



Theory

- This Algorithm simply utilizes three measures to assess thyroid function, Reverse T3 (RT3), T4 Free (T4F) and T3 Free (T3F). Each value is Low, Middle or High. This yields 27 different "scenarios" (see below), many of which overlap. It can be used to assess function with or without medications.
- If T4 is the only medication, then only three action 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 several scenarios (see below), optimal balance cannot be achieved with T4 alone.
- The relationship between T4 and T3 is not symmetrical because T3 is more 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 (often when T4 alone is utilized), there can be under- and over-conversion, in which case using T4 alone and the TSH won't be optimal. In this algorithm, TSH is only used to monitor pituitary (and hypothalamic) function.
- 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".
- Some authors, including Abraham, suggest that in some scenarios, the body takes apart thyroid hormone 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 decrease this consumption).
- For more information, see cohlife.org/thyroid (must be registered (free) to see all links)

Application

- 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 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. 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 changes moves into maintenance status.
- 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 any values are in the Very Low (VL) or Very High (VH) range, then bigger and more urgent adjustments might be necessary.
- 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, vitamin a, vitamin d, omega-3 oils and/or gut dysfunction.
- For educational purposes only, to facilitate discussions between patients and their licensed practitioners.

		T4			# of T3 Scenarios
		-	0	+	
T3	-	18,25,26,27	16,17	1,7,8,9	10
	0	22,23,24	13,14,15	4,5,6,10,11	11
	+	19,20,21	3,12	2	6
# of T4 Scenarios		10	7	10	

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



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 - 3.1	3.2 - 4.0	> 4.4	looser

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 - 1.12	1.13 - 1.47	1.48 - 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

Scenario	RT3	T4F	T3F	T4 dose	T3* dose	Conversion Issue	Notes
1	L	L	L	+	0		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	O	+	over + under	High RT3 with low T4 and T3 suggests a conversion issue
4,5	L,M	L	M	+	0		If T3 increases rather than T4, suggests a conversion issue.
6	H	L	M	+	0	over	High RT3 with low T4 and normal T3 suggests a conversion issue
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	+	O	possible	increase of T4 will either increase T3 or RT3, need to see response to raising T4
12	H	M	L	O	+	over + under	High RT3 with low T3 suggests a conversion issue
13,14,15	L,M,H	M	M	O	O		Adequate adjustment. Best if RT3 is M. If RT3 is low or high on serial tests, might bring T4 up or down.
16,17	L,M	M	H**	O	-**	over	If not on T3, can try lowering T4. Otherwise suggests a 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
22,23,24	L,M,H	H	M	-	O		If T3 goes down in response to lowering T4, will require adding T3
25,26,27	L,M,H	H	H**	-	-**		Everything high--decrease T4 (and T3 if utilized)

o = no change
 + = increase
 - = decrease

* T3 can be provided as liothyronine (Cytomel brand) and/or as a component of desiccated thyroid (Armour, Nature, West, compounded).
 ** If Very High, may require urgent reduction of T3 and/or T4.



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Thyroid Algorithm A

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TSH to assess Hypothalamic-Pituitary Function (HPF)

		TSH		
		Low	Mid	High
Thyroid Meds Adjustment Based on Algorithm	Need Less	Correct	Possible Dysfunction	Dysfunction
	No Change	Possible Dysfunction	Correct	Possible Dysfunction
	Need More	Dysfunction	Possible Dysfunction	Correct
	T4 up and T3 down or visa versa (out of sync)	Possible Adrenal or other Dysfunction		



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

Labcorp Ranges

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T3F	pg/mL	< 2.0	2.0 - 2.8	2.9 - 3.1	3.2 - 4.0	> 4.4	looser
T4T	ug/dL	< 4.5	4.5 - 6.9	7.0 - 9.5	9.6 - 12.0	>12.0	looser
T3T	ng/dL	< 71	71 - 106	107 - 144	145 - 180	>180	looser
TSH	uIU/mL	< 0.45	0.45 - 1.70	1.75 - 3.05	3.10 - 4.50	>4.50	same as Quest

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 - 1.12	1.13 - 1.47	1.48 - 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 - 7.3	7.4 - 9.7	9.78 - 11.9	>11.9	tighter
T3T	ng/dL	< 76	76 - 111	112 - 145	146 - 181	>181	tighter
TSH	uIU/mL	< 0.45	0.45 - 1.70	1.75 - 3.05	3.10 - 4.50	>4.50	same as Labcorp