

Dose Assessment and Dose Registry

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The activity of the Dose Assessment and Dose Registry unit is directed towards the assessment of doses to the Portuguese population due to several types of exposure to external radiation.

The activities developed in 2005 were mainly concentrated on the performance of the individual monitoring service of ITN in the fields of individual and environmental monitoring.

In 2005 the main activities developed and improved at this Unit were focused on:

Assessment of the occupational radiation doses:

The Individual Monitoring Service (IMS) of ITN provided individual monitoring for external exposure to approximately 3,000 workers in Portugal, with a monitoring system based on thermoluminescence dosimetry (TLD).

Strong staff reduction was observed at the IMS with only one single replacement.

Improvements to the Central Dose Registry and analysis of the occupational exposure data:

In 2005 the CDR started the process for the collection of dose data measured and reported by the dosimetry companies operating in Portugal.

At presently, the CDR contains all the occupational exposure data concerning the period 1957 to 2004.

The analysis of the occupational exposure data is also one of the aims of this work.

Improvements to the quality control program: The reduction of staff observed in 2005 hindered the analysis and improvements in quality control that would be envisaged under normal circumstances.

A database for the storage and analysis of important quality control parameters was created and presented at the Individual Monitoring Conference held in April.

The application for Accreditation according to the ISO 17025 Standard, due to take place in 2005, was not attained due to the above mentioned reasons.

Assessment of the cosmic radiation dose received by aircrew: As a result of an on-going collaboration with the Serviço de Ginecologia e Obstetrícia of the Hospital da Força Aérea Portuguesa, the in-flight cosmic radiation doses received by aircrew in military transport flights was estimated using specific software programs.

Assessment of the environmental gamma radiation dose to the Portuguese population: Environmental monitoring is one of the tasks assigned to ITN by Decree-Law 138/2005 concerning the accomplishment of Article 35 of the Euratom Treaty.

This Unit also collaborated to the MinUrar project performing the evaluation of the natural gamma radiation dose.

On-going collaboration in international working groups was developed in the framework of both EURADOS and ESOREX activities:

Eurados – European Radiation Dosimetry group: Working group 2 of Eurados entitled *Harmonization of Individual Monitoring in Europe* will continue until the end of 2006.

Esorex – European study on occupational exposure: The update of the Portuguese CDR with the occupational exposure data reported by the dosimetry companies other than ITN was of fundamental step for the participation of ITN in this working group.

In 2005 approximately € 167.600,00 were raised due to the operation of the Individual Monitoring Service.

Research Team

Researchers

J.G. ALVES, Aux.

M.B. MARTINS, Princ.

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Students

J.N. ABRANTES, Undergraduate
(transferred on 31-Mar-05)

L.C. NOVAIS, Undergraduate FCT-Euratom grant

Technical Personnel

G.C. RANGEL (retired since 31-Mar-05)

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The Central Dose Registry: Analysis of Occupational Exposure

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Objectives

ITN is entrusted the task to create and maintain a Central Dose Registry, according to Decree-Laws 165 and 167 of July, 2002.

In the beginning of 2005 Central Dose Registry (CDR) contained only the occupational exposure data of the workers monitored in Portugal by ITN-DPRSN since 1957 to 2004.

It was the aim of the CDR for 2005 to start the insertion of the data evaluated by other monitoring services external to ITN.

Results

The CDR gathers the information relative to the monitored workers and to the facilities that requested monitoring, grouped into four different fields of activity, namely health or medicine, conventional industry, research and mining. In each field of activity the most frequently found functions and practices were defined.

Full compatibility of the CDR and the databases used for routine monitoring at ITN had already been achieved in 2004.

In 2005 the CDR started the process of occupational dose data collection from monitoring companies operating in Portugal other than ITN.

The main aim was concentrated on the collection and insertion of the annual dose data for the period 1997-2004. In 2005, approximately 40,950 accumulated doses were inserted.

A questionnaire was prepared by the CDR and made available to the monitoring companies in order to obtain the necessary information concerning the workers, practices and doses in a compatible format.

Meetings were held with all the companies' representatives and with the *Centro de Protecção contra os Riscos Profissionais*.

