,524	0,000	0,672	0,000	0,750	0,000
2006	2010	Lumbar spine + pelvic bones + hand	1079-41-51-615	0,247	0,000	0,313	0,000	0,335	0,000	0,524	0,000	0,672	0,000	0,750	0,000
2006	2010	Neck + chest	1072	0,528	0,010	0,469	0,010	0,265	0,010	0,304	0,010	0,337	0,010	0,370	0,010

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2006	2010	Pelvic bones + knee	1079-51-618	0,023	0,000	0,037	0,000	0,042	0,000	0,066	0,000	0,085	0,000	0,090	0,000
2006	2010	Pelvic bones + leg	1079-51-616	0,062	0,000	0,050	0,000	0,064	0,000	0,082	0,000	0,093	0,000	0,090	0,000
2006	2010	Pelvic bones + lumbar spine	1079-41-51	0,208	0,000	0,289	0,000	0,336	0,000	0,538	0,000	0,690	0,000	0,770	0,000
2006	2010	Pelvic bones + thigh	1079-51-617	0,031	0,000	0,035	0,000	0,043	0,000	0,067	0,000	0,091	0,000	0,090	0,000
2006	2010	Shoulder + clavicle	1079-611-721	0,031	0,008	0,011	0,008	0,021	0,008	0,024	0,008	0,019	0,008	0,025	0,008
2006	2010	Skull and facial bones + clavicle	1079-11-721	0,951	0,570	1,245	0,420	1,251	0,650	0,692	0,790	0,437	0,670	0,180	1,500
2006	2010	Thoracic lumbar spine	1751	0,233	0,000	0,347	0,000	0,377	0,000	0,606	0,000	0,595	0,000	0,670	0,000
2006	2010	Thoracic spine + pelvic bones + lumbar spine	1079-31-41-51	0,232	0,000	0,355	0,000	0,392	0,000	0,627	0,000	0,695	0,000	0,760	0,000
2006	2010	Whole spine	1731	0,437	0,020	0,559	0,020	0,561	0,020	0,888	0,020	0,899	0,030	1,010	0,030
2006	2010	Wrist + knee	1079-614-618	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2011	2015	Neck	1022	0,360	0,010	0,260	0,010	0,147	0,010	0,195	0,010	0,274	0,010	0,300	0,010
2011	2015	Skull and facial bones	1011	1,136	0,570	1,542	0,420	1,532	0,650	0,825	0,790	0,514	0,670	0,180	1,050
2011	2015	Temporal-mandibular joint	1114	0,021	0,010	0,022	0,010	0,026	0,010	0,028	0,010	0,021	0,010	0,050	0,010
2011	2015	Cervical spine	1021	0,060	0,020	0,043	0,020	0,024	0,020	0,032	0,020	0,046	0,030	0,050	0,030
2011	2015	Arm (including multiple)	1612	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2011	2015	Leg (including multiple)	1616	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2011	2015	Chest/thorax	1032	0,104	0,000	0,097	0,000	0,055	0,000	0,061	0,000	0,064	0,000	0,070	0,000
2011	2015	Thoracic spine	1031	0,135	0,000	0,247	0,000	0,250	0,000	0,399	0,000	0,312	0,000	0,320	0,000
2011	2015	Abdomen (kidney, liver, intestine)	1042	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
2011	2015	Lumbar spine	1041	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
2011	2015	Pelvis Bones	1051	0,023	5,000	0,037	5,000	0,042	5,000	0,066	5,000	0,085	0,000	0,090	0,000
2011	2015														
2011	2015	Cervical spine + hand	1079-21-615	0,099	0,020	0,071	0,020	0,031	0,020	0,032	0,020	0,046	0,030	0,050	0,030
2011	2015	Cervical spine + lumbar spine + pelvic bones	1079-21-41-51	0,235	0,020	0,287	0,020	0,308	0,020	0,486	0,020	0,628	0,030	0,700	0,030
2011	2015	Chest/thorax + shoulder	1079-32-611	0,099	0,008	0,093	0,008	0,063	0,008	0,071	0,008	0,067	0,008	0,095	0,008
