

## Managing thyroid hormone replacement after total thyroidectomy: Guidance for family medicine

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### ABSTRACT

Thyroid hormones are among the most prescribed medications to patients worldwide and are commonly used to treat hypothyroidism. Thyroxine is also indicated after total thyroidectomy for Graves' disease or a multinodular goitre. In this commentary, we discuss and provide guidance for family medicine and primary care clinicians on how to navigate thyroid hormone replacement in patients after total thyroidectomy for cancer.

**Keywords:** Family medicine, primary care, thyroidectomy, thyroxine

### Background

A recent cohort study of over 65,000 patients' primary care healthcare records found an association between thyroid-stimulating hormone (TSH) oversuppression and cognitive disorders in older adults.<sup>[1]</sup> Given that thyroid hormones are among the most prescribed medications globally, it is likely that clinicians will be looking after patients who have had a thyroid function test (TFT) demonstrating TSH oversuppression. This may prompt them to alter their medication. However, TSH oversuppression may be intentional and necessary in some patients. This commentary aims to draw the attention of family medicine and primary care clinicians to patients who have had a total thyroidectomy for cancer and guide them, through reference to clinical guidance from the United Kingdom (UK), on how to navigate through thyroid hormone replacement (THR) for this specific cohort.

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Total thyroidectomy is undertaken for various indications, including thyroid cancer, benign thyroid disease such as Graves' disease, and multinodular goitre. The surgical removal of the complete thyroid gland results in a lack of endogenous thyroxine hormone (T<sub>4</sub>), which has a vital role in metabolism, growth, and numerous bodily functions. Consequently, patients undergoing total thyroidectomy require lifelong THR. The THR requirements differ according to the indication for total thyroidectomy.

### Why Is the Indication for Total Thyroidectomy Important?

Levothyroxine (LT<sub>4</sub>), a synthetic form of thyroxine hormone, is the recommended drug of choice for long-term THR. In patients who have had total thyroidectomy for benign thyroid disease, THR primarily aims to achieve a euthyroid state to prevent symptoms of hypothyroidism. Conversely, in patients with differentiated thyroid cancer (papillary and follicular carcinoma) that meet the criteria for postoperative radioiodine remnant ablation (RRA), supraphysiological doses of LT<sub>4</sub> therapy are used to reduce the risk of cancer recurrence through

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TSH suppression.<sup>[2]</sup> LT4 causes TSH suppression by negative feedback on the pituitary gland, reducing TSH secretion, which would otherwise act as a growth factor on remnant thyroid cancer cells.

## What Is the Optimal Dose for Levothyroxine?

In patients who have undergone total thyroidectomy for differentiated thyroid cancer, an initial risk stratification using the modified American Thyroid Association (ATA) guidelines,<sup>[3]</sup> needs to be done, following which the thyroid MDT will decide whether RRA, is required. In those who have undergone RRA, their thyroid surgeon will initiate LT4 therapy at doses that will suppress TSH to below 0.1mIU/litre in line with national guidance.<sup>[4]</sup> The starting dose is 2 ug per kilogram of body weight.

National guidance from the UK also recommends that thyroid surgeons inform patients' family doctors about the need for TSH suppression and their individual target TSH level.<sup>[3]</sup> After surgery, LT4 dose titration is carried out under the supervision of an endocrinologist and/or thyroid surgeon and will be adjusted by no more than 25 ug every 6 weeks until the target TSH level is achieved.<sup>[3]</sup>

At 9–12 months post-RRA, a re-evaluation of cancer recurrence risk is performed using dynamic risk stratification (DRS).<sup>[3,5]</sup> This is because many patients' disease respond well to treatment; therefore, the need for TSH suppression can be relaxed. DRS takes into consideration three factors which define the response to treatment: thyroglobulin (Tg) levels, neck ultrasound (USS) findings, and cross-sectional/nuclear imaging (if performed). According to these factors, patients are defined into one of three categories: excellent response (low-risk), indeterminate response (intermediate-risk), and incomplete response (high-risk). Depending on risk, the required level of TSH suppression will change, and therefore, LT4 dosing will be adjusted to achieve this. Definitions of each risk stratum and their respective target TSH thresholds are outlined in Table 1. An overview of the key steps in LT4 therapy initiation and dose adjustment for TSH suppression is presented in Figure 1.

