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**Thyroid Algorithm A**

4/30/2024

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**IMPORTANT NOTICE**

This information is for educational purposes only, to facilitate quality conversations between patients and their personal physician(s). Several essential considerations are required to safely administer any protocol for an individual. This information is NOT intended to diagnose, treat or encourage self-treatment of any medical condition.

**Introduction**

This simple algorithm uses three measurements to evaluate levels of T4 and T3 and provide information about the thyroid and pituitary functioning. **If using external T4 or T3 as a response, the timing, magnitude and interactions are highly individual and must be adjusted by a licensed practitioner.**

**The basic ideas are:**

1. TSH is a measure of pituitary function, NOT thyroid function. Therefore TSH is not utilized to assess the body's ("peripheral") need for thyroid hormone.
2. If only T4 is adjusted, there are only three possible changes— increase, decrease or none. If T3 and T4 can be adjusted, there are nine possible changes.
3. By measuring just three parameters, Free T4, Free T3 and Reverse T3, each with high, low, or "optimal", there are 27 possible scenarios.

**Theory**

- This Algorithm utilizes only three measures to assess thyroid function, Reverse T3 (RT3), T4 Free (T4F) and T3 Free (T3F)
- For values within the reference range, the range is broken in thirds, called Low, Middle or High.
- If the value is outside of the reference range, it will be called Very Low (VL) or Very High (VH).
- Each value is Low (or VL), Middle or High (or VH). This yields 27 different "scenarios" (see below), many of which can overlap. The algorithm can be used to assess function with or without medications.
- If any values are in the Very Low (VL) or Very High (VH) range, then more urgent adjustments might be necessary.
- If T4 is the only medication, then only three steps are available--increase, decrease or no change. If both T3 and T4 are utilized, then there are 9 different action steps that allow for a more individualized adjustment. In 16 of 27 scenarios (below), optimal balance cannot be achieved with T4 alone.
- The relationship between T4 and T3 is not symmetrical because T3 is 4-10 times more potent than T4. Also, T3 is made from T4, but T4 cannot be made (directly) from T3.
- While proper conversion of T4 to T3/RT3 does occur in many scenarios (when T4 alone can be utilized), there can be under- and over-conversion, in which case using T4 and TSH won't be optimal. In this algorithm, TSH is only used to monitor pituitary (and hypothalamic) function. Non-Thyroidal Illness Syndrome (NTIS), defined by high RT3 with low T3, T4 low or normal, can be helped with N-Acetyl Cysteine and other remedies.
- Since high thyroid values, especially T3 are considered risky for the heart, and low thyroid values are not life-threatening in the short-term, "starting low and going slow is the safest way to go".
- Abraham and others suggest that in some scenarios, the body takes thyroid hormone apart to obtain iodine and tyrosine. Persistently low thyroid values may represent this phenomenon rather than malabsorption, and will be called "consumption" below. (Future algorithms may administer iodine with thyroid hormone to help).
- For more information, see [cohlife.org/thyroid](http://cohlife.org/thyroid) (must be registered (free) to see all links)

**Application**

- **For educational purposes only, to facilitate discussions between patients and their licensed practitioners.**
- Reverse T3 will be utilized as a primary measure as it represents the integration of central (pituitary) and peripheral (liver, muscle, other) thyroid conversions and adrenal systems. It is needed when the T3 and T4 (and TSH) are not in sync. TSH is only utilized to gauge hypothalamic-pituitary function.
- T3 is the more potent hormone and is more important than T4. High T3 is considered risky for the



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heart and so preventing/addressing high T3 is a priority.

- While Free levels of T4 and T3 (T4F and T3F respectively) are being utilized as primary measures, Total T4 and T3 (T4T and T3T respectively) may need to be considered in certain scenarios (where the values are not in sync). That Algorithm B is more complex and should only be used if this Algorithm A cannot achieve balance after several adjustments.
- Frequency of testing can go from two weeks (scenarios when T3 is very high) to 3-6 weeks (usual adjustments), to quarterly or biannually ("maintenance"). Two sequential balanced values without thyroid adjustment will change status to maintenance. Each change in dosage or brand will require at least two subsequent tests, until balance (Scenarios 13, 14, 15) is achieved and maintained for two lab sets.
- Mid-range is defined as the middle third of the reference range. The lower third of the reference range is considered Low and below the reference range is considered Very Low (VL). The upper third of the reference range is considered High and above the reference range Very High (VH) (values provided below)
- If using dessicated thyroid and T3 and T4 need to go in opposite directions, use the dessicated to cover the minimum amount of both, and then adjust T3 or T4 to meet the balance.
- If all values are low and the patient is not (yet) on thyroid medication, this might reflect nutritional deficiencies of iodine, tyrosine, selenium, zinc, and other nutrients, gut dysfunction and/or toxicities such as mercury (Hg).

