Guideline for the Use of Laboratory Tests to Detect Thyroid Dysfunction CLP 015

Revised July, 2007

1. Background

The clinical manifestations of thyrotoxicosis (hyperthyroidism) or hypothyroidism may be so non-specific that a diagnosis on clinical features alone lacks both sensitivity and specificity. Hence, reliance is placed on a sensitive assay of circulating thyroid stimulating hormone (sTSH) and the measurement of free thyroid hormone levels (free T3 (fT3) and free T4 (fT4)) to confirm or rule out thyroid dysfunction. In most situations, sTSH alone is the appropriate initial test.

This Guideline is intended to provide clinicians with information to support their decision-making and to provide guidance when ordering sTSH, fT3 and fT4 levels. Guidelines, of course, cannot apply to every clinical situation, nor can they serve as a substitute for sound clinical judgement.

2. Indications for Screening

Patients with thyroid enlargement and/or signs and symptoms suggestive of thyroid disease should be tested to assess thyroid function. While screening of the general population for thyroid dysfunction is not recommended, there are certain high risk groups that clearly benefit from screening. These include:

- All newborns (neonatal screening)
- Women over 50 years of age
- Women trying to conceive
- Pregnant women during the first trimester
- Women 6 weeks to 6 months postpartum (this is a period of high risk for thyroid disease)
- Patients on medications known to cause thyroid dysfunction (see section 6)
- Individuals with a family history of thyroid disease or autoimmune disorders
- Patients with hyperlipidemia, hypertension, diabetes mellitus

3. Laboratory Investigation

Initial abnormal sTSH results should be confirmed and further investigated by:

- repeating the sTSH assay
- assessment of free thyroid hormone levels (fT3 & fT4)
- testing for thyroid autoantibodies (e.g. thyroid peroxidase antibodies (TPOAb))

These test results should be considered along with clinical findings, family history, medication history, and conditions identified in the table below (see section 6), in determining appropriate follow-up and treatment.

4. Limitations

- Elevated serum levels of TSH, as seen in hypothyroidism, are slow to respond to thyroid hormone supplementation. For this reason, after initiating or adjusting thyroid hormone therapy, clinicians are advised to wait a minimum of 4 to 6 weeks and then test for sTSH, fT3 and fT4. Results of these tests will direct alterations to hormone dosage.

- Suppressed levels of TSH, as seen in hyperthyroidism, respond to anti-thyroid medications even more slowly. Furthermore, the TSH response to such treatment can be unpredictable and usually takes 3 to 4 months to fully adjust. Therefore, efficacy of treatment is best monitored by testing fT3 and fT4 every 4 to 6 weeks.
- In contrast to primary hypothyroidism, TSH levels in hypothyroidism due to pituitary disease (secondary hypothyroidism) may be misleading. For the purpose of diagnosis, secondary hypothyroidism is almost always associated with other clinical and laboratory evidence of pituitary dysfunction. Laboratory documentation of secondary hypothyroidism will depend on a reduced serum fT4 level and associated clinical evidence.
- In sub-clinical hypothyroidism, where the diagnosis is based on mild elevation of TSH alone, the decision to treat must be based on clinical criteria.

5. TSH Reference Intervals

In the literature, discussion is ongoing as to the appropriate TSH reference range; some laboratories report a lower value for the upper limit of normal (between 2.5-3.0 mU/L). Ontario community laboratories have elected to continue to report the higher upper limit of normal (4.5 to 5.5 mU/L). The OAML Quality Assurance Committee and its Expert Panel on thyroid disease will update the reference range when there is evidence-based literature supporting such a change.

6. Causes of Abnormal TSH Results

Common Causes of Low Serum TSH	Common Causes of High Serum TSH
Hyperthyroidism due to: • Graves' disease • Multinodular goiter • Autonomous "hot" nodule • Thyrotoxic phase of subacute thyroiditis	Hypothyroidism due to: • Hashimoto's thyroiditis • Anti-thyroid medications • Late phase sub-acute thyroiditis
Drug-related Hyperthyroidism e.g. • l- thyroxine • Triiodothyronine • Amiodarone • Iodine • Dopamine	Drug-Related Hypothyroidism e.g. • Amiodarone • Lithium • Iodine

Other medications such as phenytoin, carbamazepine, heparin, pyridoxine and some antipsychotic drugs can alter thyroid results. The reader is advised to consult a specialist for interpretation in the presence of these agents.

7. General References

American Thyroid Association Guidelines 2000. Thyroid Function Tests. Retrieved June, 2007, from the American Thyroid Association's website: http://www.thyroid.org/index.html.

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Acknowledgements

The OAML gratefully acknowledges the contributions of the members of the Guideline's Expert Panel:

Vladimir Milosevic MD, FRCPC
Division of Endocrinology and Metabolism
Credit Valley Hospital, Mississauga, Ontario

William Singer MD, BS, FRCPC, FRCPE, FACP
Associate Professor of Medicine and Laboratory Medicine, University of Toronto
Consultant Physician, Division of Endocrinology & Metabolism, St. Michael's Hospital, Toronto
Consultant, LMC Endocrinology Centre, Toronto

Thomas J. McDonald MD, BASc. FRCP(C)
Professor of Medicine, University Of Western Ontario.

Laboratory Guidelines in Support of Clinical Practice

The OAML, through its Quality Assurance Committee, co-ordinates the development, dissemination, implementation and review of Guidelines for Clinical Laboratory Practice.

Guidelines are reviewed every 5 years, or as the literature warrants. When consensus on the Guideline is achieved by the Committee, the Guideline is submitted to the OAML Board of Directors for approval before distribution to clinicians.

The comments of end users are essential to the development of guidelines and will encourage adherence. You are strongly encouraged to submit your comments on this or any other OAML Guideline to:

Chair
Quality Assurance Committee
Ontario Association of Medical Laboratories
5160 Yonge Street, Suite 710
North York, Ontario
M2N 6L9

Tel: (416) 250-8555
Fax: (416) 250-8464
E-mail: oaml@oaml.com
Internet: www.oaml.com

Quality Assurance Committee Members

Frank Thompson MD, FRCPC
Medical Director, MDS Laboratories, Ontario

Philip Stuart MD, PhD, FRCP(C)
Medical Director, CML HealthCare

Joel Goodman PhD, FCACB
VP, Strategies and Innovations
Gamma-Dynacare Medical Laboratories

Janice Nolan MLT, CQA (ASQ)
Director, Quality & Regulatory Affairs
MDS Laboratories

Chair
Judy Ash BSc, ART, CQMgr, CQA (ASQ)
Director, Programs & Member Services
Ontario Association of Medical Laboratories

No conflict of interest declared