## How Should Levothyroxine be Monitored?

Primary care clinicians usually monitor all patients on LT4 with an annual TSH test, as the requirement for thyroxine changes with ageing.<sup>[3]</sup> Automated computerised reminders, where possible, may facilitate patient monitoring.<sup>[3]</sup> However, clinicians should be aware that thyroid cancer patients should be exempt from such planned or automated routine checks. Dose adjustment in this cohort should only be carried out in discussion with their thyroid surgeon or endocrinologist, depending on local secondary care arrangements. However, patients may self-present to primary or secondary care in between routine hospital appointments, with symptoms of over/under suppression. In such cases, clinicians should request TFTs and inform the patient's thyroid surgeon or endocrinologist. In addition, it is important for clinicians to be aware of important adverse effects and signs of toxicity due to high-dose LT4 therapy: this is summarised in algorithm shown in Figure 1.

## What Advice Should be Given to Patients on Thyroxine?

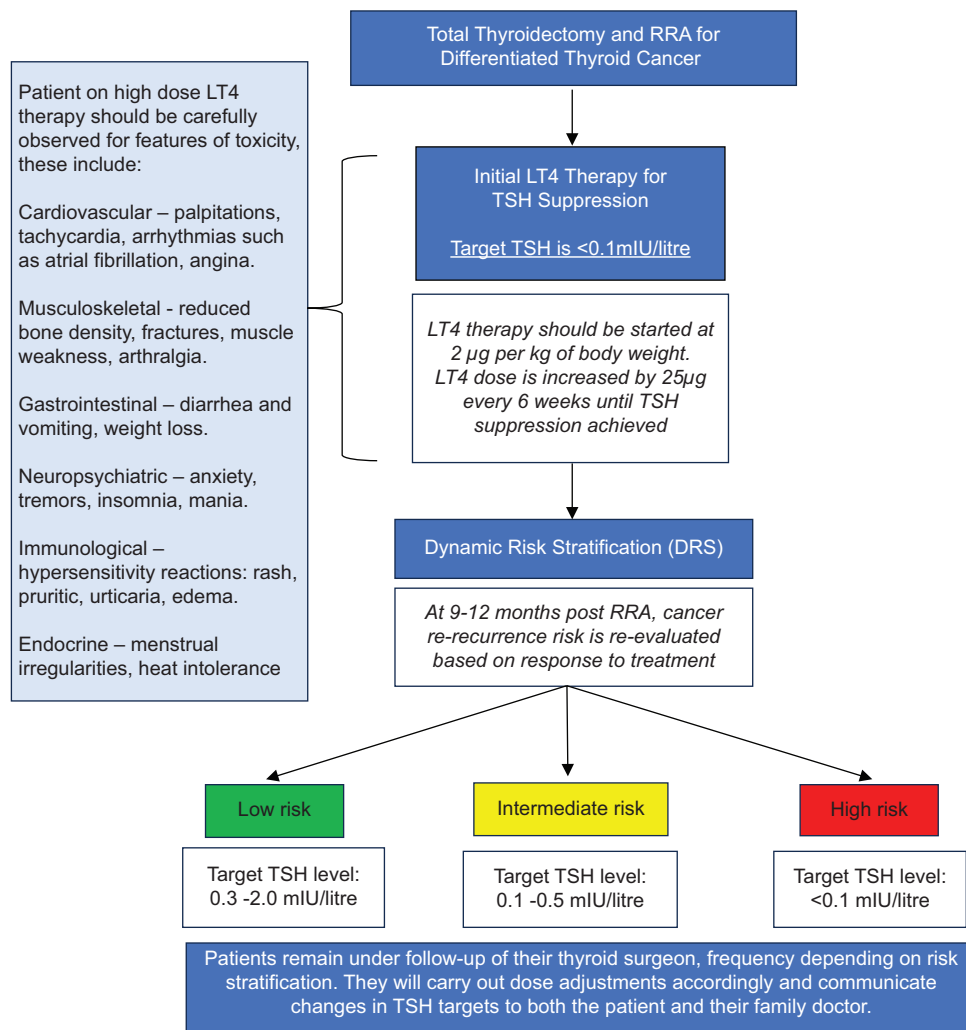
Often, cases of undersuppression are due to LT4 being taken at the incorrect time of day, which results in inadequate gastrointestinal absorption. Certain drugs (such as ferrous sulphate and calcium carbonate), foods, and dietary supplements can also interact with LT4 absorption and efficacy. Patients should be advised to take LT4 first thing in the morning, 30–60 minutes before taking any other medications, caffeine-containing drinks, or breakfast.<sup>[6]</sup> Clinicians should be vigilant of the multiple factors, summarised in Table 2, which could impact on THR requirements including pregnancy,<sup>[7]</sup> change in body mass, and gastrointestinal malabsorption conditions.<sup>[8]</sup>

