

DATE:	13 June 2022
TO:	All Zones: Physicians, Nurses and Healthcare Practitioners, and all Laboratory Services Staff
FROM:	Alberta Precision Laboratories and DynaLIFE Medical Labs
RE:	Update to thyroid hormone reference intervals and to the progressive TSH algorithm

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Key Message

Effective Tuesday June 21, 2022 there will be 4 key changes for thyroid hormone test reporting. These changes support provincial harmonization initiatives using Alberta-derived data to improve patient care.

1. New pediatric and adult reference intervals for TSH, free T4 (fT4) and free T3 (fT3), including a comment appended to non-male patients of child-bearing age with a link for gestational age-specific reference intervals (Appendices A to C).
2. New progressive TSH algorithm (Appendix D).
3. Standardization of TSH reporting units to mIU/L (note: some areas of province currently use mU/L; mIU/L is equivalent to mU/L units).
4. New TSH assay (change in manufacturer) at University of Alberta Hospital (UAH) ONLY, which will increase results by ~6-7%. fT4 and fT3 assays at UAH will remain the same.

Background

To promote provincial harmonization, a data review on each of TSH, fT4 and fT3 was performed by Alberta Precision Laboratories (APL).

- Analysis included comparison of results across multiple sites (APL and DynaLIFE Medical Labs), clinical input and endorsement from endocrinologists, and patient care optimization.

Optimization of the progressive TSH algorithm ("*TSH, Progressive*") improves laboratory follow-up testing.

- Progressive TSH testing aims to improve test utilization when screening primary thyroid disease in the community.
- Once therapy in these patients is initiated then ordering/monitoring TSH alone is often most appropriate.

Gestational age-specific reference intervals for thyroid function tests assists in appropriate assessment and management of thyroid function in pregnancy.

- These reference intervals are now available throughout the province (previously only in Calgary Zone).

How this will impact you

- If *TSH, Progressive* is ordered, TSH is always reported but fT4/fT3 are reflexed ONLY according to the algorithm (Appendix D).
 - If fT4 and/or fT3 are required upon review of results, contact your local laboratory.



- For interpretation of test results in pregnancy, refer to [Thyroid Function in Pregnancy Care Pathway](#).
- TSH testing completed at UAH will show an upward shift of ~6-7% due to a change in manufacturer.
 - Consider establishing a new baseline for patients that are being monitored over time.
- The fT4 results are ~20% higher in lithium heparin plasma compared to serum when measured by Siemens Atellica at DynaLIFE Medical Labs.
 - Serum samples are preferred. A comment will append to fT4 results from lithium heparin plasma measured at DynaLIFE, stating to interpret result with caution as the fT4 reference interval was established from serum samples.

Action Required

- Be aware of the new pediatric, adult, and gestational age-specific TSH, fT4 and fT3 reference intervals, and the new *TSH, Progressive* algorithm; see Test Directories for [APL](#) and [DynaLIFE](#).
- Be aware that individual fT4 and/or fT3 orders will be cancelled if ordered together with *TSH, Progressive*. These tests will automatically be added if indicated by the algorithm.
- Be aware of the fT4 and fT3 [Choosing Wisely Canada](#) guidelines: “*Don’t use fT4 or fT3 to screen for hypothyroidism or to monitor and adjust levothyroxine (T4) dose in patients with known primary hypothyroidism, unless the patient has suspected or known pituitary or hypothalamic disease.*”
 - If TSH, fT4 and/or fT3 are required for clinical management, order the individual test.
- Be aware that TSH testing completed at UAH will see an upward shift of ~6-7%. This shift may require establishing new baseline on patients being monitored over time.

Questions/Concerns

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Approved by

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- Dr. Dylan Pillai, Medical Director, APL, South Sector
- Dr. Michael Mengel, Medical Director, APL, North Sector
- Dr. Erene Farag, Interim Medical Director, DynaLIFE Medical Labs



Appendices

A. New TSH and TSH, Progressive Reference intervals (M/F/U/X)

Partition	Reference Interval (mIU/L)
*0 up to 8 days	1.23 – 25.00
*8 days up to 1 year	1.00 – 6.80
≥1 year	0.20 – 6.50

*These age partitions were updated on Thursday October 27, 2022 based on consultation with pediatric endocrinology and review of the reference interval dataset.

B. New Free T4 Reference Intervals (M/F/U/X)

Partition	Reference Interval (pmol/L)
0 up to 15 days	13.5 – 50.0
15 up to 30 days	8.7 – 32.5
≥30 days	10.0 – 25.0

C. New Free T3 Reference Intervals (M/F/U/X)

Age Partition	Reference Interval (pmol/L)
0 up to 30 days	4.2 – 13.0
30 days up to 1 year	5.1 – 8.6
1 up to 14 years	4.4 – 8.1
14 up to 18 years	3.5 – 7.4
≥18 years	3.0 – 6.5

D. New Progressive TSH Algorithm

*TSH algorithm reflex points are based on ≥18 years M/F/U/X reference interval

