

Sub-Laboratory Hypothyroidism, Low Body Temperature and the Empirical Use of T3



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Financial Disclosure: Co- owner Restorative Formulations

Problem

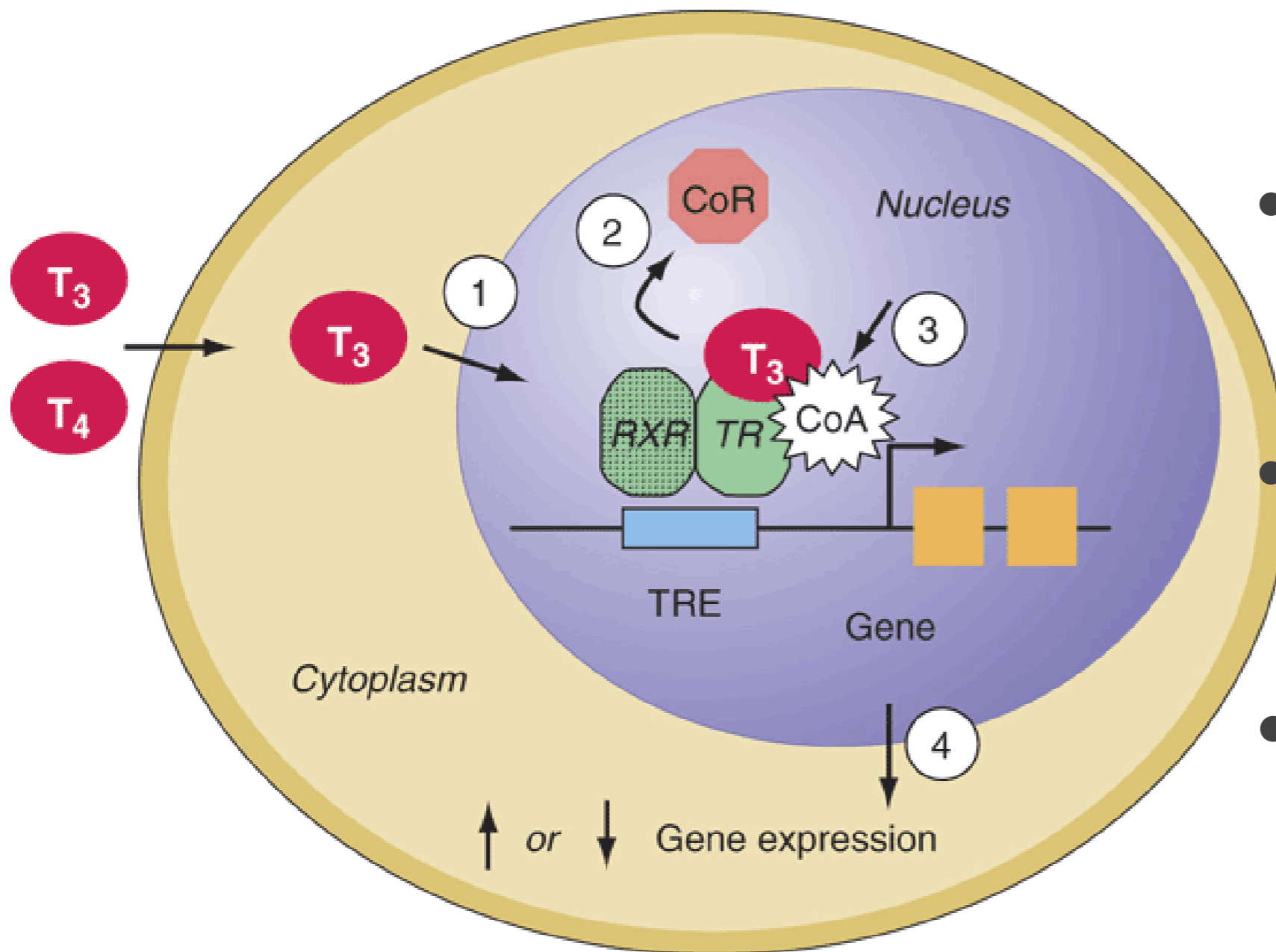
- Patients have low thyroid symptoms but their thyroid blood tests and other tests are normal
- Patients that are on thyroid medicine and their thyroid tests are normal but they still aren't feeling well

Solution

- TSH & Temperature = Simplicity & Success

Gullo D, Latina A. Levothyroxine monotherapy cannot guarantee euthyroidism in all athyreotic patients. *PLOS One*. 2011;6(8):e22552.

