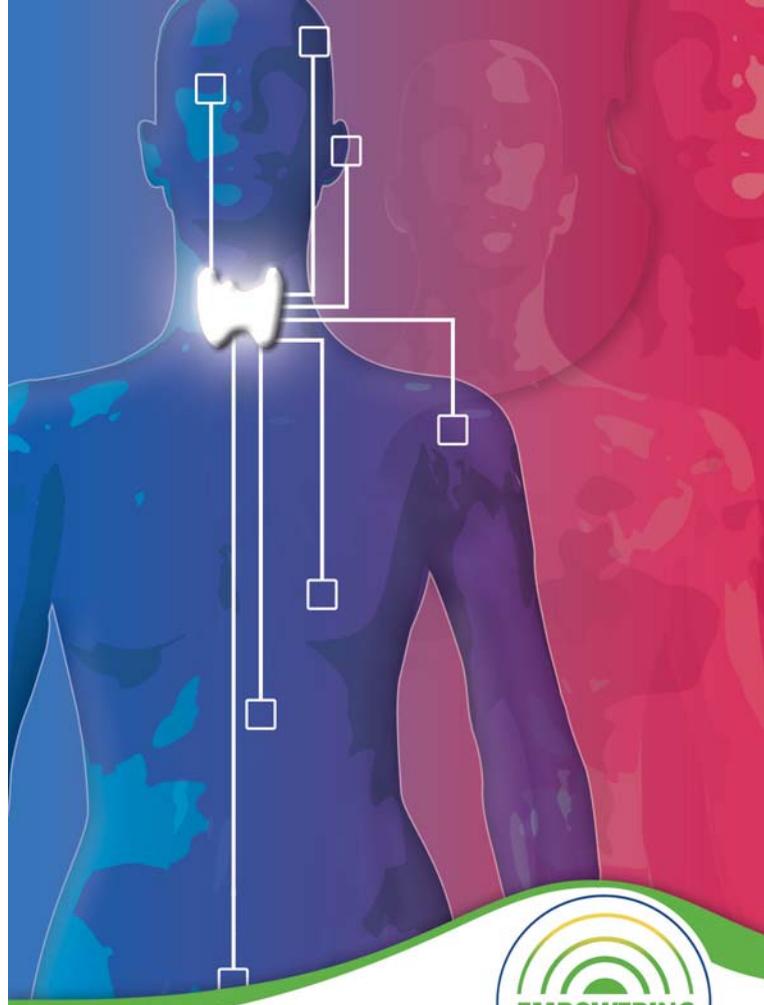


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The information in this booklet is given as a guideline only and is not intended to be exhaustive. It in no way binds bioMérieux S.A. to the diagnosis established or the treatment prescribed by the physician.



# Investigation of the Thyroid Function

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# Who requires □ a thyroid profile?

- 1 All patients with a combination of symptoms suggesting a thyroid dysfunction, and/or with a morphological anomaly of the thyroid gland.

**N.B.** Since the role of thyroid hormones is essential for maturation and development, a profile is carried out for all newborns and children with a growth disorder.

## Significance of the thyroid profile

Thyroid hormones affect the regulation of every body organ, mainly through nuclear receptors (expression of genes through transcription), but also other receptors (membrane, mitochondria, etc.) or actions linked with other hormones.

Consequently, any dysfunctioning in the thyroid system results in a large number of general symptoms indicating:

- either excess synthesis of thyroid hormones (**hyperthyroidism**)
- or insufficient production (**hypothyroidism**).