## When Should Patients be Referred to Specialist Care?

Although patients with ongoing TSH suppression tend to be under the care of their thyroid surgeon for up to 10 years,<sup>[4]</sup> patients may still present to primary or secondary care and have their TFTs checked. This may be because of undersuppression

**Table 1: Risk strata and respective TSH target levels<sup>[3,5]</sup>**

Response to therapy	Defined Criteria as per DRS	Risk stratification	TSH target level
Excellent	All of the following: <ul style="list-style-type: none"> <li>Suppressed and stimulated Tg &lt;1ug/l</li> <li>Neck USS has no evidence of disease</li> <li>Imaging (CT/PET) negative (if performed)</li> </ul>	Low Risk	0.3–2.0 mIU/litre
Indeterminate	Any of the following <ul style="list-style-type: none"> <li>Suppressed Tg &lt;1 ug/l and stimulated Tg ≥1 and &lt;10 ug/l</li> <li>Neck USS – non-specific changes or stable sub-centimetre lymph nodes.</li> <li>Imaging (CT/PET) – non-specific changes but not completely normal.</li> </ul>	Intermediate Risk	0.1–0.5 mIU/litre
Incomplete	Any of the following: <ul style="list-style-type: none"> <li>Suppressed Tg ≥1 ug/l or stimulated Tg ≥10ug</li> <li>Rising Tg Values</li> <li>Imaging (CT/PET) – positive for evidence of persistent/new structural disease</li> </ul>	High Risk	< 0.1 mIU/litre



**Figure 1:** Algorithm for TSH suppression after total thyroidectomy and RRA for differentiated thyroid cancer and monitoring for toxicity<sup>[3,5]</sup>

**Table 2: Factors effecting LT4 absorption and TSH levels<sup>[7,8]</sup>**

Factors which decrease absorption of LT4	Other considerations
Pre-existing GI disorders e.g., Celiac disease, prior bowel resection, bariatric surgery	Pregnancy: Thyroxine requirement increases during pregnancy, and TSH may be suppressed in the first trimester. Special considerations regarding THR and interpretation of TSH levels should be guided by trimester-specific reference ranges
Drugs e.g., laxatives, PPIs	Obesity: Higher BMI has been shown to have a positive correlation with increased TSH levels.
Concomitant intake of supplements containing metal ions e.g., ascorbic acid (Vitamin C), calcium, iron, antacids	TSH suppressing drugs: Many medications can decrease serum TSH levels e.g., dopamine, high-dose glucocorticoids, amphetamines, octreotide, amiodarone and bromocriptine.

