



THYROID DISORDERS

- Check that patients on levothyroxine have regular blood tests, every four to six weeks until stabilised or after a dose change, then annually
- Advise patient that some medicines both prescribed and over-the-counter can affect thyroid function results and to inform doctor of all current medications
- Advise patient that treatment with thyroid hormones is lifelong (if used for an underactive thyroid e.g. Hashimoto's or following surgery or radioiodine treatment) and takes a few weeks to produce symptomatic improvement. Levothyroxine may also be used for shorter periods in sub-acute thyroiditis and postpartum thyroid disease
- Advise patient that treatment with anti-thyroid drugs may take four to eight weeks to produce effects and they may need to continue treatment for a long time (about a year) until the condition is under control
- Counsel patient on purpose of medication and the importance of taking the tablets consistently every day
- Advise patient that levothyroxine tablets are best taken on an empty stomach and 1 hour before other medications or food
- Advise patients on levothyroxine to wait at least 2 – 4 hours before taking fibre supplements, calcium, iron, multivitamins and aluminium hydroxide antacids
- Counsel patient on signs / symptoms of complications that need referral ([see red flags overleaf](#)) and common side effects ([see side effects overleaf](#))
- Advise patients who are pregnant or planning to become pregnant to see their doctor as soon as possible as they need to increase their levothyroxine dose in the very early stages of pregnancy
- Advise patients on beta blockers that these relieve the symptoms of hyperthyroidism, but do not treat the underlying thyroid abnormality
- Report any relevant adverse drug reactions to the Yellow Card Scheme

Pathophysiology of thyroid disorders

Hypothyroidism occurs when thyroid hormones (thyroxine (T_4) and triiodothyronine (T_3)) are secreted in insufficient amounts by the thyroid gland. The commonest causes in the UK are (a) Hashimoto's thyroiditis (an autoimmune thyroid disease), (b) drugs used to treat hyperthyroidism, (c) thyroid surgery and radioiodine therapy and (d) medicines/health foods e.g. lithium, amiodarone & kelp¹. The incidence of overt hypothyroidism in the UK is approximately 1–2%, with women being more commonly affected (particularly older women) - around six times greater than men². Symptoms include lethargy, tiredness, feeling cold, weight gain, poor concentration, constipation, depression, dry skin and hair. Hyperthyroidism occurs when thyroid hormones are produced in excess or released into the blood stream in excess. The body's metabolism is then speeded up triggering a range of symptoms, such as nervousness and anxiety, hyperactivity, unexplained or unplanned weight loss and swelling of the thyroid gland (a goitre). In the UK, the incidence of hyperthyroidism is 0.8 per 1,000 for females and less than 0.1 per 1,000 for males, with the most common cause being Graves' disease³. Nodular thyroid disease (either a multi-nodular goitre or a toxic adenoma - a single nodule that becomes "toxic") accounts for the majority of the rest. Hyperthyroidism may also be caused by drugs such as lithium and amiodarone.

Lifestyle issues

- Counsel patient on reducing alcohol intake to within safe limits (up to 14 units a week, spread evenly over 3 more days, with several alcohol free days)
- Counsel patient on healthy eating, exercise & weight loss (if BMI $> 25\text{kg/m}^2$) – reduce saturated fat and salt intake, avoid salt substitutes, increase oily fish intake, complete 30 minutes of aerobic exercise three to five times a week, reduce caffeine intake to no more than 5 cups a day and recommend 5 portions of fruit and vegetables a day
- Advise patients with eye problems to stop smoking as smoking can make eye problems worse. Refer to Stop Smoking Wales or Pharmacy Stop Smoking services if willing to stop

How do thyroid medications work?

Levothyroxine & Liothyronine	Levothyroxine is the drug of choice for replacement therapy. Liothyronine sodium, which is the synthetic version of T3, has a similar action to levothyroxine but is more rapidly metabolised and has a more rapid effect. It is rarely used in clinical practice for treating the common forms of hypothyroidism.
Carbimazole & Propylthiouracil	Work primarily by interfering with the synthesis of thyroid hormones. Carbimazole is the most widely used drug in the UK with the use of propylthiouracil being reserved for a few selected patients only (those who have side effects to carbimazole or women in the first trimester of pregnancy). Graves' Disease may be treated by a "dose titration" (patients are treated with reducing doses for up to 12 months) or a "block and replacement" regime (high dose carbimazole and levothyroxine in combination (for 6-9 months))