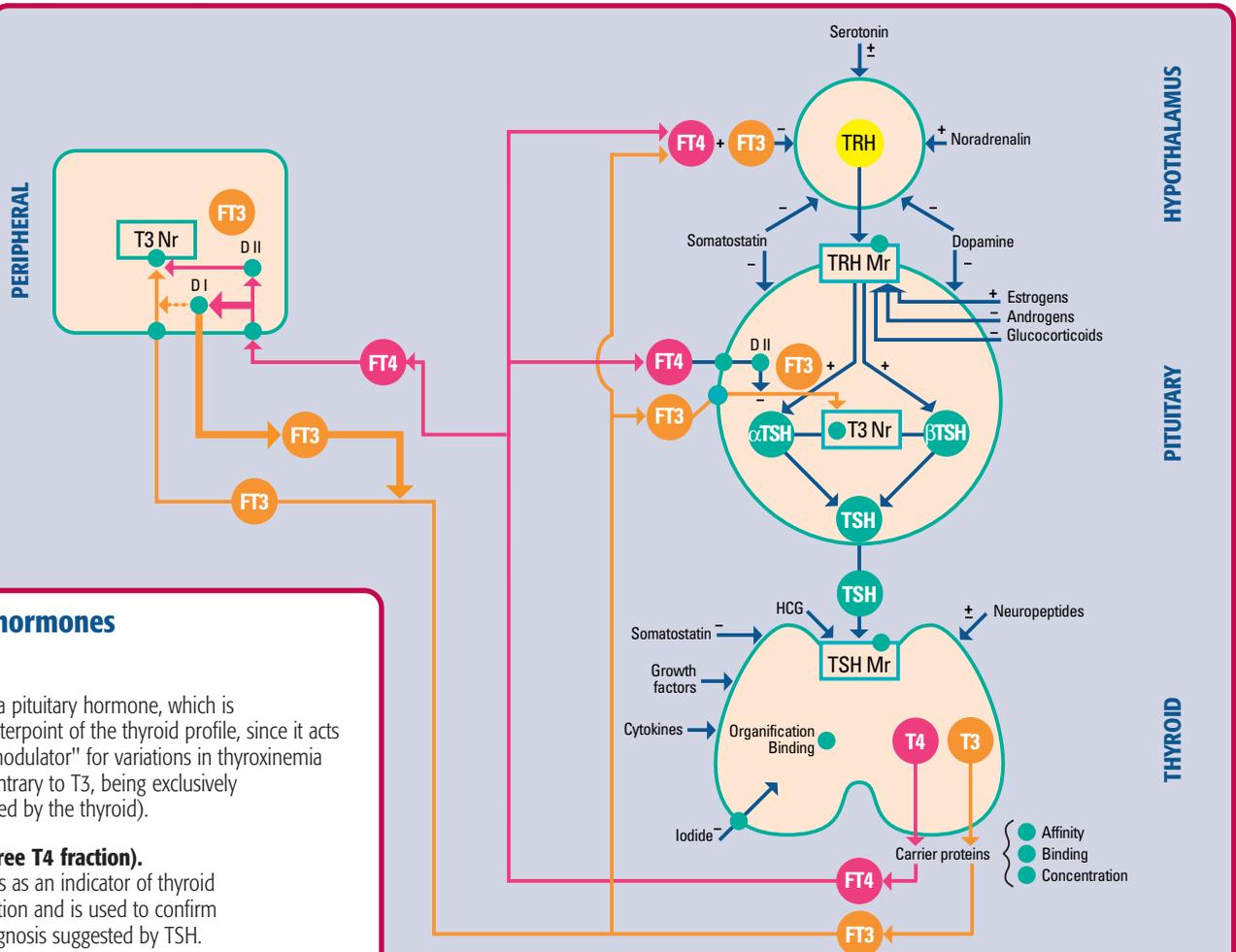
### Main general symptoms associated with thyroid dysfunction :

- **asthenia (hypo),**
- **apathy (hypo) or excitement (hyper),**
- **slow (hypo) or rapid (hyper) pulse rate,**
- **slow (hypo) or rapid (hyper) heart rate,**
- **weight gain (hypo) or loss (hyper),**
- **long (hypo) or short (hyper) intestinal transit times,**
- **in children : growth disorders.**

- 2 Patients treated for a thyroid pathology either using synthetic anti-thyroid drugs (SAT), or thyroxin (T4).
- 3 Patients treated with drugs which may induce thyroid pathologies (cordarone, interferon, lithium, etc.)
- 4 Patients with non-thyroid auto-immune diseases (dominant role of autoimmunity in thyroid pathologies and frequent associations with various auto-immune diseases).

# Biological aspects

## Regulation of thyroid function



### The hormones

#### TSH

TSH is a pituitary hormone, which is the centerpoint of the thyroid profile, since it acts as a "modulator" for variations in thyroxinemia (T4, contrary to T3, being exclusively produced by the thyroid).

#### FT4 (Free T4 fraction).

FT4 acts as an indicator of thyroid production and is used to confirm the diagnosis suggested by TSH.

#### FT3 (Free T3 fraction).

In some cases, FT3 can be produced by the thyroid gland, in preference over T4 (e.g. in cases of iodine deficiency). However, in most cases, FT3 is an indicator of peripheral deiodination of T4.

- Mr** = membrane receptor
- Nr** = nuclear receptor
- D I** = Type I deiodase
- D II** = Type II deiodase (5' deiodase)
- = main sites of interaction between drugs and non-thyroid illnesses (direct action or through agonists or antagonists of physiological molecules)
- TRH** = Thyrotropin-Releasing Hormone
- TSH** = Thyroid-Stimulating Hormone
- FT4** = Free Thyroxine
- FT3** = Free Triiodothyronine

## Main causes of discrepant profiles other than thyroid pathologies :

### ■ Decreased TSH

- Early stage of pregnancy (HCG)
- Glucocorticoids, dopamine and dopaminergics (bromocriptine), serotonin, opiates, dextrogyral T4 (DT4), triiodoacetic acid.
- Severe non-thyroid illnesses (NTI, psychiatric disorders).