Purpose of T3 is to set the speed of DNA transcription, the speed of life

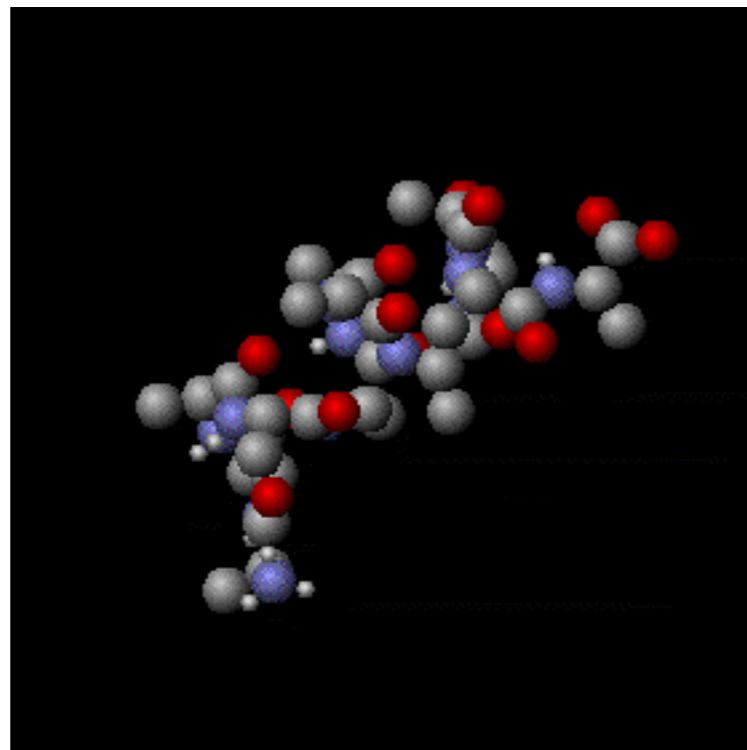


- Corepressor (CoR) is displaced
- Coactivator (CoA) is recruited
- DNA transcription is accelerated

- Kinetic energy is proportional to temperature

$$E = \frac{1}{2} m v^2 = \frac{3}{2} k T$$

- When we measure temperature we are measuring velocity



Video:
The higher the
temperature the
higher the amplitude
of movement

- 3 of the 4 “Vital signs” have to do with speed:
 1. Respiratory Rate
 2. Heart Rate
 3. Metabolic Rate
(temperature)
 4. Blood Pressure
- Speed is important and that’s regulated by the thyroid system



Thyroid hormone blood tests can't measure thyroid hormone expression because they don't measure body temperature

Step 1: Supply

- Is the person euthyroid or hypothyroid?
 - Patients who have been taking thyroid medicine for years may never have been hypothyroid, or may no longer be. What was their TSH before starting thyroid medicine?
 - Patients with a history of borderline hypothyroidism might fully recovered if their thyroid glands and pathways are properly supported and reset.
 - T4 and RT3 can down regulate the deiodinase enzyme. Patient might not need T4 for supply and it might be impairing conversion.
 - Can wean with herbal and nutritional support, or with T3

Step 2: Conversion

- If TSH is normal and Temperature is low then patient likely has a conversion problem.
 - Purpose of thyroid is to provide normal metabolic rate, or in other words, normal temperature. If temperature isn't normal then management isn't optimal.
 - Encourage conversion
 - Provide Herbal and Nutritional support
 - Decrease T4 and RT3, by weaning T4 medicine or by using T3
 - Decrease stress
 - Detoxify, diet and exercise

Step 3: Temperature

- The parameter that correlates best with patients' symptoms is body temperature.
- Measured during the day with an oral thermometer, when temperature is supposed to be its highest

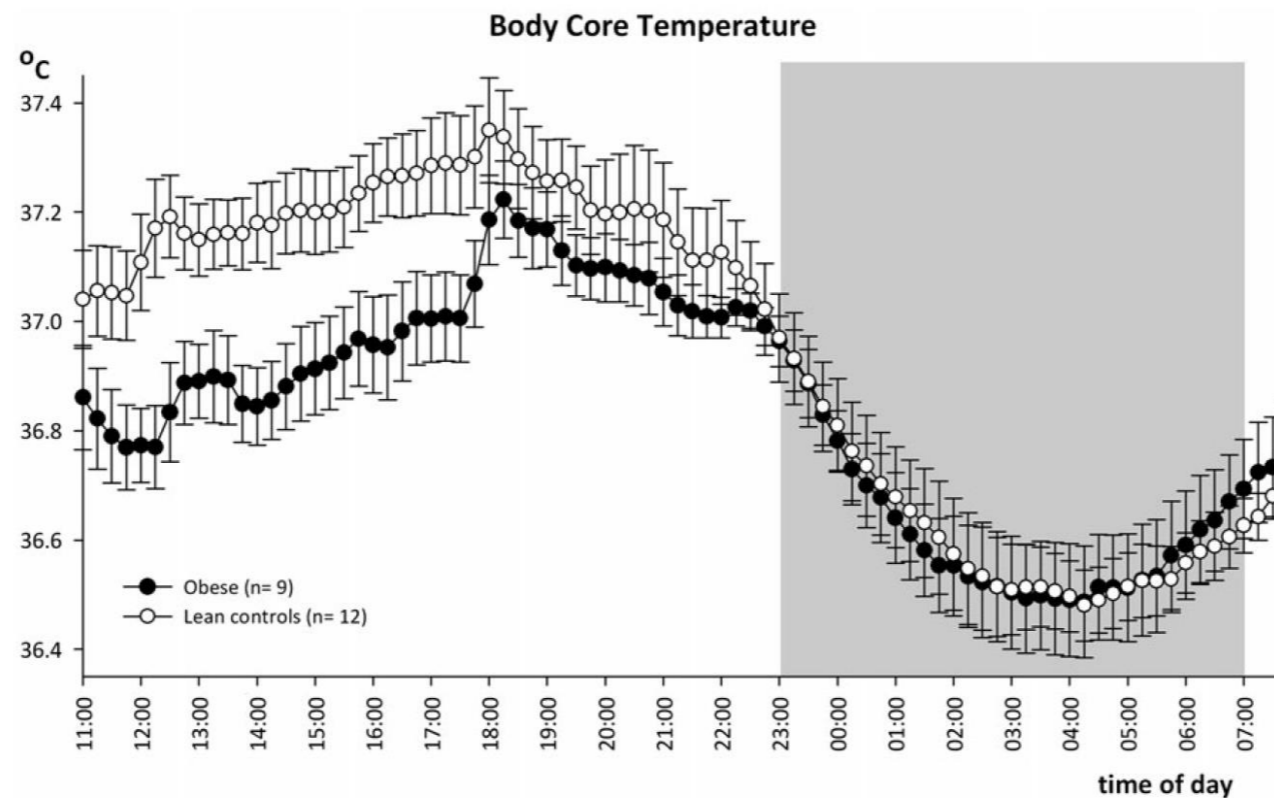


FIGURE 1. Twenty-hour body core temperature profiles (\pm SEM) in obese ($n=9$; 2 females) and lean subjects ($n=12$; 2 females). Grey panel represents the dark period. The values of BcT recorded every 2 min are averaged every 15 min.