2011	2015	Foot + ankle	1079-621-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2011	2015	Foot + hand	1079-615-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2011	2015	Foot + wrist	1079-614-622	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2011	2015	Limbs (multiple, not specified)	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2011	2015	Lumbar spine + hips	1079-41-51	0,202	0,000	0,282	0,000	0,327	0,000	0,524	0,000	0,672	0,000	0,750	0,000
2011	2015	Lumbar spine + knee	1079-41-618	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
2011	2015	Pelvic bones + thoracic lumbar spine	1079-51-751	0,232	0,000	0,355	0,000	0,392	0,000	0,627	0,000	0,695	0,000	0,760	0,000
2011	2015	Shoulder + clavicle	1079-611-721	0,031	0,008	0,011	0,008	0,021	0,008	0,024	0,008	0,019	0,008	0,025	0,008
2011	2015	Shoulder + cervical spine	1079-21-611	0,048	0,028	0,042	0,028	0,038	0,028	0,044	0,028	0,042	0,038	0,075	0,038
2011	2015	Thoracic lumbar spine	1751	0,233	0,000	0,347	0,000	0,377	0,000	0,606	0,000	0,595	0,000	0,670	0,000
2011	2015	Thoracic spine + chest/thorax	1079-31-32	0,362	0,000	0,413	0,000	0,304	0,000	0,417	0,000	0,369	0,000	0,390	0,000
2011	2015	Whole spine	1731	0,437	0,020	0,559	0,020	0,561	0,020	0,888	0,020	0,899	0,030	1,010	0,030
2016	2020	Neck	1022	0,360	0,010	0,260	0,010	0,147	0,010	0,195	0,010	0,274	0,010	0,300	0,010
2016	2020	Skull and facial bones	1011	1,136	0,570	1,542	0,420	1,532	0,650	0,825	0,790	0,514	0,670	0,180	1,050
2016	2020	Cervical spine	1021	0,060	0,020	0,043	0,020	0,024	0,020	0,032	0,020	0,046	0,030	0,050	0,030
2016	2020	Arm (including multiple)	1612	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2016	2020	Leg (including multiple)	1616	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2016	2020	Chest/thorax	1032	0,104	0,000	0,097	0,000	0,055	0,000	0,061	0,000	0,064	0,000	0,070	0,000
2016	2020	Abdomen (kidney, liver, intestine)	1042	0,058	0,000	0,065	0,000	0,079	0,000	0,129	0,000	0,164	0,000	0,200	0,000
2016	2020	Lumbar spine	1041	0,193	0,000	0,215	0,000	0,262	0,000	0,424	0,000	0,542	0,000	0,660	0,000
2016	2020	Pelvis Bones	1051	0,023	6,000	0,037	6,000	0,042	6,000	0,066	6,000	0,085	0,000	0,090	0,000
2016	2020														
2016	2020	Arm + knee	1079-612-618	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2016	2020	Limbs (multiple, not specified)	1061	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2016	2020	Lumbar spine + pelvic bones	1079-41-51	0,175	0,000	0,244	0,000	0,283	0,000	0,454	0,000	0,583	0,000	0,650	0,000
2016	2020	Lungs + thoracic lumbar spine	1079-32-751	0,493	0,000	0,561	0,000	0,461	0,000	0,662	0,000	0,662	0,000	0,740	0,000
2016	2020	Pelvic bones + foot	1079-51-622	0,037	0,000	0,046	0,000	0,048	0,000	0,066	0,000	0,085	0,000	0,090	0,000
2016	2020	Pelvic bones + knee	1079-51-618	0,023	0,000	0,037	0,000	0,042	0,000	0,066	0,000	0,085	0,000	0,090	0,000
2016	2020	Pelvic bones + leg	1079-51-616	0,062	0,000	0,050	0,000	0,064	0,000	0,082	0,000	0,093	0,000	0,090	0,000
2016	2020	Pelvic bones + thigh	1079-51-617	0,031	0,000	0,035	0,000	0,043	0,000	0,067	0,000	0,091	0,000	0,090	0,000
2016	2020	Shoulder + clavicle	1079-611-721	0,031	0,008	0,011	0,008	0,021	0,008	0,024	0,008	0,019	0,008	0,025	0,008