		# of T4 Scenarios			
		10	7	10	
# of T3 Scenarios	7	low ↑ T3	low ↑ T4	optimal →	high ↓ T4
	11	optimal →	4,5,6,10,11	13,14,15	22,23,24
	9	high ↓ T3	7,8,9	16,17	18,25,26,27
	→ no change    ↑ increase    ↓ decrease				

**Of the 27 scenarios:**  
 only 3 require no adjustment  
 only 11 can be adjusted with T4 only  
 16 require T3 for optimal adjustment  
 7 require only T3 adjustment  
 6 require moving T3 and T4 in opposite directions



Labcorp Ranges								Date	Date
Test	Units	VL	L	M	H	VH	Note		
RT3	ng/dL	< 9.2	9.2 - 14.1	14.2 - 19.2 (16.7)	19.3 - 24.1	> 24.1	tighter than Quest		
T4F	ng./dL	< 0.82	0.82 - 1.14	1.15 - 1.44 (1.30)	1.45 - 1.77	> 1.77	same		
T3F	pg/mL	< 2.0	2.0 - 2.8	2.9 - 3.5 (3.2)	3.6 - 4.4	> 4.4	looser		
Quest Ranges									
Test	Units	VL	L	M (x)	H	VH	Note		
RT3	ng/dL	< 8	8 - 13.7	13.8 - 19.2 (16.5)	19.3 - 25	> 25	looser than Labcorp		
T4F	ng./dL	< 0.8	0.8 - 1.13	1.14 - 1.46 (1.30)	1.47 - 1.8	> 1.8	same		
T3F	pg/mL	< 2.3	2.3 - 2.93	2.94 - 3.56 (3.25)	3.57 - 4.2	> 4.2	tighter		

To apply the above values to the table below: both L and VL = L; both H and VH = H

Scenario	RT3	T4F	T3F	T4 dose	T3 * dose	Conversion Issue ***	Notes
→ no change    ↑ increase    ↓ decrease							
1	L	L	L	↑	→		simple increase of T4 or might represent T4 malabsorption and require change of brand.
2	M	L	L	↑	↑	possible	If not on T3, raise T4 and see response.
3	H	L	L	→	↑	over + under ***	High RT3 with low T4 and T3 suggests a conversion issue. Try balancing with T3
4, 5	L,M	L	M	↑	→		If T3 increases rather than T4, suggests a conversion/cortisol issue.
6	H	L	M	↑	→	over	Probable conversion/cortisol issue. If not on T3, may not be optimally adjusted by raising T4.
7, 8, 9	L,M,H	L	H**	↑	↓**	over	If not on T3, may not be optimally adjusted by raising T4. May represent a cortisol effect.
10,11	L,M	M	L	↑	→	possible	increase of T4 will either increase T3 or RT3, need to see response to raising T4 alone.
12	H	M	L	→	↑	over + under ***	High RT3 with low T3 suggests a conversion/ cortisol issue that may not respond to raising T3.
13	L	M	M	→	→		Almost optimal. If RT3 is low on serial tests, might bring T4 up or explore cortisol issue.
14	M	M	M	→	→		Optimal adjustment.
15	H	M	M	→	→		Almost optimal. If RT3 is high on serial tests, might bring T4 down or explore cortisol issue.
16,17	L,M	M	H**	→	↓**	over	If not on T3, can try lowering T4 instead. Otherwise suggests a conversion/cortisol issue.
18	H	M	H**	↓	(↓**)	over	If not on T3, cannot optimally adjust by lowering T4. May represent a cortisol effect.
19, 20, 21	L,M,H	H	L	↓	↑	under ***	If not on T3, cannot optimally adjust by lowering T4. Definite conversion/cortisol issue.
22	L	H	M	↓	→	under	If T3 goes down in response to lowering T4, will require adding/increasing T3
23, 24	M,H	H	M	↓	→		If T3 goes down in response to lowering T4, will require adding/increasing T3
25	L	H	H**	(↓)	↓**	under/over ***	Low RT3 with high T4 and T3 suggests conversion/ cortisol issue--decrease T3 (and/or T4)
26, 27	M,H	H	H**	↓	↓**		Decrease T4 (and T3 if utilized)