How to Measure the Temperature

- By mouth with a Geratherm thermometer (liquid metal)
- Every 3 hours
- 3 times a day, starting 3 hours after waking
- For several days (not the 3 days prior to the period in women since its higher then) for diagnosis.
- You can also encourage your patients to check their temperatures when they feel their best and when they feel their worst, so they can see the correlation.

What the TSH is missing

Mainstream Medical Research Shows:

- Hypothermia can cause mental dullness, forgetfulness
- Hypothyroidism must be ruled out before a diagnosis of PMS can be made. What does that tell us?
- In one study, 75% of the women with PMS had subclinical hypothyroidism. There was complete resolution in over 60% of them when treated with T4

Irwin B. A case report of hypothermia in the wilderness. *Wilderness & Environmental Medicine*. 2002;13(2):125–128.

Moline M, Zendall S. Evaluating and managing premenstrual syndrome. *Medscape Womens Health*, 2000;5(2):1.

- Thyroid function should be checked in patients with Panic Disorder and Generalized Anxiety Disorder
- Hypothyroidism often presents with obesity
- Hypothyroidism can cause low libido, sexual dysfunction
- Women with hypothyroidism tend to have edema that should be treated with thyroid medicine.
- Fluid retention causes fibromyalgia-like symptoms

Simon N, Blacker D. Hypothyroidism and hyperthyroidism in anxiety disorders revisited: New data and literature review. *Journal of Affective Disorders*. 2002;69(1):209–217.

Kokkoris P, Pi-Sunyer F. Obesity and endocrine disease. *Endocrinology and Metabolism Clinics of North America*. 2003;32(4):895–914.

Viera A. Managing hypoactive sexual desire in women. *Medical Aspects Hum Sex*. 2001;1:7–13

Wheatley T, Edwards O. Mild hypothyroidism and oedema: Evidence for increased capillary permeability to protein. *Clinical Endocrinology*. 1983;18(6):627–635.

Deodhar A, Fisher A. Fluid retention syndrome and fibromyalgia. *Rheumatology*. 1994;33(6):576–582

- Hypothyroidism causes headaches. Hypothyroidism is a treatable cause of secondary headaches.
- Subclinical hypothyroidism is an exacerbating factor for migraine headache!
- Carpal tunnel syndrome is common in patients with hypothyroidism, even when medicine makes their tests normal
- In Irritable bowel syndrome, tests should be done if there is even a hint of hypothyroidism. What's that tell us?

Moreau T, Manceau E. Headache in hypothyroidism. Prevalence and outcome under thyroid hormone therapy. *Cephalalgia*. 1998;18(10):687–689.

Fallah R, Mirouliaei M. Frequency of subclinical hypothyroidism in 5- to 15-year-old children with migraine headache. *J Ped End Met*. 2012;25(9-10):859-862.

Cakir M, Samanci N. Musculoskeletal manifestations in patients; with thyroid disease. *Clinical Endocrinology*. 2003;59(2):162–167.

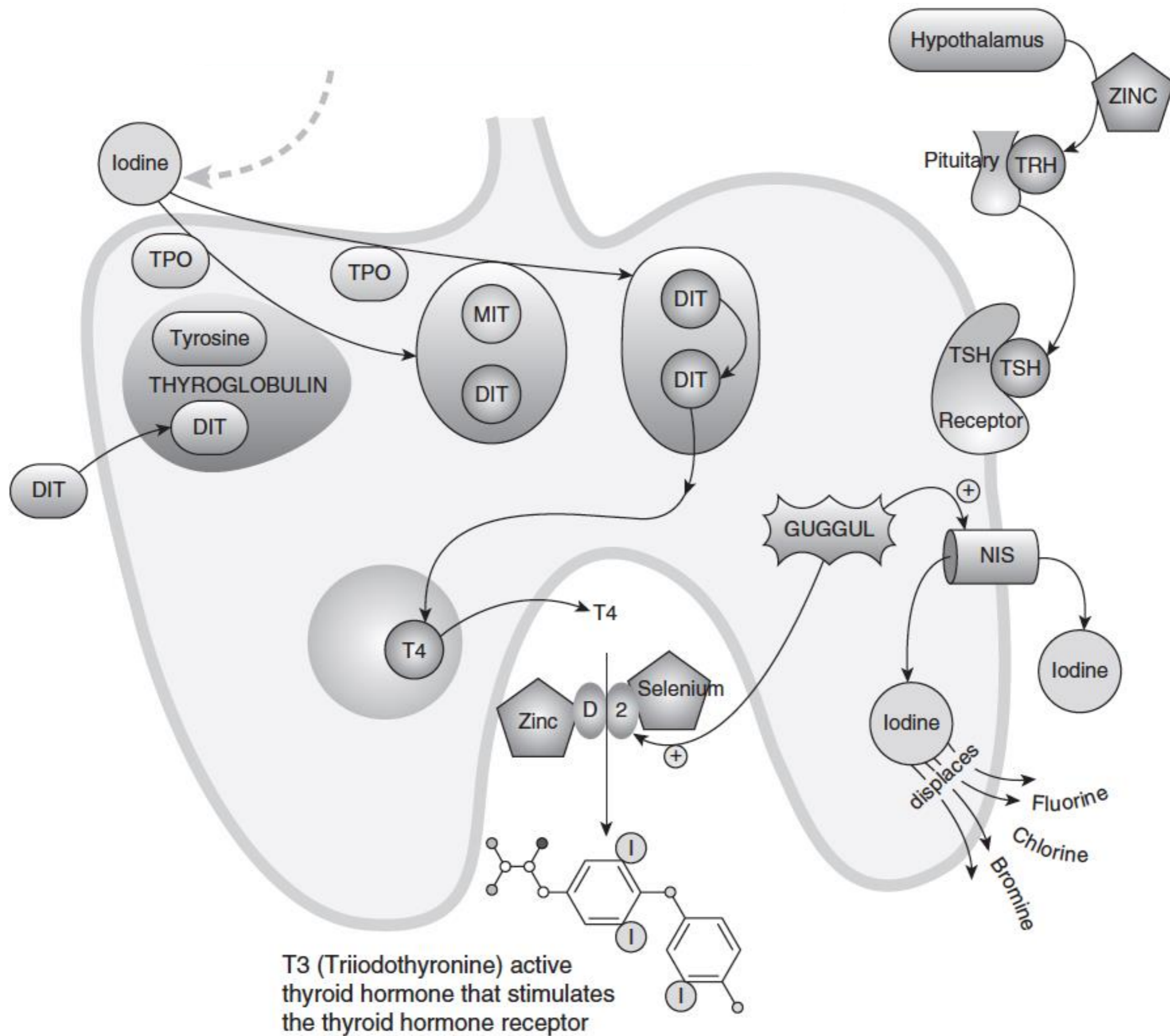
Olden K. Diagnosis of irritable bowel syndrome. *Gastroenterology*. 2002;122(6):1701–1714