### ■ Moderate TSH increase

Dopamine antagonists and neuroleptics (metoclopramide, chlorpromazine, haloperidol, domperidone, sulpiride), lithium, amiodarone (especially at the beginning of treatment).

### ■ Increased FT4

Amiodarone, propranolol, active acute and chronic hepatitis, DT4.

### ■ Decreased FT4

Kidney disorders, diphenyl-hydantoin, phenobarbital, carbamazepine.

### ■ Increased FT3

Triiodoacetic acid, DT4.

### ■ Decreased FT3

Fasting, cordarone, propranolol, severe non-thyroid illnesses (NTI), hepatic cirrhosis.

## Situations inducing thyroid pathologies :

Treatment with lithium, interferon, amiodarone, ingestion of substances leading to excess iodine exposure.

## Effect of age :

- TSH peak during first days of life
- FT4 levels higher in newborns than in adults (with lower FT3)
- FT3 levels higher in children and adolescents than in adults
- FT3 levels reduced in the elderly

## Specific cases :

- Presence of anti-hormone antibodies (anti-T3, anti-T4) or mouse anti-gammaglobulins (HAMA), or abnormal albumin levels (dysalbuminemia).
- Hypothalamo-pituitary disorders.
- Thyroid hormone resistance syndromes.

# Which tests to prescribe?

**TSH** is always the first screening test to be performed.

The following approach could then be used :

- 1** Where there is little clinical context, **eliminate** a thyroid pathology from diagnosis using only the **TSH** assay,
- 2** In cases of a clinically suspected thyroid dysfunction, **confirm** diagnosis by associating **TSH-FT4** (TSH may be affected by non-thyroid factors),
- 3** When monitoring treated patients, an **FT4** or **FT3** assay may be performed **in addition to** the **TSH** assay, if necessary.

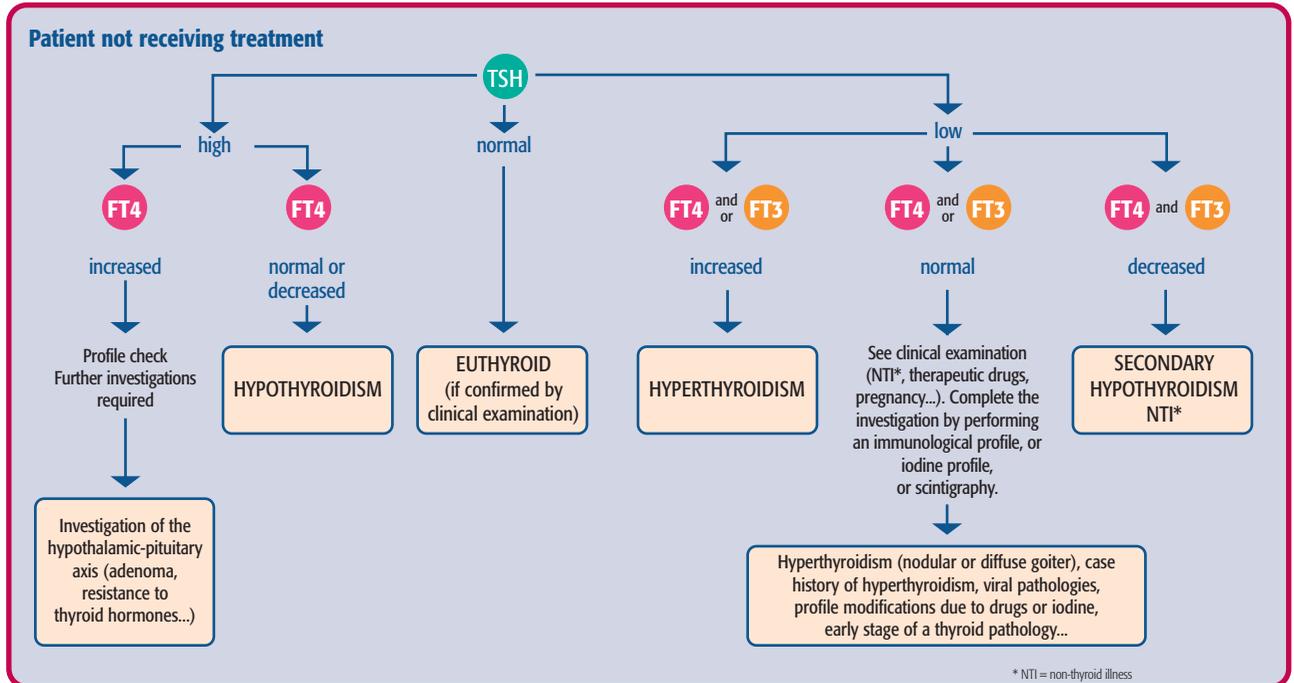
When monitoring treated cases of secondary hypothyroidism, the TSH assay is of no significance. **FT4** or **FT3** assays should be used for monitoring these patients.

