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Iodine-131 routine monitoring programme in nuclear medicine staff in Uruguay

The Centre of Nuclear Medicine and Molecular Imaging of the University Hospital (CMNIM) jointly with the Radiochemistry Department of the Faculty of Chemistry settled the Internal Dosimetry Laboratory (IDL) in 2004. Since then, this group has been working uninterruptedly in monitoring potential internal contaminations with 131-Iodine in occupationally exposed personnel (OEP) due to the manipulation of open sources. The IDL performs thyroid measurements fortnightly and free of charge to the Nuclear Medicine Centres of the country both private and public. The Effective Committed Dose E (50) is reported quarterly to the Regulatory Authority. Taking into account that the CMNIM provides more than 260 GBq of Iodine 131 per year, the evolution of the E(50) of technicians, physicians, radiopharmacists and nursing staff since 2008 to date is presented in this work.

The protocol was developed in the framework of the ARCAL RLA/09/049. The methodology consisted in the following steps:

• Calibration of the detection system Captus 3000 (Capintec) NaI (Tl) 2x2"detector in energy (weekly) and efficiency (yearly).

• Determination of the minimum detectable activity (AMD)

• Determination of counting accuracy.

• Measurement of the OEP neck at 25 cm distance from the detector, 300 seconds, fortnightly.

The effective committed dose estimation E (50) was calculated using the software AIDE 2e considering fast inhalation route, a Retention Fraction m (t): 7.41x10-2 and a Dose Coefficient e (g): 1.1 x10 -8 Sv/Bq.

The derivate registration and investigation limits were settled in 1 (yellow) and 5 (red) mSv/year respectively. Figure 1, shows the measurements results of E(50) in the period 2008-2021 in full blue line.

The implementation of the program reached the 46% of the OEP involved in the manipulation of 131I open sources in the Nuclear Medicine area. The method was robust and easy to implement in routine. The IDL participated in three regional intercomparisons promoted by the IAEA achieving excellent results, which confirm the accuracy of the measuring protocols. The E (50) values were always below the registration levels, nevertheless they are submitted to the Regulatory Authority who keeps a national dose registry. Despite the high amounts of Iodine-131 delivered doses, E (50) presents low values indicating good manipulation protocols. This programme is seen as an opportunity of continuous improvement in optimization of the practice and education of the OEP in Nuclear Medicine area.

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