- Hypothyroidism can cause insomnia
- First consideration for telogen (non-pigmented bulb) hair loss is hypothyroidism. Triggered by stress, surgery
- T3 can correct up to 50% of treatment-resistant depression

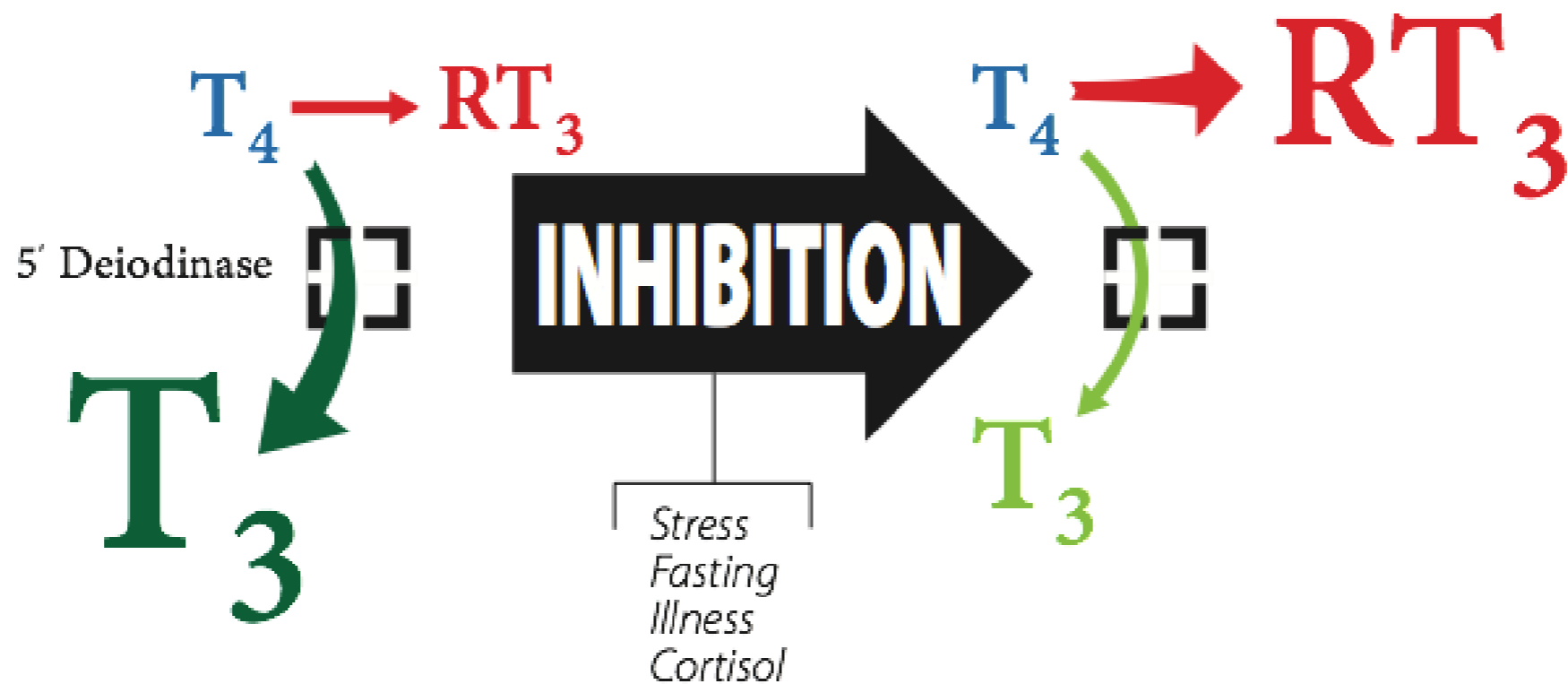
Goldacre M. Use of large medical databases to study associations between diseases. *QJM*. 2000;93(10):669–675.