Red flags that need referral

- Any chest pain
- Any symptoms of infection – warn patients about severe “sore throats” which may indicate low white cell counts in the blood in patients on carbimazole or propylthiouracil. They may also have fever, gum swelling and bleeding, mouth ulcers, bleeding, persistent cough or shortness of breath - **Immediate referral to a medical practitioner is indicated**
- Symptoms of myxedema coma (below normal temperature, decreased breathing, low blood sugar, low blood pressure, unresponsiveness, inappropriate or uncharacteristic moods) – **extremely rare medical emergency**
- Symptoms of liver disorder (anorexia, nausea, vomiting, fatigue, abdominal pain, jaundice, dark urine or pruritis) – **patients should seek prompt medical attention**
- Symptoms of a thyroid storm, precipitated by sudden severe hypersecretion of the thyroid hormone (fever, rapid palpitations, atrial fibrillation, dehydration and confusion) – **this is a medical emergency**
- Pregnancy – (a) patients on levothyroxine need to increase their levothyroxine as early as possible after they know they are pregnant. Increased doses of levothyroxine are essential for normal neurodevelopment of the foetus as at this stage the foetus does not have a functioning thyroid gland. This needs supervision by a physician and immediate referral is indicated.
(b) patients on carbimazole or propylthiouracil will also need to be referred to a physician as prompt dose adjustment and consideration for changing medication (from carbimazole to propylthiouracil in the first trimester) will need to be made
- Breastfeeding is safe if the patient is only on small doses of carbimazole. This is best judged by a physician who deals with these problems

What are the common side effects to look out for?

Drug	Common side effects	Recommendation
Levothyroxine & liothyronine sodium	Diarrhoea, vomiting, angina pain, arrhythmias, palpitations, tachycardia, tremor, restlessness, excitability, insomnia, headache, flushing, sweating, fever, heat intolerance, weight-loss, muscle cramp and weakness	Refer to prescriber as usually result of excessive dosage.
	Hypersensitivity reactions such as rash, pruritis and oedema	Refer to prescriber.
Carbimazole & propylthiouracil	Nausea and mild gastrointestinal disturbances, taste disturbance, headache, malaise, fever and arthralgia (joint pain)	Refer to prescriber if not tolerated and reassure patient that these side effects should pass.
	Itchy, skin rash	Rashes and pruritis can be treated with antihistamines.

Potential serious drug interactions?

Drugs used to treat thyroid disorders can interact with other medications. Changes in thyroid function may also affect other medication due to changes in metabolism – **See BNF Appendix 1: Interactions for more details.**

- Anticoagulants (thyroid hormones enhance the anti-coagulant effect of coumarins and phenindione and there is an increased risk of side effects when used with propylthiouracil)
- Beta-blockers, digoxin, theophylline (increased risk of side effects with propylthiouracil)
- Correction of hypothyroidism may increase requirements of insulin or oral hypoglycaemics – monitoring of blood glucose is recommended in diabetics starting thyroid hormones
- Clozapine use is contraindicated with carbimazole and propylthiouracil due to risk of bone marrow suppression

Lithium & amiodarone can induce both hyper and hypothyroidism in patients.

Where can you find more information?

- BNF: Thyroid and antithyroid drugs 6.2.1 Thyroid hormones
- The British Thyroid Foundation which can be found at <http://www.btf-thyroid.org/>
- Thyroid-disease.org.uk which can be found at <http://www.thyroid-disease.org.uk/>
- NICE Clinical Knowledge Summary can be found at <http://cks.nice.org.uk/>
- NHS choices – Underactive thyroid (Hypothyroidism) can be found at <http://www.nhs.uk/conditions/Thyroid-under-active/Pages/Introduction.aspx>

References

1. Endocrine disorders in relation to pharmacy practice(2008), CPPE distance learning pack
2. Vanderpump MP, Tunbridge WMG, French JM, et al. The incidence of thyroid disorders in the community: a twenty-year follow-up of the Whickham Survey. Clinical Endocrinology 1995;43:55–68.
3. Lloyd J, Yerbury P & Ruszala V, Thyroid disorders: clinical features and diagnosis. Clinical Pharmacist, Volume 3 November 2011: 323-329
4. Kavanagh S, Boparai P. Thyroid dysfunction and drug interactions. Pharmaceutical Journal, 28 May 2015.

