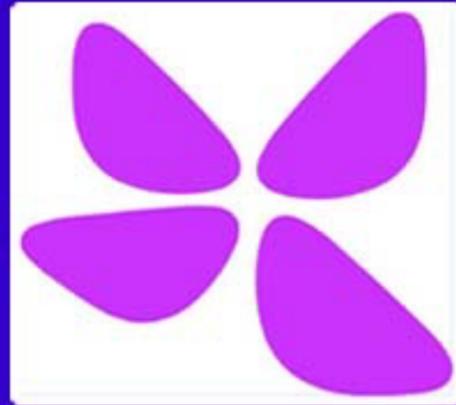


Tired Thyroid

The Facts May Surprise You



Menu

- [Doctor's Book Review](#)
- [About Me](#)
- [For General Comments](#)
- [Tired Thyroid Blog](#)
-

Do thyroid receptors really get blocked and take 12 weeks to clear? Is T4 really the problem?

Proponents of T3-only therapy believe that reverse T3 "clogs" the T3 receptors, therefore only T3 should be taken for 12 weeks until the reverse T3 is "cleared." Yet others who have *not* changed their dose to T3-only (and continued to take some T4) have reported reduced reverse T3 levels in subsequent labs, by addressing problems like low iron, or increasing their caloric intake and eating more frequently. A study in Calcutta, India illustrates that reverse T3 is indeed dynamic. Patients who suffered from malnutrition had reverse T3 values that were above the values of normal subjects, but their reverse T3 fell once they were fed, so the condition is dynamic, not static. [43] In another experiment on

fasting obese subjects, reverse T3 levels rose significantly by day 7, but returned to normal after 4 days of refeeding. [44] In both studies, the subjects' reverse T3 levels returned to normal without being put on a T3-only regimen, so this seems to refute the "clogged" receptor theory.

Reverse T3 inhibits the D2 enzyme that converts T4 to T3 in the rat brain cortex and pituitary. Rats were infused daily with four increasing levels of reverse T3, and D2 enzyme activity decreased (so T4 to T3 conversion decreased) as the reverse T3 levels increased. Tracers on the reverse T3 showed the reverse T3 was not detectable in the cell nuclei, and only 1% was found elsewhere in a homogenized mixture of the rat brain and pituitary tissue. The infused reverse T3 was no longer present, which means reverse T3 did not "clog" these receptors, nor would it be present 12 weeks later. [64] This corroborates the fact that reverse T3 has a much higher clearance rate than FT3. [6]

A study was performed to observe the effects of reverse T3 vs. T3 on cellular metabolism *in vitro* (in a lab). As expected, cells incubated with reverse T3 showed a decrease in metabolism, and those incubated with T3 showed an increase. But the later addition of T3 to the cells that had been incubated with reverse T3 completely reversed the metabolic reduction. There was no 12-week delay for "clearing." This suggests that the lack of T3, not the blocking by reverse T3, is the cause of reduced cellular metabolism. [51]

T4 is not always to blame for high reverse T3. High levels of T4 will lower D2 enzyme activity, which lowers T4 conversion to T3. But high levels of T3 will raise D3 enzyme activity, so more T4 is converted to reverse T3 to keep T3 levels normal. In other words, neither T4 nor T3 can be too high, or the appropriate enzymes are invoked to keep the levels where the body deems appropriate. Several studies that compared reverse T3 levels of hyperthyroid patients to normal or hypothyroid patients showed high reverse T3 levels in the hyperthyroid patients. The reverse T3 was high whether measured in urine [45], blood serum [46], or production rate [47]. Urinary excretion of reverse T3 was 6.4 times higher in hyperthyroids than hypothyroids, up to 43 times higher in blood serum in hyperthyroids vs. hypothyroids, and the production rate was 63 times higher in hyperthyroids vs. hypothyroids. The T3/rT3 ratio was lower in hyperthyroid patients compared to normal controls. [71] In addition, reverse T3 has a metabolic clearance rate that is almost three times faster than FT3 [6], so as long as there is adequate FT3, there should be sufficient thyroid hormone reaching the cells.