Kales A. Sleep disorders: Recent findings in the diagnosis and treatment of disturbed sleep. *NEJM*. 1974;290(9):487–499.

Harrison S. Diffuse hair loss: Its triggers and management. *Cleveland Clinic Journal of Medicine*. 2009;76(6):361–367.



T3 (Triiodothyronine) active thyroid hormone that stimulates the thyroid hormone receptor



- Stressful lifestyle and excessive dieting are well known to impair T₄ to T₃ conversion

Kaiser C, Goumaz M. In Vivo inhibition of the 5 α -deiodinase type II in brain cortex and pituitary by reverse triiodothyronine. *Endocrinology*. 1986;119(2):762–770.
 Elliot D, Goldberg L. Sustained depression of the resting metabolic rate after massive weight loss. *Am J Clin Nutr*. 1989;49(1):93–96

Typical stressors that can lower the body temperature

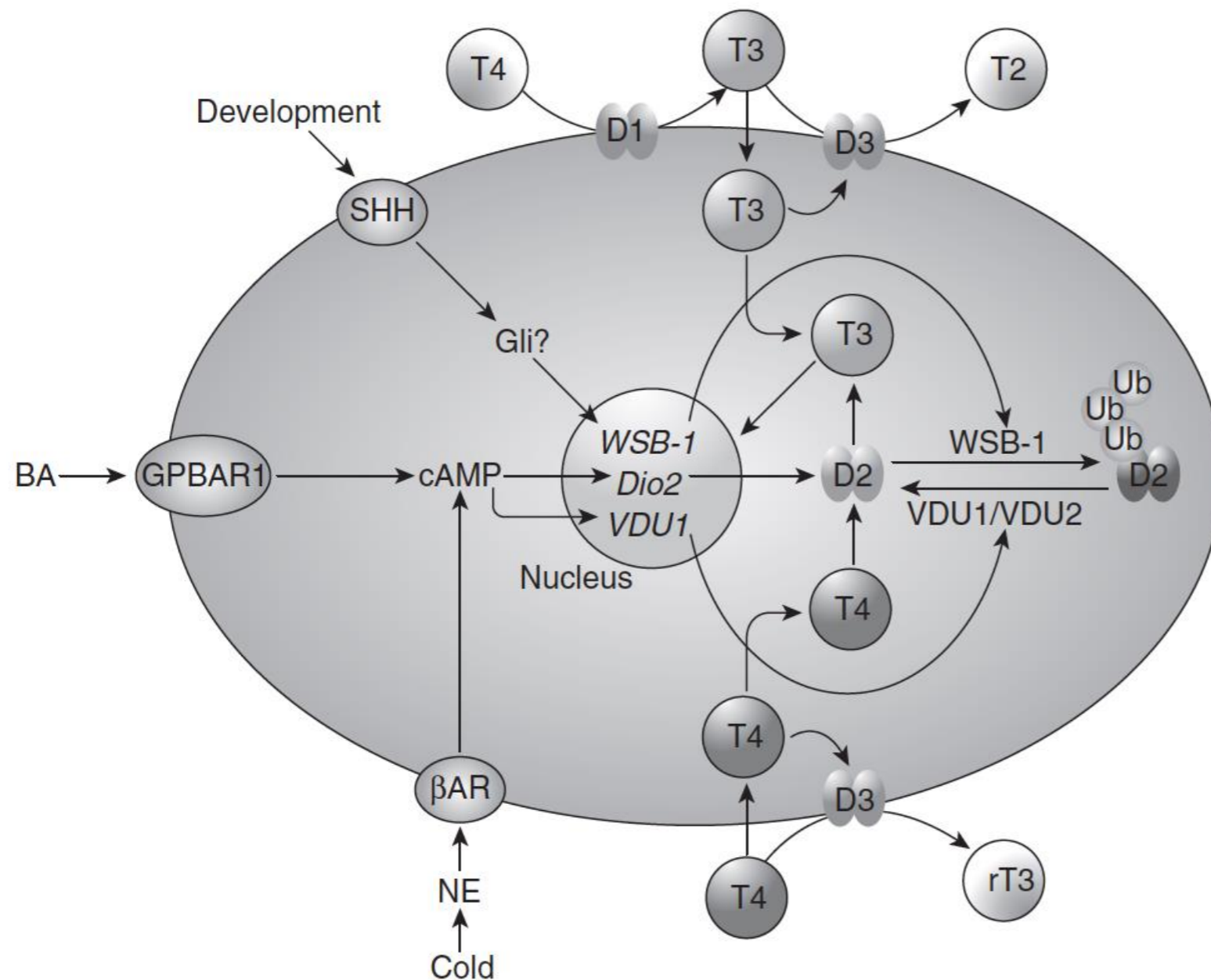
- Childbirth (No. 1 cause)
- Divorce
- Death of a loved one
- Job or family stress
- Surgery or Accidents
- Heavy metal toxicity (e.g., mercury)
- Bromine, Fluorine, Chlorine; especially a mixture of compounds that contain these

Can the Metabolism Slow Down and Stay Down?