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2016	2020	Thoracic lumbar spine	1751	0,233	0,000	0,347	0,000	0,377	0,000	0,606	0,000	0,595	0,000	0,670	0,000
2016	2020	Whole spine	1731	0,437	0,020	0,559	0,020	0,561	0,020	0,888	0,020	0,899	0,030	1,010	0,030
2016	2020	Whole spine + foot	1079-731-622	0,557	0,020	0,640	0,020	0,018	0,020	0,888	0,020	0,899	0,030	1,010	0,030
2016	2020	Whole spine + leg	1079-731-616	0,764	0,020	0,655	0,020	0,022	0,020	1,013	0,020	0,983	0,030	1,010	0,030
<b>Mammography (Sechopoulos et al., 2008)</b>															
2011	2015	Mammography	2000											0,225	0,000
2016	2020	Mammography	2000											0,225	0,000
<b>Fluoroscopy (von Boetticher 2009, Thierry-Chef 2012, Marshall 2019, ICRP 143)</b>															
		Anatomical zone													
1991	1995	Pelvis (fluoroscopy hips)	3511	0,120	0,000	0,192	0,000	0,217	0,000	0,345	0,000	0,444	0,000	0,470	0,000
1991	1995	Pelvis (cystography)	3531	0,440	0,000	0,702	0,000	0,793	0,000	1,263	0,000	1,625	0,000	1,720	0,000
1991	1995	Chest/thorax	3032	2,060	0,050	1,905	0,050	1,075	0,050	1,200	0,050	1,257	0,050	1,380	0,050
1991	1995	Abdomen	3042	1,970	0,000	5,216	0,000	2,682	0,000	4,341	0,000	5,547	0,000	6,750	0,000
1991	1995	Upper abdomen (cholangiography)	3422	0,988	0,000	1,808	0,000	1,829	0,000	2,920	0,000	2,282	0,000	2,340	0,000
1996	2000	Abdomen (fluoroscopy of spleen)	3042	0,213	0,000	0,238	0,000	0,290	0,000	0,469	0,000	0,600	0,000	0,730	0,000
1996	2000	Heart	3322	3,521	0,000	6,445	0,000	6,518	0,000	10,407	0,000	8,134	0,000	8,340	0,000
1996	2000	Pelvis (fluoroscopy)	3051	0,125	0,050	0,200	0,050	0,226	0,050	0,360	0,050	0,463	0,050	0,490	0,050
1996	2000	Pelvis (cystography)	3531	0,158	0,000	0,253	0,000	0,286	0,000	0,455	0,000	0,586	0,000	0,620	0,000
1996	2000	Chest/thorax	3032	2,134	0,050	1,974	0,050	1,114	0,050	1,243	0,050	1,303	0,050	1,430	0,050

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2001	2005	Upper abdomen (cholangiography)	3422	0,291	0,000	0,533	0,000	0,539	0,000	0,861	0,000	0,673	0,000	0,690	0,000
2001	2005	Brain vascular	3012	13	124	17,643	57	17,537	68	9,445	73	5,877	67	2,060	58
2001	2005	Heart vascular	3322	3,521	0,050	6,445	0,050	6,518	0,050	10,407	0,050	8,134	0,050	8,340	0,050
2001	2005	Chest/thorax	3032	2,134	0,050	1,974	0,050	1,114	0,050	1,243	0,000	1,303	0,050	1,430	0,050
2006	2010	Heart vascular	3322	3,521	0,050	6,445	0,050	6,518	0,050	10,407	0,050	8,134	0,050	8,340	0,050
2006	2010	Chest/thorax	3032	2,134	0,050	1,974	0,050	1,114	0,050	1,050	0,050	1,303	0,050	1,430	0,050
2006	2010	Pelvis (Fistulogram)	3051	1,309	0,000	2,089	0,000	2,361	0,000	3,758	0,000	4,838	0,000	5,120	0,000
2006	2010	Abdomen (Spleen vascular)	3042	0,873	0,000	0,974	0,000	1,188	0,000	1,923	0,000	2,457	0,000	2,990	0,000
2006	2010	Neck	3022	0,792	0,071	0,573	0,089	0,323	0,098	0,429	0,083	0,603	0,055	0,660	0,054
2011	2015	Pelvis (soft tissue/vascular)	3053	0,375	0,002	0,531	0,001	0,552	0,001	1,069	0,002	1,747	0,002	2,173	0,004
2011	2015	Pelvis (pyelogram)	3051	0,326	0,002	0,410	0,001	0,460	0,001	0,927	0,002	1,163	0,002	1,186	0,002
2011	2015	Brain vascular	3124	13	124	17,643	57	17,537	68	9,445	73	5,877	67	2,060	58
2011	2015	Chest/thorax	3032	0,342	0,071	0,323	0,089	0,236	0,098	0,176	0,083	0,106	0,055	0,095	0,054
2011	2015	Upper abdomen (cholangiography)	3422	0,675	0,010	0,728	0,005	0,419	0,009	0,772	0,015	1,203	0,013	1,678	0,000