If the hyperthyroid state causes high reverse T3 levels, and reverse T3 really "clogged" receptors, then no one could ever be hyperthyroid. The enhanced reverse T3 pathway in hyperthyroids lowers Free T3 levels, but apparently enough T3 is still getting to the cells to create hyperthyroid symptoms. This is the strongest argument against the "clogged receptors" theory. The receptors are not clogged at all; there is no reverse T3 *or* T3 in the receptors if someone is still hypothyroid. In those with high reverse T3, there is simply not enough T3 available to fill the receptors, and that is why the person still has hypothyroid symptoms. Here is a graphic that illustrates the [D3 deiodinase enzyme](#) at work. In Image A, both T3 and T4 enter the cell, but the D3 enzyme converts T4 to reverse T3 *and* T3 to T2, leaving little T3 for the nuclear thyroid receptor to perform its function. The T3 is inactivated at the cell membrane, shortly after it enters the cell, and never has a chance to reach the nucleus. Image B shows normal T4 to T3 conversion with the D2 enzyme, and as a result, a nucleus with ample T3, ready to perform. [56] The T3-only protocol is actually modeled after the hyperthyroid condition, where T3 levels are so high, that they exhaust the capacity of the D3 enzyme to inactivate any T3 to T2. What is left gets through to the open receptor. There is no reverse T3 to "unclog." However, as described in the sections above, too much T3 and lack of T4 can cause other problems, so the protocol is not without risk.

6. I J Chopra. An assessment of daily production and significance of thyroidal secretion of 3, 3', 5'-triiodothyronine (reverse T3) in man. J Clin Invest.1976 July;58(1): 32-40.
<http://www.ncbi.nlm.nih.gov/pubmed/932209>

43. Chopra IJ, Chopra U, Smith SR, Reza M, Solomon DH. Reciprocal changes in serum concentrations of 3,3',5-triiodothyronine (T3) in systemic illnesses. J Clin Endocrinol Metab. 1975 Dec;41(06):1043-9. <http://www.ncbi.nlm.nih.gov/pubmed/812882>

44, LoPresti JS, Gray D, Nicoloff JT. Influence of fasting and refeeding on 3,3',5'-triiodothyronine metabolism in man. *J Clin Endocrinol Metab.* 1991 Jan;72(1):130-6. <http://www.ncbi.nlm.nih.gov/pubmed/1986011>

45. Faber, J., Kirkegaard, B. C., Rogowski, P., Siersbæk-Nielsen, K. And Friis, T. Urinary Excretion of 3,3',5'-Triiodothyronine (Reverse T3). *Clinical Endocrinology*, 9: 279–282. Sep 1978. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2265.1978.tb02211.x/abstract>

46. Peter Laurberg and Jørgen Weeke. Radioimmunological determination of reverse triiodothyronine in unextracted serum and serum dialysates. 1977, Vol. 37, No. 8 , Pages 735-739. <http://informahealthcare.com/doi/abs/10.3109/00365517709101858>

47. Robert C. Smallridge, Leonard Wartofsky, Robert E. Desjardins And Kenneth D. Burman. Metabolic Clearance and Production Rates of 3,3',5'- Triiodothyronine in Hyperthyroid, Euthyroid, and Hypothyroid Subjects. *The Journal of Clinical Endocrinology & Metabolism* August 1, 1978 vol. 47 no. 2, 345-349. <http://www.ncbi.nlm.nih.gov/pubmed/263302?dopt=Abstract>

51. Okamoto R, Leibfritz D. Adverse effects of reverse triiodothyronine on cellular metabolism as assessed by ¹H and ³¹P NMR spectroscopy. *Res Exp Med (Berl)*. 1997;197(4):211-7. <http://www.ncbi.nlm.nih.gov/pubmed/9440139>

