

# Why TSH is not the Best Marker of Thyroid Function

## TSH

is NOT the best marker of Thyroid Function

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TSH stands for Thyroid Stimulating Hormone and is produced by the pituitary gland in the brain. The simplistic view of produced hormones looks like this:

TRH (Hypothalamus – part of the brain) -> TSH (Pituitary – part of the brain) -> Thyroid hormone Free T4 (Thyroid) -> Conversion of Free T4 to Free T3.

TSH is not a thyroid hormone per se; TSH stimulates the thyroid gland to produce thyroid hormone. Thus, judging the level of the active thyroid hormone (Free T3) by the level of Thyroid STIMULATING Hormone (TSH) just does not make sense.

Let's say TSH made by your pituitary is a thermostat. You like your indoor temperature around 70 degrees in winter. When the indoor temperature drops (i.e. your active thyroid hormone Free T3 drops), the thermostat (TSH) kicks in and turns on the heat to get the indoor temperature to 70 degrees. But what if it is 60 degrees (low Free T3) and your thermostat (TSH) is broken? What if it does not kick in and does not get you the warmth you expect? The thermostat needs to be repaired or you need to figure out how to circumvent the thermostat and get heat in your house again. This is the reason the TSH measurement alone is not an accurate marker of thyroid function.

Thyroid function needs to be measured not only by the optimal lab levels but also by the presence of symptoms of hypothyroidism. Very often I see patients whose TSH is at the optimal range of 1.0-2.0 while on levothyroxine, but their Free T3 and Free T4 are low normal or below normal. Reverse T3 hardly ever gets checked.

TSH is not the best marker of thyroid function. TSH stands for Thyroid Stimulating Hormone and is made in the pituitary gland of the brain. Therefore, TSH is NOT a thyroid hormone itself! It is just a thermostat that kicks in and gets higher when the thyroid hormone produced by the body decrease or when there is not enough thyroid hormone taken in a pill form.

In most cases when Free T3 decreases, TSH increases "nudging" the thyroid gland to produce more thyroid hormone T4 which will be converted into an active Free T3 hormone in the body.

In some cases, TSH will stay in the normal range of 1.0-2.0 even if Free T3 drops to 2.0 or even lower. In such cases, just checking TSH will not give any useful information as for the function of thyroid gland. The thermostat is broken for whatever reason and in such cases, I am concerned about the root cause of hypothyroid symptoms. The root cause could be

hypopituitarism and should be investigated further with additional testing.

So, does your healthcare provider pay attention to the TSH level alone or Free T3, Free T4, and Reverse T3 are measured too? If not, you can ask these levels to be checked and calculate your Free T3/Reverse T3 ratio with Suzy Cohen's Thyroid Hormone Ratio Calculator [here](#).