**Nuclear Medicine (Harris et al., 2013; Jacobs et al., 2005; Lassmann et al., 2014, 2007; Stauss et al., 2008)**

1988	1990	PETCT Abdomen (Gallbladder)- Tc-99m	4042					/	/	/	/			/	
1988	1990	GammaSc Abdomen (Gallbladder)- Tc-99m-IODIDA	4042					0,676		0,770				/	
1991	1995	PETCT Abdomen (Gallbladder)- Tc-99m-IODIDA	4042			0,420		0,663		0,770		1,008		1,050	0,000
1991	1995	GammaSc Whole Body- Tc-99m-methylene diphosphonate (MDP)	4078			7,125		6,460		5,100		5,460		4,800	0,950
1991	1995	GammaSc Abdomen (Gallbladder)- Tc-99m-IODIDA	4042			0,420		0,663		0,770		1,008		1,050	0,000

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
1991	1995	GammaSc Liver / pancreas	4431			/	/	/	/	/	/	/	/	/	/
1991	1995	GammaSc Kidneys / Supra renal glands- Tc-99m MAG3 (mercaptoacetyltriglycine)	4432			0,115	0,014	0,105	0,012	0,117	0,010	0,114	0,046	0,105	0,007
1996	2000	PETCT Chest / Thorax- Tc-99m	4032			/	/	/	/	/	/	/	/	/	/
1996	2000	SPECT Chest / Thorax- Tc-99m	4032			/	/	/	/	/	/	/	/	/	/
1996	2000	GammaSc Abdomen (Gallbladder)- Tc-99m-IODIDA	4042			0,280	0,007	0,393	0,007	0,485	0,006	0,592	0,005	0,585	0,005
1996	2000	GammaSc Abdomen- Tc-99m	4042			/	/	/	/	/	/	/	/	/	/
1996	2000	GammaSc Whole Body	4078			/	/	/	/	/	/	/	/	/	/
1996	2000	GammaSc Liver / pancreas- Tc-99m-IODIDA	4431			0,280	0,007	0,393	0,007	0,485	0,006	0,592	0,005	0,585	0,005
1996	2000	GammaSc Neck- Tc-99m-sestamibi	4002			7,524	4,617	9,180	4,896	5,049	5,049	5,048	5,048	4,851	4,586
1996	2000	GammaSc Kidneys / Supra renal glands- Tc-99m MAG3 (mercaptoacetyltriglycine)	4432			0,115	0,014	0,105	0,012	0,117	0,010	0,114	0,046	0,065	0,007
1996	2000	Tc-99m DMSA	4432			0,252	0,130	0,297	0,132	0,340	0,125	0,362	0,116	0,390	0,120
2001	2005	PET Brain	4012	/	/	/	/	/	/	/	/	/	/	/	/
2001	2005	PET Neck to pelvis- FDG-18 (Fludeoxyglucose)	4074	/	/	2,242	2,394	2,176	3,128	2,142	4,182	2,212	6,162	2,156	7,448
2001	2005	PET Head to Pelvis- FDG-18 (Fludeoxyglucose)	4783	/	/	2,242	2,394	2,176	3,128	2,142	4,182	2,212	6,162	2,156	7,448
2001	2005	Missing modality Abdomen	4072	/	/	/	/	/	/	/	/	/	/	/	/
2001	2005	GammaSc Abdomen	4042	/	/	/	/	/	/	/	/	/	/	/	/
2001	2005	GammaSc Liver / pancreas- Tc-99m (mebrofenin) (IDA)	4431	/	/	0,280	0,007	0,393	0,007	0,485	0,006	0,592	0,005	0,573	0,005
2001	2005	GammaSc Abdomen (Gallbladder)- Tc-99m	4042	/	/	/	/	/	/	/	/	/	/	/	/
2001	2005	Tc-99m (mebrofenin) (IDA)	4042	/	/	0,280	0,007	0,393	0,007	0,485	0,006	0,592	0,005	0,573	0,005



