



Improvement of Thyroid Diagnostics by Means of Control Loop Analysis

Doepp Manfred*

Holistic Center 13 Haupt St Abtwil 9030 Switzerland

*Corresponding author: Doepp Manfred, Holistic Center 13 Haupt St Abtwil 9030, Switzerland.

To Cite This Article: Doepp Manfred. Improvement of Thyroid Diagnostics by Means of Control Loop Analysis. Am J Biomed Sci & Res. 2021 - 14(5). AJBSR.MS.ID.002033. DOI: [10.34297/AJBSR.2021.14.002033](https://doi.org/10.34297/AJBSR.2021.14.002033).

Received: 📅 November 02, 2021; Published: 📅 November 12, 2021

Introduction

Three functional states of the thyroid gland are usually distinguished: hypothyroidism, euthyroidism and hyperthyroidism. This is insufficient. Even within the so-called euthyroidism, there are conditions that require therapy. For laboratory diagnosis in blood, the free thyroxine (fT4), free triiodothyronine (fT3) and the thyroid-stimulating hormone, the basic TSH, are determined.

Their usual normal ranges are wide:

Baseline TSH: 0.3 - 4.0 mU/L

TSH after TRH : increase of more than 2.7 mU/L

fT4 : 7 - 30 pmol/L, mean value: 17 (lab 1)

6.8 - 18 pmol/L, mean value: 12 (lab 2)

fT3 : 4.6 - 9.2 pmol/L, mean : 6.8

These normal ranges include the potential dysfunctions and are therefore insufficient.

So a baseline TSH of 0.35 mU/L may not be euthyroidism, it is potential hyperthyroidism.

So a baseline TSH of 3.5 mU/L may not be euthyroidism, it is potential hypothyroidism.

An fT4 of 7 pmol/L is potential hypothyroidism.

An fT4 of 30 pmol/L is potential hyperthyroidism.

An fT3 of 4.6 pmol/L is potential hypothyroidism.

An fT3 of 9.2 pmol/L is potential hyperthyroidism.

What is the best way to assess the real functional state? By means of control loop analysis, by the assessment of the negative feedback mechanism.

The use of feedback is to make a system self-regulating to minimize the effect of a disturbance. Using a negative feedback loop, a measurement of some variable is subtracted from a required value (the set point) to estimate an operational error in system status, which is then used by a regulator to reduce the gap between the measurement and the required value. The regulator modifies the input to the system according to its interpretation of the error in the status of the system (https://en.wikipedia.org/wiki/Negative_feedback).

Regulator is the TSH, most informative after TRH application. Controlled variables: target values of the free thyroid hormones, they are compared with the actual values.

T4 is considered a prohormone for T3. T3 is several times (about 5 times) more effective than T4, but is less concentrated in the blood. The free hormones depend on the mass law of action, including the TBG : thyroid hormones binding globulin.

$$\text{Mass law of action: } fT4 = \frac{\text{Total T4}}{\text{free binding capacity of TBG}}$$

If one wants to record the total of free iodine hormones, one can form a total balance, the best is the formula (absolute numbers in pmol/L): $fT4 + 5 \times fT3$.

Thus, an assessment of the thyroid control loop consists of a comparison of this total balance and the TSH (basic value or ideally

according to TRH). Examples in the analysis of the control loop are:

Potential hyperthyroidism:

$TSH = 0.3 \text{ mU/L}, fT4 = 30 \text{ pmol/L}, fT3 = 9 \text{ pmol/L}, \text{ total balance} = 75.$

Absolute euthyroidism:

$TSH = 1.5 \text{ mU/L}, fT4 = 18 \text{ pmol/L}, fT3 = 6.7 \text{ pmol/L}, \text{ total balance} = 51.5$

Potential hypothyroidism:

$TSH = 3.8 \text{ mU/L}, fT4 = 7 \text{ pmol/L}, fT3 = 4.6 \text{ pmol/L}, \text{ total balance} = 30$

Manifest hyperthyroidism:

$TSH = 0.01 \text{ mU/L}, fT4 = 35 \text{ pmol/L}, fT3 = 12 \text{ pmol/L}, \text{ total balance} = 95$

Manifest hypothyroidism:

$TSH = 10 \text{ mU/L}, fT4 = 5 \text{ pmol/L}, fT3 = 3 \text{ pmol/L}, \text{ total balance} = 20$

In this way, the feedback mechanism is perfectly described. The

ranges of the total balance

are:

Absolute euthyroidism: 40 – 64 TSH: 0.9 – 2.2

Potential hyperthyroidism: 65 – 74 TSH: 0.2 – 0.8

Manifest hyperthyroidism : > 74 TSH : 0 – 0.1

Potential hypothyroidism: 31 – 39 TSH: 2.3 – 4.0

Manifest hypothyroidism : < 31 TSH: > 4.0

Examples:

T3-hyperthyroidism: TSH = 0.01, fT4 = 18, fT3 = 13, total balance = 83

T3-hypothyroidism: TSH = 12, fT4 = 9, fT3 = 3, total balance = 24.

If the feedback mechanism of the control loop is disturbed, this is shown by the fact that the TSH does not correspond to the value expected from the total balance. If the TSH is relatively too low, one must assume and examine partial autonomy of the thyroid gland. If the TSH is relatively too high, pituitary involvement (organic or psychogenic) must be assumed.

This differentiation makes it possible to treat the potential dysfunctions with soft means:

For potential hyperthyroidism: Lycopodium virg./europ., Lithium orotate; no iodine and fluorine intake.

For potential hypothyroidism: kelp/seaweed, selenium 200 ug/day.

In case of positive anti-thyroidal antibodies: frankincense, and rub the skin in the region of the thyroid gland softly with frankincense oil.

Summary

The standard ranges used so far in laboratory thyroid diagnostics are insufficient. As a result, the potential dysfunctions are usually inadequately treated. A method is presented to bring the free thyroid hormones together into a total balance. This makes it possible to assess the control loop of the thyroid gland. An absolute euthyroidism can be described and distinguished from potential dysfunctions. The spectrum of therapy is thus expanded.