

Hyperthyroidism: What are the advantages and disadvantages of combined treatment with anti-thyroid drugs and radioiodine?



Using anti-thyroid drugs before, during or after radioiodine therapy reduces the adverse effects of the treatment, but the trade-off is a similar reduction in treatment effectiveness.

Using anti-thyroid drugs before, during or after radioiodine therapy reduces the adverse effects of the treatment, but the trade-off is a similar reduction in treatment effectiveness.

Hyperthyroidism is a common condition: it affects 2 out of every 1,000 men (0.2%) and 20 out of every 1,000 women (2%). It often leads to a visible enlargement of the thyroid gland, which is located at the front of the neck. This swelling in the neck is called a goitre.

Hyperthyroidism is the medical term for an overactive thyroid gland. The thyroid gland is a part of the body's endocrine (hormone) system – the glands that help regulate many of the body's functions. If the thyroid is overactive, it produces too much of the thyroid hormone called thyroxine.

Having too much thyroid hormone speeds up several of the body's process, for example it causes the metabolism and heart rate to go faster. Symptoms include weight loss, fatigue, hyperactivity, a racing heart and atrial fibrillation (an extremely fast and irregular heartbeat). A very high level of thyroid hormone can cause heart failure.

On the other hand, too little thyroid hormone slows down the body's processes. This condition is called hypothyroidism, underactive thyroid or thyroid insufficiency. Its symptoms include weight gain and a general loss of energy and strength.

Hypothyroidism can also be an adverse effect of treatment for an overactive thyroid gland if the treatment has suppressed the production of thyroid hormones too much. Once this happens, the person will most likely need thyroid treatment (thyroid hormone replacement therapy) for the rest of their lives. The risk of this and other adverse effects means that treatment for hyperthyroidism is a very delicate balancing act.

The main treatments for hyperthyroidism are medications that reduce the production of thyroid hormones (anti-thyroid drugs), surgery to remove thyroid gland tissue, and radioiodine therapy. The choice of treatment depends on various factors. For example, radioiodine therapy is particularly suitable for people whose thyroid gland has not grown much in size. One of the most common forms of hyperthyroidism is called Graves' hyperthyroidism. You can read more about anti-thyroid drugs for Graves' hyperthyroidism [here](http://www.informedhealthonline.org/index.99.en.html) (URL: <http://www.informedhealthonline.org/index.99.en.html>).

Radioiodine therapy involves swallowing radioactive iodine (radioiodine), which collects in the overactive thyroid gland and slows the production of thyroid hormones. Radioiodine is taken in the form of a capsule or dissolved in water. The amount of radiation is very low and most of it will have left the body within a few days. Still, people who take radioiodine should avoid very close contact with other people for one to two days. In Germany, they stay in hospital for a few days because of this. Radioiodine therapy is not suitable for pregnant women.

In the treatment of hyperthyroidism, anti-thyroid drugs are often used on their own at first. If this does not work, additional treatments like radioiodine therapy or surgery may be needed too.

In order to weigh up the benefits and harms of combining anti-thyroid drugs and radioiodine, researchers from the Basel University Hospital in Switzerland looked for clinical trials where people with hyperthyroidism were given radioiodine, with or without anti-thyroid drugs (used either before, during or after radioiodine). They found 14 of these trials, involving over 1,300 people with hyperthyroidism. The most commonly used drugs were propylthiouracil, carbimazole and methimazole.

The main goal of adding these drugs is to reduce the adverse effects of radioiodine, especially the risk of what is called a thyroid storm. That is a sudden increase in thyroid hormones which is so high that it is life-threatening. This rare complication is believed to happen in about 3 out of every 1,000 people treated with radioiodine, but there has not been enough research to be sure about how often it happens and how often people die as a result. Other researchers have looked at the question of whether radioiodine therapy can increase the risk of cancer, but this question has not been answered by long-term clinical trials.

The Swiss researchers concluded that taking anti-thyroid drugs on top of radioiodine can reduce the adverse effects of radioiodine therapy, including a worsening of symptoms shortly after therapy. When people used anti-thyroid drugs before, during and/or after radioiodine therapy, their rate of hypothyroidism was about 10% lower. In other words, for every 10 people who used anti-thyroid drugs as well, one person avoided hypothyroidism (and the possible lifelong thyroid treatment that comes with it). It is difficult to be precise though, because this adverse effect sometimes occurs

long after the treatment is finished. Even with the use of anti-thyroid drugs, the rate of hypothyroidism after radioiodine therapy might still be as high as 14% (14 out of every 100 people). This means that people who have radioiodine therapy need to be monitored for years afterwards to see whether they are developing hypothyroidism.

The rate of adverse effects other than hypothyroidism was about 2 out of every 100 people (1.8%). These were mostly allergic skin reactions.

