

Absorbed dose evaluation at different organs after ^{131}I oral contamination of two Wistar rat models

Meriem Mezaguer-Lekouaghet^{1*}, Eric Blanchardon², Abdelwahab Badreddine¹, Jean-Marc Bertho², Maamar Souidi², Ahcène Baz³, and Zohra Lounis-Mokrani¹

¹ Centre de Recherche Nucléaire d'Alger, Algérie

² Institut de Radioprotection et de Sécurité Nucléaire Fontenay-Aux-Roses, France

³ Ecole Normale Supérieure de Kouba, Algérie

*Corresponding author: m_mezaguer@yahoo.fr

Abstract

Iodine-131 (^{131}I) is one of the most frequently used radionuclides for diagnosis and therapy of thyroid diseases. It is administered orally in the treatment of cancer to eliminate the residual postoperative microscopic tumor foci, and the residual normal thyroid tissue for early detection of recurrence [1].

The comparative behavior of ^{131}I concentration into two animal models with total and partial thyroid has been investigated in our previous work [2]. The accumulated activities have been measured in fourteen organs.

In this study, the mean absorbed doses resulting from ^{131}I accumulated in all organs have been evaluated using RODES software [3, 4]. With this software, mean absorbed doses were calculated for selected organs (thyroid, lungs, heart, liver, kidneys, stomach, spleen, large and small intestine, testes, urinary bladder wall) by combining the specific absorbed fractions (SAF) of energy with radiation emission spectra and biokinetic data determined from our previous experimental study [2]. Calculations were based on the ^{131}I photon and electron emissions reported by [5] and SAFs previously calculated by Monte Carlo simulation in the voxel phantom of an adult male rat [3, 4].

The obtained results show high absorbed doses delivered to stomach and lungs for both models compared to other organs. The dose received by the testes and salivary glands is found to be higher in the case of the rat model without thyroid. Conversely, the spleen and bladder wall received lower doses in this latter model compared to those received by the rat model with thyroid. One can also note that the difference in mean absorbed dose received by liver, lungs, heart, and walls of the stomach is not significant between the two rat models.

References

- [1] S.P. Marcel, D.H. Junak, M. Lassmann, M. Dietlein, M. Luster, *Eur J Nucl Med Mol Imaging*, 37(2010).
- [2] M. Mezaguer-Lekouaghet, A. Badreddine, N. Ait Kaci, K. Remil, A. Benbournane, F. Boucheneb, F. Messili, A. Baz, M. Souidi, & Z. Lounis-Mokrani, *ICNTRM. Strasbourg France* (2017).

- [3] M. Locatelli, H. Miloudi, G. Autret, D. Balvay, A. Desbrée, E. Blanchardon, and J.M Bertho, *J. Radiol. Prot.* 37 (1) (2017).
- [4] H. Miloudi, M. Locatelli, G. Autret, D. Balvay, A. Desbrée, E. Blanchardon, and J.M Bertho *J. Radiol. Prot.* 37 (3) (2017).
- [5] International Commission on Radiological Protection. *ICRP Pub.107.* (2008).