

FIVE YEARS OF PERSONAL DOSIMETRY USING TL DOSIMETERS IN GREECE (2001-2005)

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The aim of this study is to present and analyse the annual dose information in the 5 year period of 2001-2005 where the used dosimeter was only of TLD type. About 10,000 workers from 1,000 establishments are subjected to routine monitoring, on a monthly basis by the Personnel Dosimetry Department of the Greek Atomic Energy Commission (GAEC). At present, there is only one Dosimetry Service for all the country, run by GAEC and accredited by the National Accreditation Council according to ISO17025 criteria since 2002.

The workers are grouped according to their occupational category. The categories that are examined in this study are: diagnostic radiology, interventional radiology, nuclear medicine, radiotherapy, industrial radiography, education and others. The original data from the measurements and the evaluated doses are kept in the National Dose Registry Information System (NDRIS) of GAEC. The evaluated doses refer to $H_p(10)$. The values less than the reporting level (RL), which is 0.1 mSv, are kept as zero. The non-returned dosimeters are not included in the mean doses referred to the following analysis.

The total number of the distributed dosimeters, the percentage of the non-returned dosimeters, the total number of monitored workers, the number of workers with recorded dose above the RL, the collective dose and the estimated "lost" dose (from the non returned dosimeters) are shown in the following table 1.

Table 1: Data from the NDRIS for the years 2001-2005

Year	2001	2002	2003	2004	2005
number of distributed dosimeters.	87248	88803	93708	101016	107544
% of non-returned dosimeters	4.39	3.57	3.13	2.25	2.64
number of monitored workers	8562	8666	9329	9942	10248
mean dose / worker (mSv)	0.48	0.53	0.45	0.39	0.43
% of workers with dose ≥ 0.1 mSv	23	26	23	23	24
mean dose / exposed worker (mSv)	2.11	2.02	1.93	1.72	1.78
collective dose (manSv)	4.11	4.59	4.20	3.93	4.41
estimated Lost Dose (Sv/year)	0.22	0.16	0.15	0.09	0.11

From the table it is seen that the number of the monitored workers is increasing, nearly 20% in the last 5 years. The collective dose and the mean dose per worker remain almost the same, whereas the mean dose per exposed worker presents a small decrease of 15%. The percentage of non-returned dosimeters has reached the number of almost 2.5 % and therefore the estimated 'lost' dose per year has been also reduced to 50%.

Figures 1 represents the distribution of the monitored workers for the year 2005 and figure 2 the percentage of the collective dose for the same occupational categories for the years 2001-2005. The vast majority of the occupationally exposed workers belongs to the diagnostic radiology sector. However, the respective number of doses refers only to the 30% of the collective dose.

The occupational category of the interventional radiology covers almost the half part of the collective dose (47%), though the percentage of the monitored workers is only 10%. It should be noted that in Greece the dosimeter is worn above the lead apron.

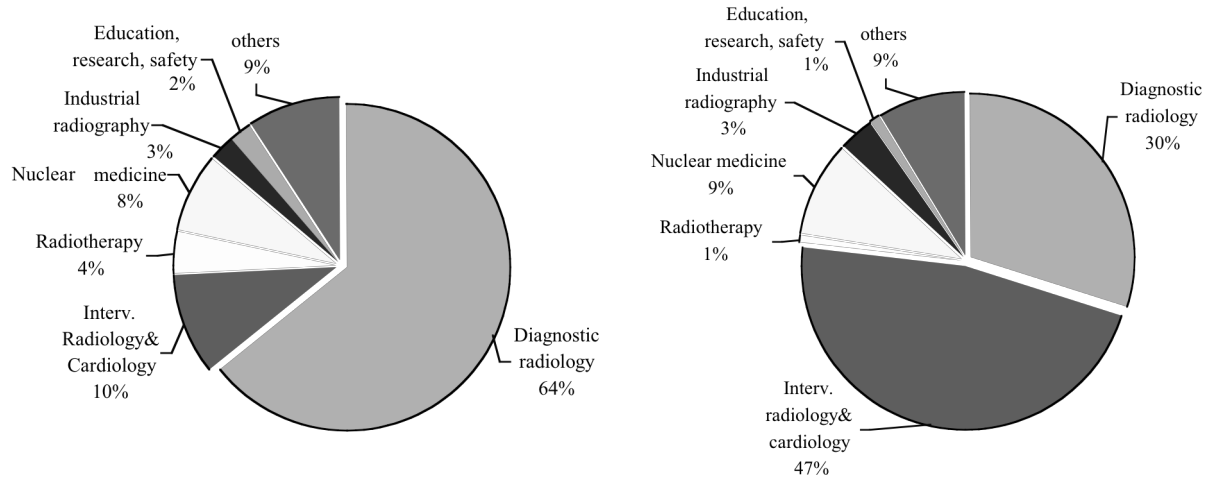


Figure 1: The distribution of the monitored workers

Figure 2: The percentage of the collective dose (in manmSv) for the years 2001-5

The mean annual dose (MAD) for the different occupational categories has been also calculated. In the following table 2 the MAD of the monitored workers and of the exposed ones is shown for the years 2001-2005.

Table 2: MAD (in mSv) for the various occupational categories for the years 2001-2005. The first column in each year refers to the monitored workers and the second to the exposed ones.

	2001		2002		2003		2004		2005	
Diagnostic radiology	0,25	1,87	0,28	1,79	0,21	1,50	0,15	1,17	0,17	1,05
Interv. radiology & cardiology	2,21	4,25	2,48	4,53	2,24	4,08	2,03	3,95	2,17	4,09
Radiotherapy	0,06	0,72	0,14	1,16	0,12	1,28	0,05	0,67	0,11	1,06
Nuclear medicine	0,50	1,07	0,68	1,39	0,63	1,36	0,56	1,17	0,48	0,94
Industrial radiography	0,69	2,05	0,58	2,02	0,28	1,16	0,55	2,13	0,61	2,08
Total Education, research, safety	0,20	1,87	0,09	0,88	0,18	1,51	0,25	2,21	0,33	3,17

Discussion: The results of the present analysis showed that during the years 2001-2005 the MAD remained almost unchanged. However, a decrease of 25% is observed if we compare the mean dose of 2001-2005 with the respective one for the years 1994-1998 [1]. In general, the reported doses are relatively low; the percentage of the workers with a non-zero dose is nearly 23% and it can be considered constant for the last years. The vast majority of the collective dose refers to the interventional radiology sector and to the diagnostic radiology one. The third category in the collective dose is the nuclear medicine one. The annual dose of 20 mSv has been exceeded sometimes by interventional cardiology staff but the estimated effective dose was much lower. Incidentally high doses occur in the industrial radiography and the nuclear medicine categories where special investigation is performed, driven by the inspectors of GAEC and the radiation protection officers of the institutes concerned.

References

- [1] V. Kamenopoulou, G. Drikos and P. Dimitriou, "Occupational exposure to ionising radiation in Greece (1994-1998)", *Radiation Protection Dosimetry*, Vol. 91, No. 4, pp. 385-389 (2000)