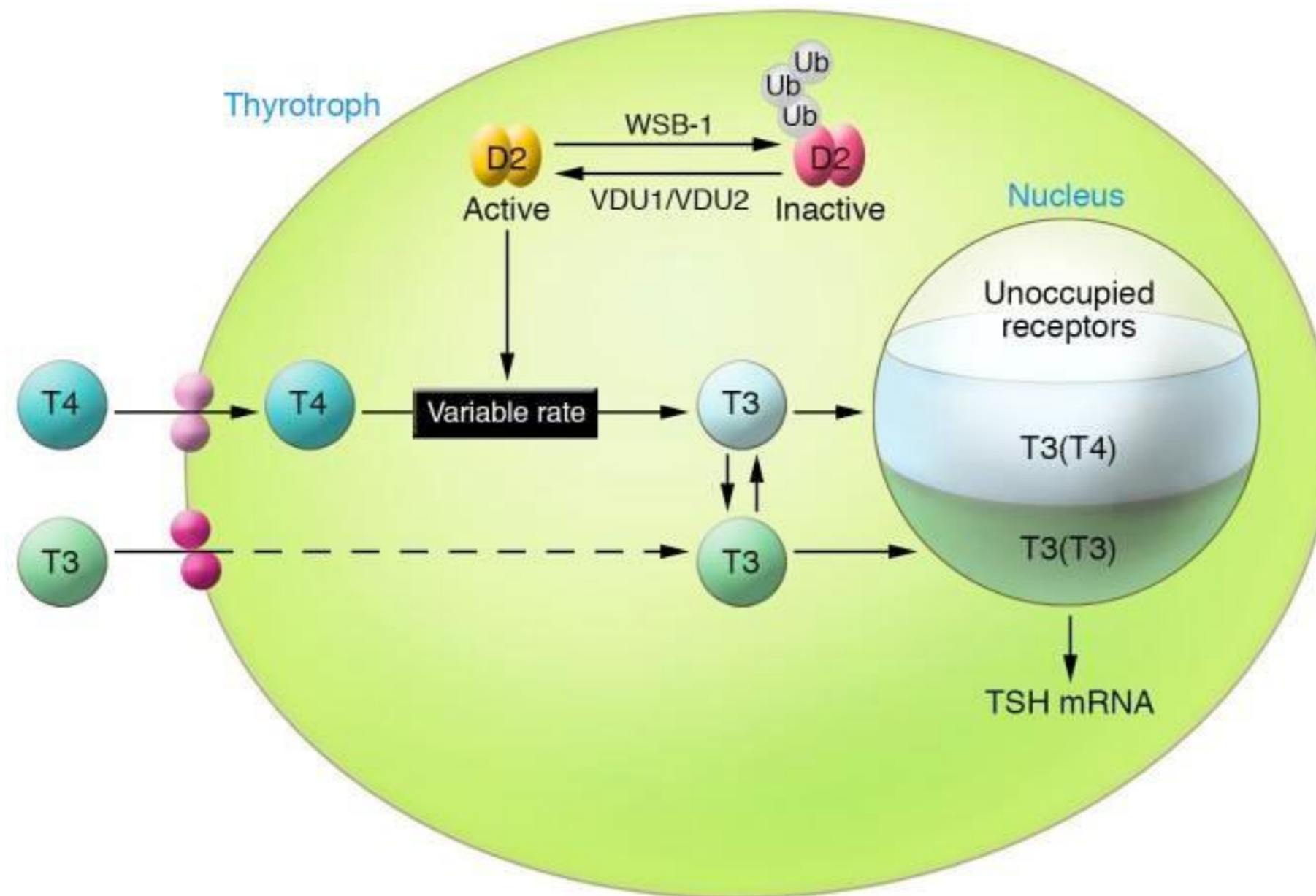
- People can experience sustained depression of the metabolic rate after moderate or massive weight loss, even after re-feeding.

Elliot D, Goldberg L. Sustained depression of the resting metabolic rate after massive weight loss. *Am J Clin Nutr.* 1989;49(1):93–96.

80% of T3 is produced and regulated intracellularly in a time-specific and tissue-specific fashion



This regulation and control is invisible to blood tests

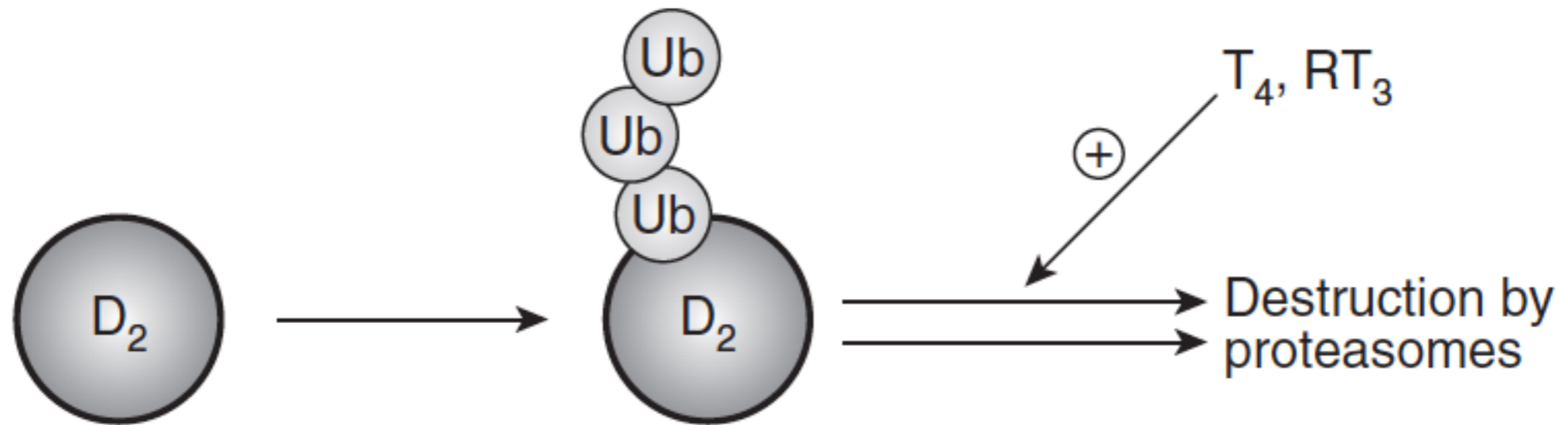


A great deal of the T3 stimulation of the nucleus depends on the intracellular conversion of T4 to T3, and that's regulated.