		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2001	2005	GammaSc Whole Body	4078	/	/	/	/	/	/	/	/	/	/	/	/
2001	2005	GammaSc Kidneys / Supra renal glands-Tc-99m MAG3 (mercaptoacetyltriglycine)	4432	/	/	0,115	0,014	0,105	0,012	0,117	0,010	0,118	0,008	0,064	0,007
2001	2005	Tc-99m DMSA	4432	/	/	0,462	0,238	0,441	0,196	0,435	0,160	0,418	0,134	0,382	0,118
2006	2010	PETCT Brain-FDG-18 (Fludeoxyglucose)	4012			2,242	2,394	2,080	2,990	2,142	4,182	2,282	6,357	2,200	7,600
2006	2010	PETCT Head to Pelvis-FDG-18 (Fludeoxyglucose)	4783			2,242	2,394	2,176	3,128	2,142	4,182	2,212	6,162	2,156	7,448
2006	2010	PETCT Neck to pelvis-FDG-18 (Fludeoxyglucose)	4074			2,242	2,394	2,176	3,128	2,142	4,182	2,212	6,162	2,156	7,448
2006	2010	PETCT Whole Body (skeletal)-FDG-18 (Fludeoxyglucose)	4078			2,242	2,394	2,176	3,128	2,142	4,182	2,212	6,162	2,156	7,448
2006	2010	GammaSc Whole Body	4078			/	/	/	/	/	/	/	/	/	/
2006	2010	GammaSc Whole Body (Skeletal)	4078			/	/	/	/	/	/	/	/	/	/
2006	2010	PETCT Whole Body	4078			/	/	/	/	/	/	/	/	/	/
2006	2010	PETCT Chest + abdomen-FDG-18 (Fludeoxyglucose)	4075			2,242	2,394	2,176	3,128	2,142	4,182	2,212	6,162	2,156	7,448
2006	2010	SPECT Brain-99Tcm-HMPAO (hexamethylpropyleneamine oxime)	4012			1,960	5,180	2,000	5,250	2,230	6,048	2,399	6,435	2,465	4,930
2006	2010	GammaSc Kidneys / Supra renal glands-Tc-99m MAG3 (mercaptoacetyltriglycine)	4432			0,115	0,014	0,105	0,012	0,117	0,010	0,118	0,048	0,064	0,007
2006	2010	Tc-99m DMSA				0,462	0,238	0,432	0,192	0,435	0,160	0,409	0,131	0,390	0,120
2006	2010	GammaSc Heart	4322			/	/	/	/	/	/	/	/	/	/
2011	2015	PET Brain-11C-methionine	4012							2,198	2,279	2,520	3,816	1,998	3,848
2011	2015	PETCT Abdomen	4042							/	/	/	/	/	/
2011	2015	PETCT Neck to pelvis-FDG-18 (Fludeoxyglucose)	4074							3,969	7,749	4,088	11,388	3,993	13,794
2011	2015	PETCT Whole Body (skeletal)-FDG-18 (Fludeoxyglucose)	4078							2,142	4,182	2,212	6,162	2,156	7,448
2011	2015	GammaSc Abdomen	4042							/	/	/	/	/	/