56. Balázs Gereben, Ann Marie Zavacki, Scott Ribich, Brian W. Kim, Stephen A. Huang, Warner S. Simonides, Anikó Zeöld, and Antonio C. Bianco. Cellular and Molecular Basis of Deiodinase-Regulated Thyroid Hormone Signaling. *Endocr Rev.* 2008 December; 29(7): 898–938. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2647704/>

64. Kaiser CA, Goumaz MO, Burger AG. In vivo inhibition of the 5'-deiodinase type II in brain cortex and pituitary by reverse triiodothyronine. *Endocrinology.* 1986 Aug;119(2):762-70. <http://www.ncbi.nlm.nih.gov/pubmed/3732144>

71. Banovac, K., Bzik, L., Sekso, M., & Petek, M. (1978). Decreased ratio of serum T3: rT3 in patients with hyperthyroidism. *Endokrinologie*, 71(2), 159. <http://www.ncbi.nlm.nih.gov/pubmed/668639>

Share this:

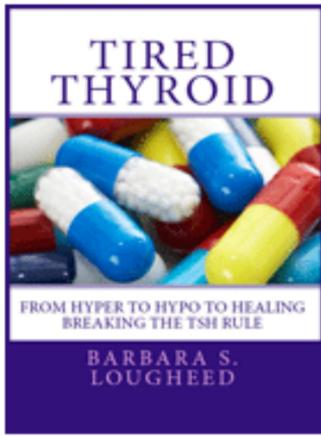
- [Email](#)
- [Print](#)
- [Facebook](#)
- [LinkedIn](#)
- [Google](#)
- [Pinterest](#)
- [Pocket](#)
- [Reddit](#)
- [Tumblr](#)
- [Twitter](#)
-

Categories [Reverse T3 & T3-only](#)

Post navigation

[Optimal thyroid dosing](#)
[T3-only side effects](#)

**Your book is absolutely
the best . . . even better
than Dr. Broda Barnes'.
–Louis Pottkotter, M.D.**



Categories

- [Bioidentical Hormone Replacement](#) (3)
- [Conditions Caused by Low Thyroid Levels](#) (6)
- [Graves' Disease](#) (1)
- [Reverse T3 & T3-only](#) (11)
- [T3 Side Effects](#) (4)
- [Thyroid Medications and Other Supplements](#) (2)
- [Thyroid Terminology \(Home\)](#) (1)
- [TSH, Thyroid Testing, and Interpretation](#) (4)
- [Who Writes Tired Thyroid?](#) (2)