\* T3 can be provided as liothyronine (Cytomel brand) and/or as a component of dessicated porcine thyroid (DPT, Armour, NP Thyroid, compounded).  
 \*\* If Very High, may require urgent reduction of T3 and/or T4.  
 \*\*\* Non-Thyroidal Illness Syndrome (NTIS) = RT3 H, T3 L, T4 M or L



**Assessing Hypothalamic-Pituitary Function (HPF) based on TSH status**

**TSH**

**Thyroid  
 Meds  
 Adjustment  
 Based on  
 Algorithm**

	<b>VL</b>	<b>L</b>	<b>M</b>	<b>H****</b>	<b>VH****</b>
<b>Need Less</b>	Possible Dysfunction	Correct	Possible Dysfunction	Hypothalamic-Pituitary Dysfunction	Hypothalamic-Pituitary Dysfunction
<b>No Change</b>	Hypothalamic-Pituitary Dysfunction	Mild Dysfunction and/or Iodine deficiency	Correct	Mild Dysfunction and/or Iodine supplementation	Hypothalamic-Pituitary Dysfunction
<b>Need More</b>	Hypothalamic-Pituitary Dysfunction	Hypothalamic-Pituitary Dysfunction	Possible Dysfunction	Correct	Possible Dysfunction
<b>T4 up &amp; T3 down or visa versa (out of sync)</b>	Possible Adrenal or other Dysfunction(s)				

\*\*\*\* TSH can raise in response to scenarios other than 1) low thyroid levels, including 2) pituitary dysfunction, 3) hypothalamic dysfunction, 4) iodine administration, 5) adrenal, and 6) other pituitary hormone dysfunctions (prolactin), 7) gut, liver, vagal dysfunction.

**DRAFT**



## Assessing Hypothalamic-Pituitary Function and Preparation for Algorithm B

In an ideal world, T4F, T3F and RT3 should be in sync as well as T4 Total (T4T), T3 Total (T3T) and TSH.

### Labcorp Ranges

Test	Units	VL	L	M	H	VH	Note
RT3	ng/dL	< 9.2	9.2 - 14.1	14.2 - 19.2	19.3 - 24.1	> 24.1	tighter range than Quest
T4F	ng./dL	< 0.82	0.82 - 1.14	1.15 - 1.44	1.45 - 1.77	> 1.77	same
T3F	pg/mL	< 2.0	2.0 - 2.8	2.9 - 3.5	3.6 - 4.4	> 4.4	looser
T4T	ug/dL	< 4.5	4.5 - 7.0	7.1 - 9.4	9.5 - 12.0	>12.0	looser
T3T	ng/dL	< 71	71 - 107	108 - 143	144 - 180	>180	looser
TSH	uIU/mL	< 0.45	0.45 - 1.80	1.85 - 3.10	3.15 - 4.50	>4.50	same
TSH	uIU/mL	< 0.45	0.45 - 1.05	1.10 - 2.35	2.40 - 3.00	>3.00	Cheikin correction

### Quest Ranges

Test	Units	VL	L	M	H	VH	Note
RT3	ng/dL	< 8	8 - 13.7	13.8 - 19.2	19.3 - 25	> 25	looser range than Labcorp
T4F	ng./dL	< 0.8	0.8 - 1.13	1.14 - 1.46	1.47 - 1.8	> 1.8	same
T3F	pg/mL	< 2.3	2.3 - 2.93	2.94 - 3.56	3.57 - 4.2	> 4.2	tighter
T4T	ug/dL	< 5.1	5.1 - 7.4	7.5 - 9.62	9.63 - 11.9	>11.9	tighter
T3T	ng/dL	< 76	76 - 111	112 - 145	146 - 181	>181	tighter
TSH	uIU/mL	< 0.45	0.45 - 1.80	1.81 - 3.10	3.15 - 4.50	>4.50	same
TSH	uIU/mL	< 0.45	0.45 -			>3.00	Cheikin correction