# THYROID FUNCTION TESTS (CASE STUDY)

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# Case study 1

A 30-year-old housewife attended her GP. She had lost weight (6kg in the previous 3 months), was irritable and felt uncomfortable in the recent spell of hot weather. She was taking an oestrogen-containing oral contraceptive. On clinical examination, her palms were sweaty and she had a fine tremor of the fingers when her arms were outstretched. There was no thyroid enlargement or bruit, and no eye signs. The following results were reported for thyroid function tests:

| Serum | Result | Reference range |
|---|---|---|
| TSH | <0.01 | 0.2–4.5 mU/L |
| FT4 | 19 | 9–21 pmol/L |
| FT3 | 12.1 | 2.6–6.2 pmol/L |
| Total T3 | 6.5 | 0.9–2.4 nmol/L |

What is the diagnosis in this patient, and on which results was this diagnosis based?

**Comments:** The patient had T3 thyrotoxicosis, and the diagnosis was based on the increased plasma FT3 and undetectable TSH, in the presence of a normal plasma FT4. The fact that the patient was taking an oestrogen-containing oral contraceptive would account for some of the increase in total T3, since the oestrogen content in the oral contraceptive would cause an increase in plasma TBG.

In patients with thyrotoxicosis but no goitre, it is helpful to perform a thyroid isotope scan to help determine the cause of the hyperthyroidism. This patient's thyroid scan showed a diffuse and increased uptake of Tc-99m pertechnetate, and TSH receptor antibodies were detected in her serum. This patient had Graves' disease but no goitre; this is thought to arise when TRAbs are present that stimulate the pathways required for thyroid hormone synthesis, but not thyroid growth.

Case study 2

A 28-year-old female office worker presented to her GP complaining she had developed what she described as a persistent sore throat following a cold she had 2 weeks earlier. The throat pain was worse when she turned her head or swallowed. She also complained of feeling very tired. There was no past medical history of note.
On examination she was pyrexial and had a fine tremor and tachycardia (90 beats/min). Her thyroid was firm but tender and appeared to be slightly enlarged.
The GP took a blood sample and the following results were found:

## Haematology

The erythrocyte sedimentation rate (ESR) was markedly increased. Full blood count and blood film were unremarkable.

## Biochemistry

| Serum | Result | Reference range |
|---|---|---|
| TSH | <0.01 | 0.2–4.5 mU/L |
| FT4 | 40 | 10–21 pmol/L |
| FT3 | 10 | 2.6–6.2 pmol/L |

The patient was referred to an endocrinologist and seen 2 weeks later. Her thyroid gland was no longer painful and repeat blood tests were performed.
The ESR remained elevated.

| Serum | Result | Reference range |
|---|---|---|
| TSH | <0.01 | 0.4–4.5 mU/L |
| FT4 | 23 | 10–21 pmol/L |
| FT3 | 7 | 2.6–6.2 pmol |

Anti-thyroid peroxidase and TSH-receptor antibodies were negative. The uptake of Tc-99m pertechnetate by the thyroid was found to be negligible.
What is the likely diagnosis?
**Comments:** The patient has viral thyroiditis (also known as de Quervain thyroiditis). This induced a transient hyperthyroidism.
The very low uptake of radioiodine is due to the low TSH (TSH is required to trap iodine) and the fact that thyroid follicular cells are damaged.
She returned to the clinic 4 weeks later for review and was found to be biochemically hypothyroid (raised TSH, low FT4). No treatment with thyroxine was required as the hypothyroidism is usually transient in this disorder.