

# Focus on Health

SPECIAL EDITION  
JUNE 2002

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## ASSESSING AND TREATING THYROID FUNCTION

Understanding and interpreting blood tests which diagnose thyroid gland dysfunction or monitor treatment regimens is rather complex, but entirely understandable these days. One major change that occurred several years ago was the development of much more sensitive blood tests. The method, radio-immunoassay, allows one to measure rather than calculate thyroid hormone levels. Older tests, called "thyroid surveys", which included T3 uptake, T4 and T7, are completely obsolete and should no longer be used. Why calculate something we can now accurately measure? In addition, these tests are made inaccurate by changes in estrogen level, while the newer tests are not affected by changes in estrogen level.

Control of thyroid function is a stepwise affair in the human body. The hypothalamus of the brain secretes a hormone called thyroid release hormone (TRH) to initiate the sequence. The TRH causes the pituitary gland to secrete thyroid stimulating hormone (TSH). The TSH stimulates the thyroid gland to produce and secrete thyroxin (T4). The T4 is converted to triiodothyroine (T3), which is the active form of thyroid hormone. All of these, TRH, TSH, T4 and T3 can now be directly measured.

Both T4 and T3 are mostly (roughly 99%) bound to thyroid binding globulin (TBG) in the blood. Thus, measuring a total T4

or a total T3 is not helpful. One must measure a free T4 and a free T3 to accurately assess thyroid function, since the part bound to TBG is inactive.

Therefore, the four tests that can define thyroid function are: TRH, TSH, free T4 and free T3. At least three of the four tests should be done anytime a person's thyroid is evaluated. In order of accuracy and sensitivity, I would rank them TRH, free T4, free T3 and TSH.

Many doctors only measure a TSH to test the thyroid or combine the TSH with a thyroid survey. Of all the four valid thyroid tests, the TSH is actually the least accurate. However, medical laboratories report TSH's out to three decimals (example: 2.567), implying that they are extremely sensitive. Don't be fooled. They aren't. If there is disagreement between the four tests, as can sometimes happen, I tend to throw out the TSH. Of the other three tests (TRH, free T4 and free T3) the TRH is the most sensitive, and therefore the most believable. Unfortunately TRH's are not even done in medical laboratories here in Dallas. We have to send the blood samples for TRH's to a laboratory in California, which delays the result by a week.

Thyroid replacement for those who are shown to be low has also evolved over the years. U.S.P. Armour thyroid, made from ground up pig thyroids, was the original medication available. It was a mixture of T3 and T4, but of

course they were of animal origin, not human. This drug is now obsolete and should be removed from the market in my opinion. Several brands of T4 (synthroid, levoxyl, Unithroid, Levothyroid) which are synthetically manufactured but are exactly, molecule for molecule, the same as human T4 are available. A generic substitute for T4 is on the market, but under U.S. law it may vary in potency from the brand name by up to 25% in either direction. It is therefore unacceptable and only brandname T4's should be prescribed.

Only one human T3 is on the market, Cytomel. It has rapid onset of action and wears off quickly. My compounding pharmacist makes slow T3 instead, which is slower acting and lasts longer, and works better.

Replacement of T3 and T4 should therefore be done separately so that one can be raised or lowered without affecting the other, based on separate blood tests. Most people only need to take T4 for replacement. They convert it to T3 in the body. A small percentage don't convert effectively (called Wilson's Syndrome), in which case the slow T3 can be added.

Oversecretion of thyroid hormones is treated with a drug called Tapazole, or by partial or total removal of the gland, or by inactivating the thyroid permanently with radioactive iodine injected intravenously.