Bianco A, Kim B. Deiodinases: Implications of the local control of thyroid hormone action. *J Clin Invest.* 2006;116(10):2571–2579.

Ubiquitin Proteasome Pathway

- Key regulatory system for protein levels
- Ubiquitin is found in every cell
- When a protein is tagged with a chain of at least 4 ubiquitin, it is tagged for digestion by proteasome and amino acids are recycled
- This is the key pathway that regulates the activity of D2 which converts T4 to T3

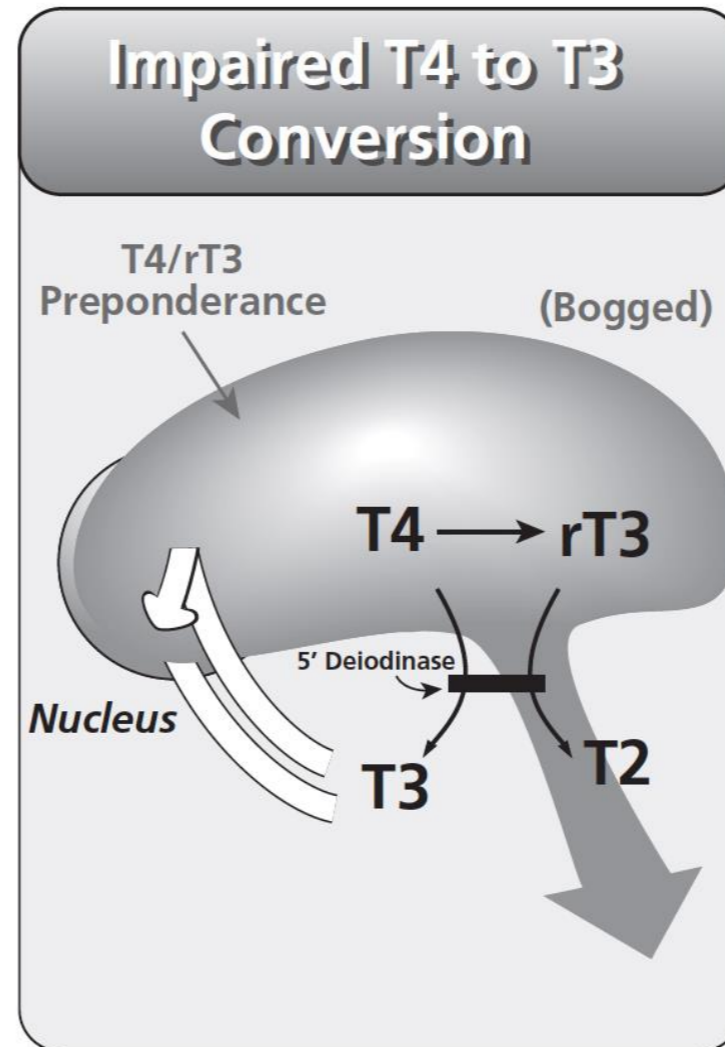
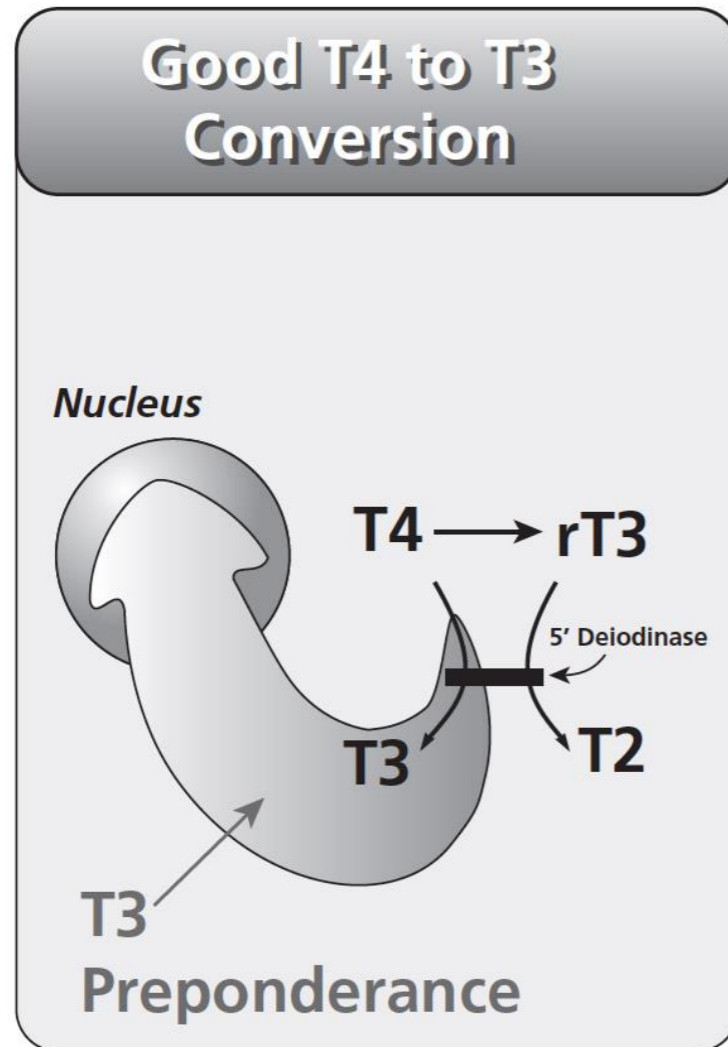