The “price” of less hypothyroidism (underactive thyroid gland) was a reduction in the effectiveness of the treatment. The treatment’s success was reduced by roughly the same amount as the hypothyroidism rate: of the people who used anti-thyroid drugs, treatment failed for an extra 10% compared to those who did not take these drugs. Treatment failure means the hyperthyroidism (overactive thyroid gland) symptoms returned and they had to be treated again.

Using a combination of anti-thyroid drugs and radioiodine therapy will involve a lot of monitoring and adjusting the medication and the radioiodine, depending on the individual person. There is no conclusive answer about whether one anti-thyroid drug works better than others in combination with radioiodine therapy. However, some studies have found more benefit from carbimazole and methimazole than from propylthiouracil. In June 2009 the US regulatory authority FDA (the Food and Drug Administration) issued a safety alert: Propylthiouracil in particular has been found to cause severe damage to the liver. If you are using this drug, you can talk to your doctor about the benefits and possible harms of taking it and find out about the warning signs of liver damage.

Author: German Institute for Quality and Efficiency in Health Care (IQWiG)

Glossary

hormones

“Hormones” is the collective term for different types of messenger substances in the body. They are produced in different organs or tissues and released into the blood or the lymphatic system to be distributed throughout the body. Hormones only have an effect on those parts of the organism that have a corresponding docking site. This is how hormones can have such specific effects. Insulin, estrogens, vasopressin and thyroxine are some well-known hormones. Many medical ingredients imitate the effect of hormones.

atrial fibrillation

Atrial fibrillation is a type of arrhythmia where the heart's atria (the chambers where blood enters the heart) beat very rapidly and irregularly. This is not usually acutely life-threatening, but with time it can increase the risk of having a stroke. This is due to small blood clots that are then more likely to occur in the atria because the normal flow of blood is affected.

fatigue

Fatigue is a term used to describe paralyzing mental and physical exhaustion that may also be accompanied by heightened emotional sensitivity. In contrast to usual tiredness, fatigue only responds to rest or sleep to a very limited extent.

Sources

IQWiG health information is based on research in the international literature. We identify the most scientifically reliable knowledge currently available, particularly so-called “systematic reviews”. These summarise and analyse the results of scientific research on the benefits and harms of treatments and other health care interventions. This helps medical professionals and people who are affected by the medical condition to weigh up the pros and cons. You can read more about systematic reviews and why these can provide the most trustworthy evidence about the state of knowledge here (URL: <http://www.gesundheitsinformation.de/evidence-based-medicine.61.en.html>) . The authors of the major systematic reviews on which our information is based are always approached to help us ensure the medical and scientific accuracy of our products.

Abraham P, Avenell A, Watson WA, Park CM, Bevan JS. Antithyroid drug regimen for treating Graves' hyperthyroidism. *Cochrane Database of Systematic Reviews* 2005, Issue 2. [Cochrane summary (URL: <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003420/frame.html>)] [Informed Health Online summary (URL: <http://www.informedhealthonline.org/index.99.en.html>)]

Metso S, Auvinen A, Huhtala H, Salmi J et al. Increased cancer incidence after radioiodine treatment for hyperthyroidism. *Cancer* 2007; 109: 1972-1979. [PubMed summary (URL: <http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=ShowDetailView&TermToSearch=17393376&ordinalpos=33&itool=En>)]

US Food and Drug Administration (FDA). *FDA Alert: Propylthiouracil-Induced Liver Failure*. Rockville: FDA. 4 June 2009. [Full text (URL: <http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/DrugSafetyInformationforHeathcareP>)]

Walter MA, Briel M, Christ-Crain M, Bonnema SJ et al. Effects of antithyroid drugs on radioiodine treatment: systematic review and meta-analysis of randomised controlled trials. *BMJ* 2007; 334: 514. [Full text (URL: <http://www.bmj.com/cgi/content/full/334/7592/514>)]

The German Institute for Quality and Efficiency in Health Care (IQWiG)

The German Institute for Quality and Efficiency in Health Care (IQWiG) was established by legislation to provide evaluations of the effectiveness, quality and efficiency of healthcare services. This includes the assessment of medicines as well as the publication of health information for consumers and patients.

Evidence basis of our health information

Our information is based primarily on systematic reviews of the effects of health care. Systematic reviews are necessary to gain an objective picture of health care. In order to do this, a clear question is formulated. Researchers then find all the relevant studies that could answer this question. They then evaluate those studies.

You can find a list of the evidence and other scientific literature on which this information is based at [**www.informedhealthonline.org**](http://www.informedhealthonline.org)

Disclaimer

This information was prepared and published by the German Institute for Quality and Efficiency in Health Care (IQWiG). It is based on the evidence and other scientific literature available at the time of publication. The information is intended for the use of patients in Germany. It is not intended to for use to diagnose illnesses and the information is not intended to substitute for medical advice.