

# Hyperthyroidism caused by excessive consumption of sausages

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## ABSTRACT

Hyperthyroidism results from excessive production of thyroid hormones. This is usually caused by Graves disease, but exogenous thyroid hormones can lead to similar symptoms. Recognition of the latter is difficult as excessive intake of thyroid hormone is not usually admitted nor recognised. To our knowledge, exogenous hyperthyroidism caused by thyroid-contaminated food has been described twice, but not in the Netherlands.

A 77-year-old man presented at the Outpatient Department of Internal Medicine with lab values revealing hyperthyroidism. There were no abnormal findings at the physical examination. Antibodies against the thyroid-stimulating hormone (TSH) receptor were not detectable. Thyroid scintigraphy with <sup>123</sup>I showed an uptake of less than 1%. Silent thyroiditis was diagnosed and the natural course was awaited, but with no improvement in the thyroid values. The thyroglobulin was very low. Further anamnesis revealed an excessive daily consumption of sausages. Thyroid hormones were detectable in these sausages. After the patient stopped eating them, he became and remained euthyroid. The case stipulates the importance of a thorough anamnesis.

hyperthyroidism, in which the hyperthyroidism is the result of an excessive intake of thyroid hormone. This is either done deliberately or by accident. We describe a patient with an exogenous hyperthyroidism caused by excessive intake of sausages contaminated with thyroid hormone.

## PATIENT HISTORY

Patient A, a 77-year-old male, was referred to our Outpatient Department of Internal Medicine by the general practitioner because of abnormal lab values revealing hyperthyroidism. His medical history included hypertension, myocardial infarction and a coronary bypass surgery. His medication consisted of carbasalate calcium, quinapril and pravastatin; there was no history of amiodarone use. He complained of involuntary weight loss, 12 kilos in one year. He noted no diarrhoea, sweating, palpitations or neck pain. On examination he was not ill-looking, he was slightly overweight (BMI 25.5 kg/m<sup>2</sup>), with a blood pressure of 110/60 mmHg and a pulse of 80 beats/min. Examination of heart, lungs, abdomen and extremities showed no abnormalities, the thyroid was not enlarged and had a normal consistence. Laboratory results

## KEYWORDS

Exogenous hyperthyroidism, sausages, thyroid hormone

## INTRODUCTION

Hyperthyroidism usually has an endogenous cause such as Graves disease, toxic multinodular struma or silent thyroiditis. A less frequently recognised cause is exogenous

### What was known about this topic?

Hyperthyroidism can be caused by exogenous intake, and it is not always recognised. Food in itself is not often considered a cause.

### What does this add?

This article stresses the importance of a thorough anamnesis and search for a causative agent for hyperthyroidism, and not to diagnose a silent thyroiditis too easily.

showed a hyperthyroidism (reference values between brackets); thyroid-stimulating hormone (TSH) of 0.01 (0.44 to 4.22) mU/l and a free T<sub>4</sub> of 21.9 (7.0 to 17.1) pmol/l. Total T<sub>3</sub> and total T<sub>4</sub> were also elevated at 3.6 (1.0 to 3.0) and 178 (72 to 161) nmol/l, respectively. Antibodies against the TSH receptor were not detectable. Other lab values were in the normal range.

Thyroid scintigraphy with <sup>123</sup>I showed an uptake of less than 1%. We made the diagnosis of silent thyroiditis in this patient and awaited the natural course. After six months the patient's TSH/free T<sub>4</sub> values had not improved. A control thyroid scintigraphy again showed a very low uptake: 3%. Thyroglobulin was tested to exclude exogenous hyperthyroidism; it was very low at 0.7 pmol/l (2.5 to 50.0). The patient had not had any contact with potential thyroid-containing food supplements or iodide-containing roentgen contrast. He did eat a large amount of sausages (300 g/day) bought at a budget supermarket. We tested two sausages for thyroid hormone. The sausages indeed contained T<sub>4</sub> (26 and 71 ng/g) and T<sub>3</sub> (7 and 3 ng/g) (no reference values, no confidence interval known). So, the patient was consuming between 7.8 and 21.3 µg T<sub>4</sub> and between 2.1 and 1 µg T<sub>3</sub> a day. We advised the patient to stop eating sausages of this specific brand after which he became and remained euthyroid. The thyroid scintigraphy after five months showed an uptake of 13%. We concluded that this patient had an exogenous hyperthyroidism caused by excessive intake of thyroid-containing sausages. We reported the case to the Dutch food authority.