- T4 and rT3 both accelerate the destruction of type II deiodinase (D_2), decreasing the half-life of D_2 by as much as 50%, slowing the conversion of T4 to T3
- This can explain why many patients don't feel well on T4-containing medicine
- Some people feel better on herbs than on T4

Bianco AC, Salvatore D, Gereben B, Berry MJ, Larsen PR. Biochemistry, cellular and molecular biology, and physiological roles of the iodothyronine selenodeiodinases. *Endocrine Reviews* 2002;23(1):38–89

Can the peripheral conversion get persistently bogged down even though the 1/2 life of RT3 is a few hours and the 1/2 life of D2 is less than an hour?

- Have you ever felt refreshed after a 5 minute nap?
- What happened in those 5 minutes?
- Would it have happened if you had not taken the nap?
- Dynamic systems can sometime get stuck out of balance.



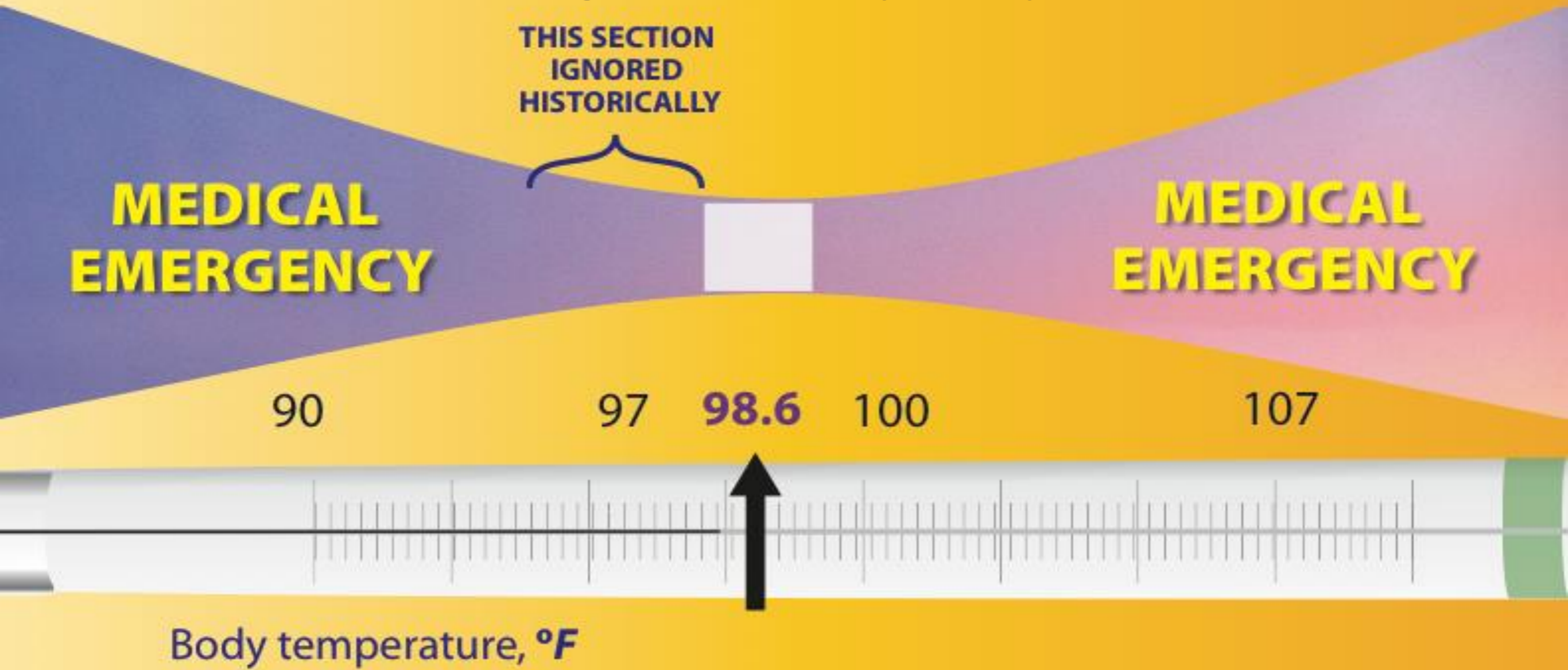
- With good T4 to T3 conversion, T4 medicine may improve a patient's temperature (expression).
- With poor T4 to T3 conversion, T4 medicine and RT3 may make conversion worse.
- This can explain why some patients feel worse and worse when their T4-containing medicine is increased



- When we're driving down the road and we're wondering how fast we're going, we look at the speedometer not the gas gauge.
- A thermometer is literally a speedometer
- The body temperature is not a good measure of the metabolic rate. It's an exact measure.

TEMPERATURE-MEDIATED PROBLEMS

People don't have hypothyroid symptoms without having a low body temperature



- How many have seen temperatures normalized with herbs and nutrients alone? Results?
- How many have seen temperatures normalized with T3 alone? Results?

Conclusion

- TSH and body temperature are most predictive in helping patients feel well
- Low body temperature can result from either inadequate supply centrally, or inadequate conversion, expression peripherally
- High TSH indicates low thyroid hormone supply. Normal TSH and low temperature indicates intracellular peripheral problem invisible to thyroid blood tests

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