## Other parameters for investigation of the thyroid function

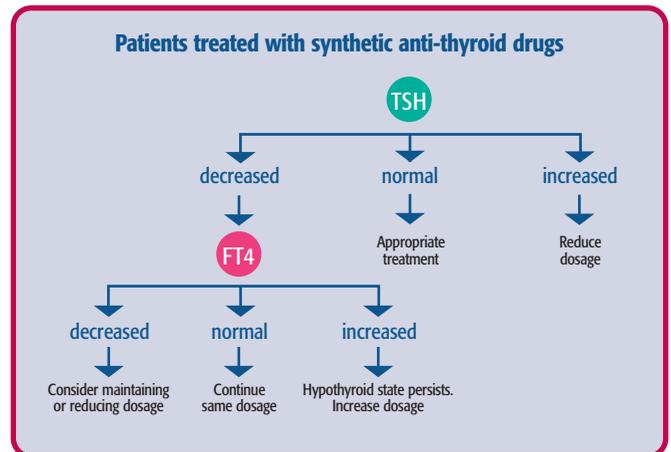
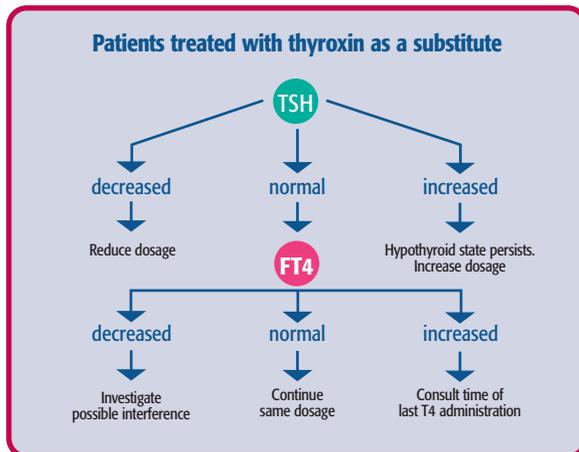
*TSH anti-receptor antibody*  
*Anti-thyroglobulin antibody*  
*Anti-thyroxine peroxidase antibody*  
*Thyroglobulin*  
*Thyrocalcitonin*

# Profile interpretation

## Initial biological investigation of thyroid disorders



## Biological monitoring\*



\* A considerable time period (at least 2 to 3 weeks) should separate the

biological follow-up from the initiation or modification of treatment.

# Interpretation □ difficulties

These difficulties are based on the following observations :

- 1** The non-thyroid origin of TSH (physiological or pathological disorders of the hypothalamo-pituitary axis),
- 2** Difficulty in determining the free fraction of thyroid hormones,
- 3** Difficulty in defining a normal range,
- 4** Repercussions possibly due to a deficiency or excess of iodine (although no pathology is detected),
- 5** The inevitable possibility of interference due to analytical (*in vitro*), medicinal (*in vivo* and sometimes *in vitro*) or biological (associated pathologies) factors.

# What should be done □ in the case of a discrepant profile?

- 1** Check that results are valid (by controlling the assay giving an apparently abnormal result).
- 2** Study the information given on treatments being taken which may interfere with the parameters being tested (see page 4).
- 3** Perform several simple tests to eliminate the possibility of analytical interference (dilutions, spiking tests). Ask your supplier for advice.

After these controls, it may be helpful to perform an immune profile and/or an iodine profile.

Repeating a profile at a later date may often be useful in clarifying the situation (return to normal or evolution).

# bioMérieux Thyroid Offer □ Experience and Innovation

bioMérieux is committed to maintaining a leading position in *in vitro* diagnostics. In the early 1980's, as an innovative RIA specialist, bioMérieux gained valuable know-how in the field of hormonology.

Based on this extensive experience, bioMérieux has been able to develop tests for VIDAS® and VIDIA®.

## ■ Investigation of the thyroid function on VIDIA

<b>VIDIA TSH</b>	ref. 38 200	100 tests
<b>VIDIA FT4</b>	ref. 38 210	100 tests
<b>VIDIA FT3</b>	ref. 38 220	50 tests

## ■ Investigation of the thyroid function on VIDAS

<b>VIDAS TSH</b>	ref. 30 400	60 tests
<b>VIDAS TSH 3</b>	ref. 30 441	60 tests
<b>VIDAS FT4</b>	ref. 30 401	60 tests
<b>VIDAS FT3</b>	ref. 30 402	60 tests
<b>VIDAS T4</b>	ref. 30 404	60 tests
<b>VIDAS T3</b>	ref. 30 403	60 tests

Please contact your local bioMérieux representative for further information and product availability