		Anatomical Zone	Code	Newborn		1 year		5 year		10 year		15 year		adult	
				BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)	BM (mGy)	Brain (mGy)
2011	2015	SPECT CT Abdomen (Gallbladder)- Tc-99m (mebrofenin) (IDA)	4042							0,470	0,012	0,567	0,011	0,559	0,010
2011	2015	GammaSc Abdomen (Gallbladder)- Tc-99m (mebrofenin) (IDA)	4042							0,470	0,012	0,567	0,011	0,559	0,010
2011	2015	GammaSc Kidneys / Supra renal glands- Tc-99m MAG3 (mercaptoacetyltriglycine)	4432							0,072	0,010	0,074	0,008	0,064	0,007
2016	2020	PETCT Neck to pelvis- FDG-18 (Fludeoxyglucose)	4074											3,993	13,794
2016	2020	PETCT Whole Body (skeletal)- FDG-18 (Fludeoxyglucose)	4078											3,993	13,794
2016	2020	PET CT Head to Pelvis + Thigh- FDG-18 (Fludeoxyglucose)	4079-617-783											3,993	13,794
2016	2020	PETCT Chest + abdomen- FDG-18 (Fludeoxyglucose)	4075											3,993	13,794
2016	2020	GammaSc Whole Body (skeletal)- Tc-99m	4078											/	/
2016	2020	GammaSc Abdomen	4042											/	/
2016	2020	GammaSc Kidneys / Supra renal glands- Tc-99m MAG3 (mercaptoacetyltriglycine)	4432											0,064	0,007

## 4. Annexes

Annex 1: Classification of CT examinations based on EU Report RP154 (European Commission Radiation Protection, 2008)

Region of body		Part of Body		Specific exams & organs	
Code	Name	Code	Name	Code	Name
1	Head	11	Skull & facial bones	111	Skull
				112	- Orbits
				113	- Temporal bone / petrous bone
				114	- Temporal-mandibular joint
				115	- Sella turcica
				116	Face
				117	Dental
		12	Brain	121	Brain
				122	- Cerebrum
				123	- Posterior fossa
				124	- Brain vascular
				125	Pituitary gland
		13	Head soft tissues	131	Sinus
				132	Internal auditory meatus
				133	Nasal cavity
				134	Mouth
		2	Neck	21	Cervical spine
221	Larynx				
22	Neck			222	Pharynx
				223	Neck vascular
3	Chest	31	Thoracic spine	311	Thoracic spine
				321	Mediastinum
		32	Chest/thorax	322	Heart
				323	Thoracic aorta
				324	Lungs standard
				325	Lungs High Resolution
				326	Lungs low dose
				327	Lungs vascular
4	Abdomen	41	Lumbar spine	411	Lumbar spine
				421	Full abdomen
		42	Abdomen	422	Upper abdomen
				431	Liver / pancreas
		43	Liver, pancreas & kidneys	432	Kidneys / Supra-renal glands
5	Pelvis	51	Pelvic bones	511	Hip / pelvic bone
				512	Sacrum/coccyx

Region of body		Part of Body		Specific exams & organs	
Code	Name	Code	Name	Code	Name
				513	Sacro-iliac joint
		52	Pelvimetry	521	Pelvimetry (obstetric)
		53	Pelvis	531	Pelvis (soft tissues/vascular)
6	Limbs	61	Limbs	611	Shoulder
				612	Arm
				613	Elbow
				614	Wrist
				615	Hand
				616	Leg
				617	Thigh
				618	Knee
				619	Lower leg
				620	Calcaneum
				621	Ankle
				622	Foot
				623	Several limbs
7	Multiple regions	71	Head + Neck	711	Supra-aortic trunks
		72	Neck + chest	721	Clavicle/collarbone
		73	Neck + chest + abdomen	731	Whole spine
		74	Neck to pelvis		
		75	Chest + abdomen	751	Thoracic lumbar spine
		76	Chest + abdomen + pelvis		
		77	Abdomen + pelvis	771	Uroscan
		78	Whole Body	781	Head to Thorax
				782	Head to Abdomen
				783	Head to Pelvis
		79	other combinations		
8	Not classifiable				
9	Missing values				