## DISCUSSION

### Epidemiology

There is little known about the incidence and prevalence of thyreotoxicosis factitia. In the literature we found reports on outbreaks of hyperthyroidism caused by eating hamburgers containing ground beef thyroid (Nebraska 1984,<sup>1</sup> Minnesota 1986<sup>2</sup>). In 2001 a Canadian case report described hyperthyroidism caused by eating grounded beef.<sup>3</sup>

### Causes

Excessive intake of thyroid hormone is usually accidental: patients are prescribed the wrong dose of levothyroxin by their doctor or children take a parent's medicine. Patients trying to lose weight can take thyroid hormone on purpose, or consume it accidentally (diet pills).<sup>4</sup> Beef containing ground thyroid is found incidentally as described above.<sup>1,3</sup> In *table 1*, we list the most frequent causes.

### Symptoms

The symptoms depend on the amount and sort of thyroid hormone ingested. T<sub>3</sub> will cause symptoms earlier due

**Table 1.** Causes of thyreotoxicosis

Frequent	Rare
Graves disease	Silent thyroiditis
Toxic multinodular struma	Thyroiditis post partum
	Hashimoto toxicosis (patients eventually become hypothyroid)
	Choriocarcinoma, germ cell tumours (direct stimulation TSH receptor by HCG)
	Radiation thyroiditis
Iatrogenic (excessive thyroxin supplementation in hypothyroidism)	Medication-induced thyroiditis (amiodarone, interferon-α, interleukin-2)
Knowingly suppressing TSH with exogenic thyroxin supplementation for control of struma or thyroid carcinoma	Ectopic thyroid tissue (struma ovarii)
	Pregnancy
	Functional metastatic follicular carcinoma
	TSH-producing pituitary adenoma
	Thyreotoxicosis factitia

**TSH = thyroid-stimulating hormone; HCG = human chorionic gonadotropin.**

to a greater absorption and a higher activity. Age is an important factor, younger and healthier patients experience fewer symptoms. Presentation of a patient with an exogenous hyperthyroidism resembles other causes such as Graves disease or toxic multinodular struma. Tachycardia and elevated systolic blood pressure are often present in patients with exogenous hyperthyroidism. Struma and exophthalmia are usually not present.<sup>3,4</sup>

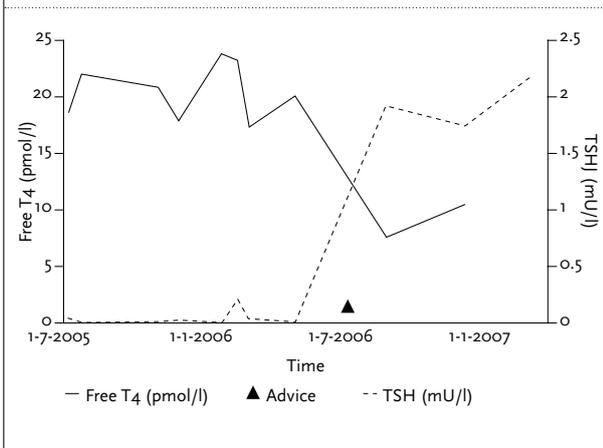
### Diagnosis

Exogenous hyperthyroidism must be considered when a patient has hyperthyroidism, no struma, a low uptake in thyroid scintigraphy and a low serum thyroglobulin. A low uptake in a thyroid scintigraphy, due to suppression of TSH secretion, is present in exogenous hyperthyroidism, thyroiditis or in iodide-induced hyperthyroidism. The final diagnosis can be made by testing thyroglobulin as thyroglobulin is low in exogenous hyperthyroidism and elevated in the other causes of hyperthyroidism.<sup>3,5</sup> One study evaluated faecal T<sub>4</sub> measurements to diagnose exogenous hyperthyroidism. Faecal T<sub>4</sub> was increased twofold (normal subjects 1 nmol/g) in patients with Graves disease and 12 to 24-fold increased in patients with exogenous hyperthyroidism.<sup>6</sup> Serum concentrations of T<sub>4</sub> and T<sub>3</sub> can be useful to diagnose which kind of thyroid hormone is ingested.

### Treatment

Treatment is symptomatic and consists of discontinuation of the intake of thyroid hormone and, if necessary, β-blockade for relief of symptoms.<sup>4,5</sup> Acute intoxication

**Figure 1.** Thyroid function in time. Arrow: moment at which the patient was instructed to quit eating the sausages



after excessive intake can be treated with a gastric lavage. When the intoxication is life-threatening, plasmapheresis can be considered, but is only partially effective as 25 to 30% of the total ingested dose is removed.<sup>4</sup>

## CONCLUSION

Hyperthyroidism is rarely caused by excessive intake of thyroid hormone. As mentioned above, there have been published cases of hyperthyroidism due to intake of beef with ground thyroid. In 1933, hyperthyroidism caused by iodised kitchen salt was described by Pinkhof.<sup>7</sup> As far as we know, this is the first case of hyperthyroidism caused

by ground beef in the Netherlands. We do not know how the sausages were contaminated with thyroid tissue and how long they had been contaminated. Perhaps there are more cases which have not been recognised (yet), and we ask colleagues to be aware of this possibility.

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