

DR. LEIGH'S POSITION ON THYROID HORMONE REPLACEMENT

There is a lot of controversy these days about what form of thyroid hormone to use. A sizeable group of patients and alternative practitioners advocate using Armour thyroid (dried thyroid gland from pigs) rather than plain T4 (levothyroxine) supplementation. *I do not.* This handout explains why.

Note: In my writing, I use the term "bioidentical. This means a medication that is chemically the same as the one produced normally by the human body. This kind of medication, theoretically, is already familiar to the body, and is most efficiently and effectively utilized by the normal biochemical pathways.

A drug can be bioidentical and still be "synthetic," meaning it is made in a laboratory, but has the same chemical nature as the substance synthesized by the body. Conversely, a substance can be "natural" and made by an animal - like pig thyroid hormones, cow adrenal hormones, or estrogen from pregnant mare's urine - and not be bioidentical for a human, because it is not human hormone.

Please also note that swallowing a pill is not a "bioidentical" means of drug delivery. Normally, hormones are released directly into the bloodstream by the glands, and they travel through the bloodstream until they reach the tissues that have receptors for them. This is not the same as a pill that is digested in the stomach and metabolized by the liver before entering the bloodstream.

In some cases, it may be preferable to administer hormones transdermally (as a skin cream) or sublingually (under the tongue), so that the hormone enters the bloodstream directly, rather than being digested. Transdermal and sublingual dosages and effects may be different from oral pill dosages and effects.

A little background information:

- The thyroid gland is a butterfly-shaped gland located just below the Adam's apple of the throat. It makes thyroid hormone (thyroxine), which speeds up metabolism.
- Thyroid hormone is a protein chemical that comes in two active forms: T4 and T3. T4 has four molecules of iodine in it, and T3 has three. Thyroid hormone is released into the bloodstream, and practically every tissue in the body has cell receptors to receive it, on an as-needed basis.
- How much thyroid hormone the gland makes is controlled by the brain. The brain makes TSH, thyroid-stimulating hormone, which tells the thyroid gland to work harder. If the thyroid gland is underactive, the brain makes more TSH.
- About lab tests: T4 and T3 measurements vary a lot, depending on how much the tissues are using up for varying metabolic needs. However, TSH is produced more steadily, so we usually measure it first - it's a little more accurate and stable. If the TSH is high, it means there probably isn't enough thyroid hormone, and the around brain is telling the thyroid gland, "Work harder!"
- If TSH is high, and you have symptoms of an underactive thyroid gland, you might benefit from thyroid hormone replacement. But what is the "normal" level of TSH? This is contentious at this time. The level that I or your practitioner thinks is optimal or normal may not agree with the normal range given on the lab results.
- If you don't have enough thyroid hormone (high TSH), your metabolism functions too slowly for proper health. Symptoms include "moon face" and overweight that is not lost despite a proper diet and exercise regimen, feeling cold all the time when others are warm, thinning hair, heavier menstrual periods than previously, muscle fatigue (which is not the same as feeling sleepy or having muscle weakness) and/or muscle pain, and constipation.
- Conversely, if you have too much thyroid hormone (low TSH), it causes toxic symptoms, as seen in Grave's disease and when people overdose on thyroid hormone pills. Symptoms include cachexia (inability to maintain normal body weight), very frequent bowel movements, abnormally fast and/or irregular heartbeat, heart muscle disease (myopathy), and high blood pressure with higher risk of stroke.
- Cognitive changes, from "brain fog" to psychosis, can be produced by either too much or too little thyroid hormone.

For these reasons, it is not wise to leave hypothyroidism untreated, or to take more thyroid hormone than you need - and the symptoms that you feel may not, by themselves, be the best indicator of how much you need. A combination of lab tests *and* symptoms is needed to determine proper dosages.

I believe that people tend to either be under- or over-dosed on Armor thyroid. Here is why.

