

# DRUGS FOR THYROID DISORDERS

The thyroid gland produces the hormone thyroxine, which regulates the body's metabolism. During childhood, thyroxine is essential for normal physical and mental development. Calcitonin, also produced by the thyroid, regulates calcium metabolism and is used as a drug for certain bone disorders (p.80).

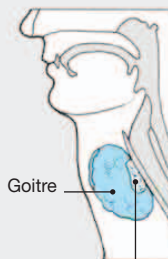
## Hyperthyroidism

In this condition (often called thyrotoxicosis), the thyroid is overactive and produces too much thyroxine. Women

are more commonly affected than men. Symptoms include anxiety, palpitations, weight loss, increased appetite, heat intolerance, diarrhoea, and menstrual disturbances. Graves' disease is the most common form of hyperthyroidism. It is an autoimmune disease in which the body produces antibodies that stimulate the thyroid to produce excess thyroxine. Patients with Graves' disease may develop abnormally protuberant eyes (exophthalmos) or a swelling involving the skin over the shins (pretibial myxoedema). Hyperthyroidism can be caused by a benign single tumour of the thyroid (an adenoma) or a pre-existing multinodular goitre. Rarely, an overactive thyroid may follow a viral infection, a condition called thyroiditis. Inflammation of the gland leads to the release of stored thyroxine.

## TREATMENT FOR GOITRE

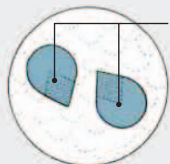
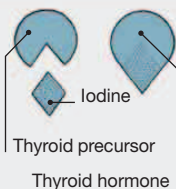
A goitre is a swelling of the thyroid gland. It may occur only temporarily, during puberty or pregnancy, or it may be due to an abnormal growth of thyroid tissue that requires surgical removal. It may rarely be brought about by iodine deficiency. This last cause is treated with iodine supplements (see also p.430).



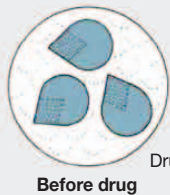
## ACTION OF DRUGS FOR THYROID DISORDERS

### Thyroid hormone production

Iodine combines with other chemicals (precursors) in the thyroid gland to make thyroid hormones.

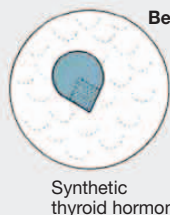


**Normal output of thyroid hormones**  
Thyroid output is normally regulated according to the body's needs.



### Action of antithyroid drugs

In hyperthyroidism, antithyroid drugs partly reduce the production of thyroid hormones by preventing iodine from combining with thyroid precursors in the thyroid gland.



### Action of thyroid hormones

In hypothyroidism, when the thyroid gland is underactive, supplements of synthetic or (rarely) natural thyroid hormones restore hormone levels to normal.

## Management of hyperthyroidism

There are three possible treatments: antithyroid drugs, radioactive iodine (radio-iodine), and surgery. The most commonly used antithyroid drug is carbimazole, which inhibits the formation of thyroid hormones and reduces their levels to normal over about 4–8 weeks. In the early stage of treatment a beta blocker (p.55) may be prescribed to control symptoms. This should be stopped once thyroid function returns to normal. Long-term carbimazole is usually given for 12–18 months to prevent relapse. A "block and replace" regimen may also be used. In this treatment, the thyroid gland is blocked by high doses of carbimazole and thyroxine is added when the level of thyroid hormone in the blood falls below normal.

Carbimazole may produce minor side effects such as nausea, vomiting, skin rashes, or headaches. Rarely, the drug may reduce the white blood cell count. Propylthiouracil may be used as an alternative antithyroid drug.

Radio-iodine is frequently chosen as a first-line therapy, especially in the elderly, and is the second choice if hyperthyroidism recurs following use of carbimazole. It acts by destroying thyroid tissue. Hypothyroidism occurs in up to 80 per cent of people within 20 years after treatment. Long-term studies show radio-iodine to be safe, but its use should be avoided during pregnancy and breast-feeding, and in patients with thyroid eye disease.

Surgery is a third-line therapy. Its use may be favoured for patients with a large goitre, particularly if it causes difficulty in swallowing or breathing. Exophthalmos may require corticosteroids (p.99) as it does not respond to other treatments.

## Hypothyroidism

This is a condition resulting from too little thyroxine. Sometimes it may be caused by an autoimmune disorder, in which the body's immune system attacks the thyroid

gland. Other cases may follow treatment for hyperthyroidism. In newborn babies, hypothyroidism may be the result of an inborn enzyme disorder. In the past, it also arose from a deficiency of iodine in the diet.

The symptoms of adult hypothyroidism develop slowly and include weight gain, mental slowness, dry skin, hair loss, increased sensitivity to cold, and heavy menstrual periods. In babies, low levels of thyroxine cause permanent mental and physical retardation and, for this reason, babies are tested for hypothyroidism within a week of birth.

## Management of hypothyroidism

Lifelong oral treatment with synthetic thyroid hormones (thyroxine (levothyroxine), or liothyronine) is the only option. Blood tests are performed regularly to monitor the treatment and permit dosage adjustments. In the elderly, as well as people with heart disease, gradual introduction of thyroxine is used to prevent heart strain.

In severely ill patients, thyroid hormone may be given by injection. This method of administration may also be used to treat newborn infants with low levels of thyroxine.

Symptoms of thyrotoxicosis may appear if excess thyroxine replacement is given. Otherwise, no adverse events occur since treatment is adjusted to replace the natural hormone that the body should produce itself.

## COMMON DRUGS

**Drugs for hypothyroidism**  
Levothyroxine (thyroxine) \*  
Liothyronine

**Drugs for hyperthyroidism**  
Carbimazole \*  
Iodine \*  
Nadolol  
Propranolol \*  
Propylthiouracil \*  
Radioactive iodine (radio-iodine)

\* See Part 3