GI: gastrointestinal; PPI: proton pump inhibitor; BMI – body mass index

leading to symptoms of overt hypothyroidism or complications of oversuppression such as atrial fibrillation, osteoporosis, irritability, insomnia, and possible hypomania.<sup>[2]</sup> In these cases,

referral to an endocrinologist is urgently warranted. In addition, the thyroid cancer team will want to assess the risks associated with oversuppression against the risk of cancer recurrence, considering the patient's age, cardiovascular, and skeletal status.<sup>[9]</sup>

If patients present with head and neck symptoms relating to potential recurrence of thyroid cancer, a focused clinical assessment should be carried out: Red flags are highlighted in Table 3.<sup>[10]</sup> The presence of red flags should trigger a fasttrack referral back to the patients' thyroid surgeon, who will carry out further investigations such as ultrasound imaging and thyroglobulin assays.

## Conclusion

Managing THR after total thyroidectomy necessitates a nuanced understanding of individual patient needs, particularly with respect to the indication for surgery. Although management of benign thyroid disease is often straightforward, primary care teams must be vigilant in recognising patients who are on LT4 for TSH suppression after total thyroidectomy. Urgent referrals to

**Table 3: Red flags in patients with previous thyroid cancer<sup>[10]</sup>**

History	Examination
Unexplained hoarse voice	A rapidly enlarging, painless, thyroid mass
New external neck lump	Persistent cervical lymphadenopathy
Breathing difficulty	Stridor (warrants same day referral)

specialists may be needed to manage potential complications of under and oversuppression, as well as potential cancer recurrence.

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### Conflicts of interest

There are no conflicts of interest.

### References

- Adams R, Oh ES, Yasar S, Lyketsos CG, Mammen JS. Endogenous and exogenous thyrotoxicosis and risk of incident cognitive disorders in older adults. *JAMA Intern Med* 2023;183:1324-31.
- Grani G, Ramundo V, Verrienti A, Sponziello M, Durante C. Thyroid hormone therapy in differentiated thyroid cancer. *Endocrine* 2019;66:43-50.
- British Thyroid Association. UK Guidelines for the Use of Thyroid Function Tests. 2006. Available from: [https://www.british-thyroid-association.org/sandbox/bta2016/uk\\_guidelines\\_for\\_the\\_use\\_of\\_thyroid\\_function\\_tests.pdf](https://www.british-thyroid-association.org/sandbox/bta2016/uk_guidelines_for_the_use_of_thyroid_function_tests.pdf) [Last accessed on 2024 Mar 03].
- National Institute for Health and Care Excellence. Thyroid cancer: Assessment and management. Available from: <https://www.nice.org.uk/guidance/ng230>. [Last accessed on 2024 Mar 03].
- Pitoia F, Jerkovich F. Dynamic risk assessment in patients with differentiated thyroid cancer. *Endocr Relat Cancer* 2019;26:R553-66.
- British National Formulary. Levothyroxine sodium. Available from: <https://bnf.nice.org.uk/drugs/levothyroxine-sodium/>. [Last accessed on 2024 Mar 03].
- Krhin B, Besic N. Effectiveness of L-thyroxine treatment on TSH suppression during pregnancy in patients with a history of thyroid carcinoma after total thyroidectomy and radioiodine ablation. *Radiol Oncol* 2012;46:160-5.
- Miccoli P, Materazzi G, Rossi L. Levothyroxine therapy in thyroidectomized patients. *Front Endocrinol (Lausanne)* 2021;11:626268.
- Biondi B, Cooper DS. Benefits of thyrotropin suppression versus the risks of adverse effects in differentiated thyroid cancer. *Thyroid* 2010;20:135-46.
- British Thyroid Association. Guidelines for the management of thyroid cancer. Available from: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/cen.12515>. [Last accessed on 2024 Mar 03].