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## BACKGROUND

Thyroid cancer is the most common endocrine malignancy, with increasing incidence globally (Franchini et al., 2022). RAI therapy is the standard treatment for DTC, improving survival and reducing recurrence risk (NCCN Guidelines, 2022). However, RAI treatment may increase the risk of SPM in thyroid cancer patients (Pasqual et al., 2022). Conflicting findings exist on this association, possibly due to study design, patient population, or length of follow-up. The risk and pattern of SPMs in DTC survivors are unclear, and potential risk factors for SPMs after RAI treatment are poorly defined.

## AIM AND SPECIFIC OBJECTIVES

### Aim:

This retrospective cohort study aims to investigate the incidence, risk factors, and patterns of second primary malignancies (SPM) in differentiated thyroid cancer (DTC) patients treated with radioactive iodine (RAI) in Oman.

### Specific Objectives:

- To determine the incidence of SPM in DTC patients treated with RAI at Sultan Qaboos University Hospital (SQUH).
- To identify the patterns of SPMs that arise in thyroid cancer patients following RAI treatment.
- To evaluate possible factors associated with SPM in DTC survivors including age at diagnosis of DTC, gender, DTC subtype, cumulative RAI activity, and follow-up period.

## JUSTIFICATION OF RESEARCH

This research is necessary to understand the potential risks of SPMs associated with RAI treatment in thyroid cancer patients. If not done, valuable information regarding the long-term effects of RAI treatment and the potential risks of SPMs may be lost, leading to suboptimal patient care and management.

## METHODOLOGY

A retrospective cohort study was conducted at SQUH for patients with DTC who received RAI treatment between January 2007 and December 2017. We collected patients' information including gender, age at diagnosis, thyroid cancer subtypes, SPM, cumulative RAI doses, and follow-up period. Descriptive statistics and logistic regression were used to analyze the data. SPM was defined as a new malignancy diagnosed at least one year after the first RAI dose.

## RESULTS

- A total of 500 patients with thyroid cancer who underwent RAI treatment were included in this study. The mean age at diagnosis was  $37.2 \pm 12.7$  years (range 4-84), and most of the patients were female (81.8%). The mean follow-up period was  $9.5 \pm 3$  years. The most common thyroid cancer subtypes were papillary (88.2%) and follicular (10.6%), with the remaining 6 patients (1.2%) having other subtypes.
- During follow-up, 4 patients (**0.8%**) developed SPMs, all of them with the papillary subtype. The sites of the SPMs were the **colon, bladder, breast, and liver**. Table 1 describes the individual characteristics of the 4 patients.

Table 1: Individual characteristics of patients who developed SPM.

Gender	DTC histological subtype	Age at SPM diagnosis (years)	Cumulative RAI activity (GBq)	Latency period (years)	SPM subtype
F	PTC	54.6	3.52	7.6	Colon
M	PTC	66	3.4	3	Bladder
F	PTC	53.4	3.3	3.4	Breast
M	PTC	64.8	2.57	7.8	Liver

DTC: thyroid carcinoma; SPM: second primary malignancy; RAI: radioactive iodine; PTC: papillary thyroid carcinoma; GBq: The SI unit of measurement of radioactivity.

- Table 2 shows the clinical features of patients with and without SPM.
- The results indicated a **significant difference in age at diagnosis of DTC**. The two groups had no significant differences regarding gender, histological subtype, cumulative RAI activity, and follow-up period.

Table 2: Descriptive analysis of groups of DTC patients with and without SPM.

Baseline variables	With SPM (n=4)	Without SPM (n=496)	P value
Age at diagnosis of DTC (years)	51.8 ( $\pm 10.2$ )	37.1 ( $\pm 12.7$ )	<b>0.02*</b>
Gender	Female	2 (50%)	407 (82.1%)
	Male	2 (50%)	89 (17.9%)
Histological subtype (PTC)	4 (100%)	437 (88.1%)	0.47
Cumulative RAI (GBq)	3.35 (0.95)	3.45 (42.7)	0.55
Follow-up period (years)	10.1 (8.3)	8.9 (10.8)	0.41

Values are represented by mean ( $\pm$ SD), number of patients (%), or median (range).

\*Statistically significant  $p < 0.05$ .

- To assess the simultaneous impact of independent variables (age and gender) on the incidence of SPM, logistic regression was conducted. The results revealed that age at diagnosis was the only statistically significant predictor independently related to the occurrence of SPM ( $p=0.04$ ).

## CONCLUSION

Our findings suggest that the risk of SPMs in patients treated with RAI is low, and the age at diagnosis was the only significant predictor of SPM occurrence. These results are important for patients with thyroid cancer who receive RAI as they provide reassurance about the low risk of SPMs. The study contributes to the knowledge and may help guide clinical decision-making regarding the use of RAI in the treatment of thyroid cancer.

## REFERENCES

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