# Radiation protection following iodine-131 therapy for thyroid cancers: comparison of two methods to calculate restriction times

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**Introduction**: In France, it is required to give patients some radiation safety advice following an iodine-131 therapy of thyroid. However, there is no regulatory methodology proposed to assess the restriction times required to limit radiation dose received by their family and by third persons. In this study, we compared two methods to perform the calculation of restriction times for differentiated thyroid cancer: the first one followed the recommendations of the *Conseil Supérieur d’Hygiène Publique de France (CSHPF)* [1] and the second one, called the “patient-dependent” method (PaDe), used the effective half-life measured for each patient during the 48h-of hospitalization.

**Material and methods**: For these simulations, the input parameters were dose constraints, contact patterns, dose rate measurements and dose rate variation with distance. For the *CSHPF* method, these parameters were fixed and were not changed. For the PaDe method, the input parameters were mostly defined according to the literature [2]. The dose constraint for members of the public was set to 1 mSv. The effective half-life was calculated for each individual patient from a mono-exponential fit of dose rate measurements performed during the hospitalization. Using this effective half-life and the dose rate measured at the time of discharge, restriction times were computed for each contact pattern. Comparison between the two methods was carried out for 59 patients.

**Results**: For 63% of the patients (37/59), no restrictions were necessary according to the PaDe method whereas the *CSHPF* method required the restrictions to be applied during up to 2 days. For almost 20% of them (12/59), restriction times estimated with the PaDe method were systematically lower. For the remaining 17% (10/59), the CSHPF method underestimated the restrictions for at least one contact pattern. Furthermore, with the *CSHPF* method, the same instructions were given to 97% of the patients (57/59). These results showed the limits of the *CSHPF* method which does not consider individually tailored biological data and applies a theoretical inverse square law to derive dose rates at different distances.

**Conclusion**: In order to improve the well-being of the patient and to optimize the radiation protection, this study made us change our method to follow the PaDe computed recommendations.

**References**:

* [1] Précautions recommandées aux patients ayant bénéficié d’un traitement par l’iode radioactif afin de limiter l’exposition aux rayonnements ionisants des personnes à son contact, **Groupe de travail de la section radioprotection du CSHPF, 2006** ;
* [2] Recommandations pratiques concernant la sortie des patients après traitement du cancer différencié de la thyroïde à l’iode 131, **Carlier *et al*. 2004, Radioprotection Vol. 39**.