- ☞ T4-T3 conversion issues: In pig thyroid, as in human thyroid, the ratio of *stored* T4 to T3 is about 4 to 1. However, in the blood circulation, where the hormone does its work, the ratio is about *16 to 1*.
The human thyroid normally produces about 100 mcg T4 and about 6 mcg T3 daily. About 30 mcg of T3 are used by the body daily - 6 mcg directly secreted by the gland, and about 24 mcg converted from T4 by the peripheral cells of the body.
The conversion is not uniform; it is locally controlled in a "tissue-specific manner" according to metabolic needs, differently in different tissues - by brain cells, by liver cells, by muscle cells, etc.
T3 has a short half-life (is used up quickly), so it would be recommended to divide the total T3 supplement into 3-4 doses per day (example, 1.5 mcg four times a day).
There is a lot of speculation around the Internets that many people may have difficulty converting T4 to T3. This has not been shown in fact, but is under investigation. Some research centers are genotyping people who truly do not respond to T4 alone. It is not known to be a widespread problem.
- ☞ Overdosing? If you take enough pig thyroid to bring the TSH down into the "treated" range (around 1), you may be getting too much T3, and risking the harms caused by hyperthyroidism.
- ☞ Underdosing? If you only take enough to bring T3 down into the "treated" range (and personally I'm not sure what this range is), you probably won't get enough T4, you may have symptoms of hypothyroidism, and your TSH would not be in the "treated" range.
- ☞ Half-life issues: Because T3 has a very short half-life, and T4 has a longer half-life, these differences can goof up test result interpretation. For example, what time was the blood drawn, relative to when the pig thyroid pill was taken? What time should it be drawn? We really don't know.
- ☞ Armor pig-thyroid pills are measured in grains, rather than milligrams. Bioidentical replacement thyroxine (levothyroxine) is measured in micrograms (the dosage is too small to use milligrams easily).
According to the Armour website, their pills contain 38 mcg T4 and 9 mcg T3 per 1 grain. If you take a standard daily dosage of 1/2 grain, you are getting *19 mcg T4* and 4.5 mcg T3. But typical daily dosages of levothyroxine (LT4) are *50-75 mcg T4*. Many patients take 100-137 mcg, and some take more.
If you took *50 mcg T4* as Armor (1 1/3 grains), you would also be getting *12 mcg T3* - *twice* what the thyroid gland normally makes. If you took this as a single dose, that would be a big, short blast of T3 - much more than your normal thyroid gland would release into the blood. You'd need to divide it into several doses per day. Depending on the size of the pill (they're usually small), this could be difficult.
Conversely, to obtain *6 mcg T3* (the amount your thyroid gland would normally make per day), you'd take 2/3 grain, which would also give you 25 mcg T4, an ultra-low dose that would not be expected to have much effect on symptoms. There is just no good physiologic way to dose the Armor product.
- ☞ A high dose of T3, as most folks use it, has a stimulant effect - like a large dose of caffeine. It makes you feel good. People get used to that spike of energy every day, and do not want to go without it, even if the higher dosages they are taking don't make much sense physiologically, or may actually be dangerous, especially for the heart. This may account for some of the bitter, angry, contentious discourse on websites like "Stop the Thyroid Madness." People feel very threatened when they are told that something which makes them feel so good may actually be bad for them - and people on stimulants tend to be more aggressive than those who are not.

Take-home message:

- Levothyroxine (LT4) is generally effective to treat underactive thyroid.
- LT4 is bioidentical, and is more physiologic and safer than pig gland pills.
- In a person with normal brain signalling, you should take enough LT4 that your TSH stays around 1.0 (0.5-1.5) and your free T4 and T3 levels are in the usual age-normal range.
- If you still have symptoms at that dosage, other medical disorders should be ruled out, before you presume that LT4 simply doesn't work for you personally.
- If you like simply "feeling better" on Armor, despite its many issues, you might consider safer forms of "energy-boosting" stimulation, combined with intensive stress management techniques (since stress dramatically impacts hormone and immune functions), along with LT4 hormone replacement.