PS32 - 1.6

DOSES REDUCTION STUDY FROM PRODUCTION AND DISTRIBUTION OF RADIOACTIVE MATERIAL USED IN MEDICINE

GABURO, Janete C.; SANCHES, Matias P. & SORDI, Gian M.A.A.
(Instituto de Pesquisas Energéticas e Nucleares - CNEN/SP)
C.P. 11049, CEP 05422-970 - São Paulo-SP, Brazil.

[Introduction] A brief description of the main operations performed in the Radioisotope Production Facility at IPEN-CNEN/SP is presented. This facility is provided with hot cells which must be periodically replaced due to deterioration by reagent processing and hard treatment that they are submitted. When the lifetime of these hot cells are in their limit leaking of airbone materials arises bringing forth incorporation by workers.
[Materials and Methods] As safe control a series of procedures have been implemented in a programme of internal monitoring for ^{131}I by urine sampling which is based in the use of silver chloride to separate iodine by precipitation from the sample. The detection is carried out in a NaI(Tl) scintillator counter. The external monitoring is performed by film badge. From this programme it became possible to evaluate the radiation dose received by workers.
[Results] The results obtained within the last 10 years, where analyzed against the lifetime of the hot cells and studies were made to verify possible explicit or implicit relations between doses and the natural stress of these hot cells. In the distribution of the effective dose equivalent among 303 workers submitted for individual monitoring of internal exposure by urine samples, some significant exposures higher than 1,5 mSv, in 125 cases were presented. From these cases, 63 had an effective dose higher than 5,0 mSv.
[Conclusion] The addition of effective doses with doses from external exposures can lead to levels close to regulatory limits. The internal effective dose equivalent is small when compared with whole body external dose equivalent, however it is not negligible.

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RADIATION DOSIMETRY IN PATIENTS TREATED WITH RADIOIODINE

A.C.H.Nascimento, A.C.Freitas and J.L.Lipsztein

Radioprotection and Dosimetry Institute - CNEN
Av. Salvador Allende, s/nº - Via 9 - CEP 22780-160
Rio de Janeiro, RJ - BRAZIL

Treatment of thyroid remaining tumor tissue, after surgical ablation, is a common procedure. The average activity administered is 3700 MBq.

Three patients, 1 man and 2 females, treated with I-131 agreed to contribute to this study. They were monitored periodically in the whole body counter and donated urine samples for analysis. Measurements started just after diagnosis, when they received 18 MBq of I-131, and proceeded after therapy treatment until body burdens lowered to background levels. Estimates have been made of the biokinetics of radioiodine for these patients and studies to evaluate thyroid uptakes will proceed.

These patients were asked to donate blood samples for cytogenetics analysis. After diagnostic dose, the presence of chromosomal aberrations in samples were not detected. One month after I-131 ablation doses, blood samples presented, in average, 5 dicentrics per 500 cells. This frequency corresponds to an average external whole body dose of 0.4 Gy, using a Co-60 source, with a dose rate of 1.5 10^{-3} $Gy.s^{-1}$, for calibration. Cytogenetics analysis proceeded for a period of 5 months with no significative decrease in the frequency of dicentrics.

Using ICRP publication 53, the administration of I-131 with no uptake by the thyroid is responsible for an effective dose of 0.3 Sv, comparable to the cytogenetics estimates.