The CDR was registered at the *Comissão Nacional de Protecção de Dados*. At present all the annual dose data evaluated in Portugal in the period 1997 to 2004 have been inserted in the CDR. The CDR presently contains the records of approximately 35,300 workers from 2,108 facilities monitored by the five monitoring companies operating in Portugal.

The statistical analysis of data is also a task entrusted to ITN by Law, as mentioned above.

The CDR also allows the statistical analysis of the occupational exposure data stored. The number of monitored workers and facilities can be grouped by fields of activity, their respective distribution by effective dose intervals can be calculated, as well as the corresponding average and collective doses. These parameters are important to characterize the occupational exposure in Portugal.

In 2005, based on the data of the RCD, a study was carried out with workers of Nuclear Medicine. This was one of the aims of the work presented at the IM2005 – Individual Monitoring of ionizing Radiation held in Vienna.

Published or in press work

1. M.B. Martins, J.G. Alves, J.N. Abrantes, A.R. Roda Occupational Exposure in Nuclear Medicine in Portugal in the 1999 - 2003 Period, *IM2005 – European Workshop on Individual Monitoring of Ionizing Radiation*, Vienna, Austria 11-15 April (2005), *Radiat. Prot. Dosim*, in press.

¹. Transferred on March 31st, 2005.

Assessment of the Cosmic Radiation Dose Received by Military Aircrew in Transport Missions

J.G. Alves, J. Mairós¹

This project aims at performing an estimate of the cosmic radiation dose received by military aircraft crews on realistic transport missions. The cosmic radiation dose received was estimated for transport missions carried out on the Hercules C-130 type of aircraft by a single air squad in one month. The flights departed from Lisboa to areas such as the Azores, to several countries in central and southern Africa, to the eastern coast of the USA and to the Balkans and an estimate of the cosmic radiation dose received on each flight was carried out. A monthly average cosmic radiation dose to the aircrew was determined and the dose values obtained were discussed in relation to the limits established by the European Union Council Directive 96/29/Euratom. The estimates were performed using the EPCARD v3.2 and the CARI-6 computing codes. EPCARD v3.2 was kindly made available by GSF-National Research Centre for Environment and Health, Institute of Radiation Protection (Neuherberg, Germany). CARI-6 (version July 7th, 2004) was downloaded from the web site of the Civil Aerospace Medical Institute, Federal Aviation (USA). Special attention was given to the case of a pregnant crew member.

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Individual Monitoring Service, Improvements to the Quality Control program

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The Individual Monitoring Service (IMS) at ITN is based on a TLD dosimetry system, that consists of two 6600 Harshaw TLD readers and on the Harshaw 8814 TL card and holder containing two LiF:Mg,Ti (TLD-100) detectors for the evaluation of Hp(10) and Hp(0.07). In 2005 the IMS provided monitoring for external radiation to 3165 workers from 226 facilities in Portugal. Nearly 85.6% of the monitored persons work for the medical field of application, 8.2 in the conventional industry and 6.2% in research.

A quality control programme has been running at the TLD section of the IMS since 2000. Since then regular evaluation of the quality control parameters have suggested some modifications that were introduced, when necessary. A database for the storage of quality control parameters was created using MS-Access. At the moment, the database has a passive role and is used for storage of data and for the retrospective statistical evaluation of important parameters and their evolution with time. It is regularly fed with the files generated by the NETREMS and/or WINREMS software from Harshaw (presently Thermo Electron Corporation), and allows a quick and user friendly visualization of the data.

¹ Transferred to another Group, ² Retired, ³ Transferred to another institution.

Assessment of the Environmental Gamma Radiation Dose to the Portuguese Population

J.G. Alves, L. Novais, S. Rangel, E. Flores

Environmental monitoring for environmental gamma radiation is one of the tasks concerning the accomplishment of Article 35 of the Euratom Treaty. Three measurement points were selected at ITN as used as reference points for the setup of the methodology in use. By the end of October a net of measurement points was established.

This Unit also collaborated to the MinUrar project performing the evaluation of the natural gamma radiation dose in regions close to the former Uranium mines.