Follow me on Twitter

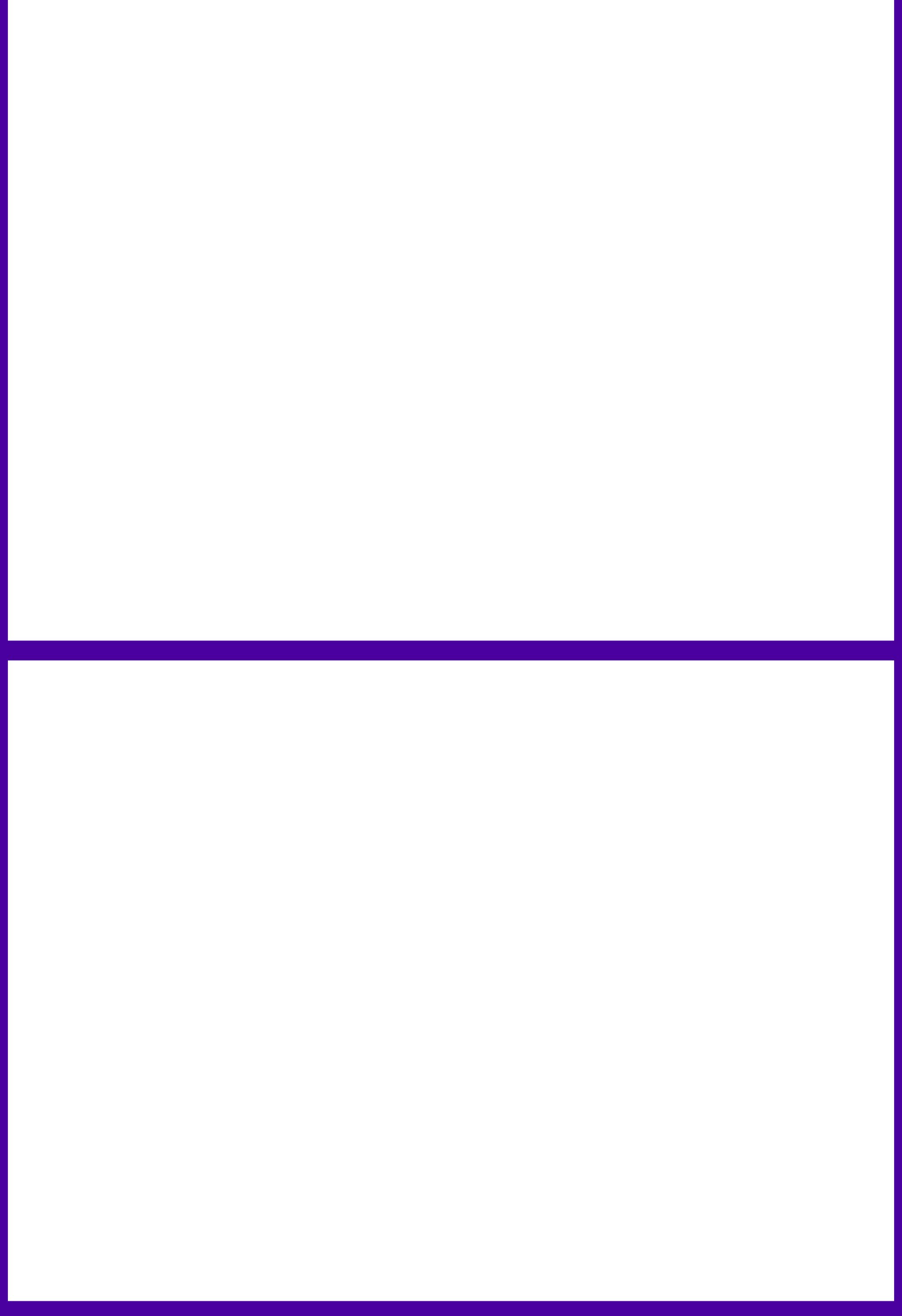
[My Tweets](#)

iHerb.com
Trusted Brands. Healthy Rewards.

**Huge selection of
vitamins and
more at great
prices!**

**SAVE \$5 off your
first order with
coupon code
BAB997**

**FREE shipping
on any order
over \$20**



Disclaimer

This website is for educational and informational purposes only and should not be taken as medical advice. It is not exhaustive and cannot possibly cover all conditions. It is your responsibility to consult a doctor for any diagnosis, treatment, and medication or supplement changes. Any information followed without his/her advice is done at your own risk. I am not a doctor, but a hypothyroid patient who had radioactive iodine treatment for Graves' hyperthyroidism who enjoys medical research.

Copyright

Copyright © 2011-2015 by Grain of Salt Publications LLC. All rights reserved. If you copy or repost information from this website, you must credit TiredThyroid.com and link back to this page.

Privacy Policy

Google ads on this site generate revenue to pay the costs of maintaining a legitimate website. Ads are shown to you based on your interests, determined by previous visits to other websites, and demographic details on your computer's browser. By using this site, you consent to this privacy policy. You may opt out of this service by following the directions on this page: <https://support.google.com/ads/answer/2662922>