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LOGISTICS FOR EVALUATION OF DOSES RECEIVED BY IOE DUE TO HANDLING 18FDG-RADIOPHARMACEUTICAL DURING PROCESSING (IEN/CNEN) AND IN RADIODIAGNOSTIC (CLINICAL)

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ABSTRACT

The objective of this study is to propose an improvement in radiological practices involving production, transportation and application of radiopharmaceutical ^{18}F, by tracking the radiation doses received by occupationally exposed individuals (OEI) that develop production practices, transportation and application of some patients in hospitals and clinics in Rio de Janeiro, the radiopharmaceutical ^{18}FDG. In light of the results and observations of how these practices are developed, it's necessary to evaluate and suggest a logistics to minimize the doses received by OEI during these practices, seeking improvements in the actions and procedures for radiological protection. In practice the production of the radiopharmaceutical, the study focuses on the time of withdrawal of ^{18}FDG cell processing, where the technician is exposed to higher dose rates. At this stage, we take to accomplish, yet two other reviews: the first is the placement of electronic dosimeters inside and outside the lead apron, whose objective is to assess the attenuation capacity of the apron. This last procedure refers to the use of a phantom cylindrical containing TLD 700 dosimeter in order to evaluate, using a mathematical model (MCNP), the doses ends (hand) of the technician, the process of removing the radiopharmaceutical of the cell and to compare the dosimetric dose recorded in the ring. Regarding the transport of ^{18}FDG, we take into account the doses recorded in the cabin of the vehicle and the doses recorded in the dosimeter of the carrier. Finally, the doses

received by health professionals who handle ^{18}FDG are analyzed, since its withdrawal from the packing until administration to the patient.

1 INTRODUCTION

The Positron Emission Tomography (PET) is a noninvasive imaging technique that can detect changes in cellular metabolism, using specific markers, one of which is 18-fluordeoxiglicose (^{18}FDG). The use of a marker for biological activity confers this test very sensitive, being capable of diagnosing changes have not identifiable by other imaging means. In recent years, there has been an explosive growth of its application in many fields of medicine and, in particular, in malignancies, as a method of diagnosis and staging, assessment of treatment response and suspicion of tumor recurrence. It is, however, an examination with high costs, little available outside the population centers and, as with other methods, with some limitations. It is a method of diagnostic imaging complement the other (magnetic resonance imaging - MRI, computed tomography - CT, etc.) and not competitive with them. You could say that the history of nuclear medicine began with the discovery of natural radioactivity by Henri Becquerel in 1896, and natural radioactive elements by Marie and Pierre Curie in 1898 (discovered by which the three scientists received the Nobel Prize in Physics of 1903).
At IEN, the two cyclotrons are used to ^{18}F production. The 111 RDS cyclotron is used only ^{18}F while 28-CV cyclotron is used to iodine and ^{18}F production.

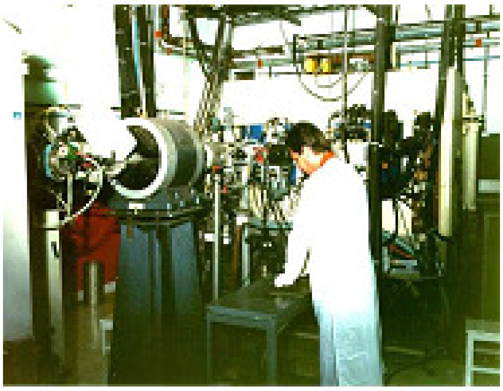

Fig. 1 - 28-CV cyclotron

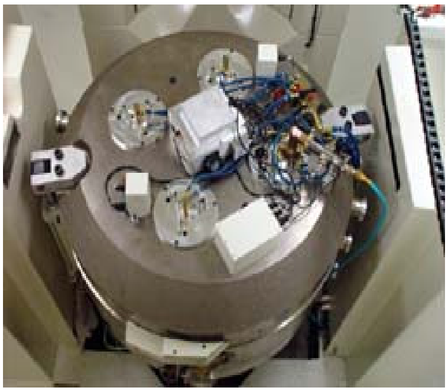

Fig. 2 - 111-RDS cyclotron

2. MATERIALS AND METHODS

The materials to be used for monitoring of these practices, in addition to the observation of the same, are Polimaster portable monitors (Geiger and cesium iodine) and leaded aprons.
The methodology consists of accompaniment of the practices in areas of ^{18}FDG processing at IEN, in rooms intended for the use of this radionuclide in the clinical A and B hospital.
In the first stage of labor, specifically the removal ^{18}FDG of the cell will be realized a simulation using MCNP mathematical modeling (cylindrical geometry), to compare with doses in extremities recorded by dosimeter ring.

In the second stage of this work, we will take into account radiometric surveys in these areas as well as the observation method for possible suggestions that minimize doses in both the professionals engaged in these practices as in their respective areas.

3. RESULTS AND CONCLUSIONS

The data collected in the two segments of this work, are insufficient for an adequate statistical method. However, the first segment, i.e. the practices carried out at IEN, by observing the position of experts in relation to cell, we see the need to put together a camera - monitor so that best practice is implemented as well as provide the cell of an articulated arm to minimize doses to the extremities and trunk of the technicians. In the second segment of this work has not yet been implemented because only few practices have been observed to suggest procedures that will optimize them. Given the above arguments, although the work has not yet been completed, the present work is feasible and it will achieve its objective to improve practices and reduce doses.

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