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"Evaluation of the effect of various parameters on the amount of radiation dose received by family members after 131-I therapy "

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Abstract:

The main concern with respect to discharge of patients from hospital after 131-I therapy is contamination of their surroundings and exposure of people who are in close contact with them. In this study, we evaluated absorbed dose received by homemates of these patients within one week of discharge from hospital. This study was based on 100 patients (23 patients with thyroid cancer together with 70 members of their families and 2 hyperthyroid patients plus 5 of their family members). Measurements were performed by TLD. Patients were discharged from hospital if the dose rate from a meter distance of their thyroid was below 20 μSv/hr (ICRP-60). The hospitalization period for those patients with thyroid cancer varied between 2-3 days (Depending on the amount of radioactivity received). Hyperthyroid patients were treated as outpatients. Our data indicate that although hyperthyroid patients received much less activity in comparison to those with thyroid cancer, but due to the slow iodine discharge rate from their bodies, they radiated more to their surroundings. For patients with thyroid cancer, when the given activity increased from 100 mCi to 150 mCi, the average dose absorbed by their family members increased by a factor of 3. The duration of hospitalization as well as the amount of activity given to the patients have a significant effect on the amount of radiation dose received by the family members. In a group of patients who received 100 mCi of 131-I, the average radiation dose received by the family members of those patients who were hospitalized for 2 days were 1.5 times more than that of those patients who were hospitalized for 3 days, whereas following therapy with 150 mCi of 131-Iodine, the average radiation dose received by the family members of those patients who were hospitalized for 2 days were about 6.5 times more than that of those who were hospitalized for 3 days. The size of the patient's house and the time that family spends with the patient at house are other considerable factors. Our data show that by increasing the house size from 45-50 m to 75-100 m, the average radiation dose received by the family members reduce by a factor of 4, wheras by increasing the house size from 75-100 m to about 120-400 m, this dose only reduce by a factor of 1.5. The average dose for family members who were at house for less than 10 hours a day is about 5 times less than that of the individuals who were at house for more than 10 hours a day. In addition, average absorbed dose by children was about 9 times more than that of spouses. On the basis of this study findings, we suggest that parameters such as the amount of received activity, type of disease, house size, presence of children at house, duration of time which family members spend with the patient at house and differences in cultural behaviors between children and their parents should be considered in order to decrease the exposure of the family members and also to decide for duration of hospitalization and the approtiate time of discharge.

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