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St. Paul's Hospital &
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Laboratory Medicine Bulletin

Thyroglobulin by Tandem Mass Spectrometry

January 10, 2017

On January 16, 2017 St. Paul's Hospital (SPH) will begin offering thyroglobulin (Tg) analysis by liquid chromatography and tandem mass spectrometry (LC-MS/MS). This assay is used for recurrence monitoring in patients who have been treated for papillary or follicular thyroid carcinoma and is not affected by the presence of anti-thyroglobulin (ATg) antibodies which are present in about 25% of these patients [1]. The assay works by first digesting the specimen with trypsin and then using SISCAPA® technology [2] to immunopurify a peptide unique to the Tg amino acid sequence [3-7]. After this step, LC-MS/MS is used to quantify the peptide as a surrogate for the intact protein. Any potentially interfering antibodies are removed by the initial trypsin digestion.

This new assay has confirmed previous observations that the commonly employed Tg immunoassays (Siemens Immulite, Roche Cobas, and Beckman Access) are all affected by ATg – producing falsely lowered results when ATg is present [6]. In contrast, the SISCAPA® LC-MS/MS assays do not appear to be affected. The effect of ATg on the accuracy of routine Tg immunoassays is greatest at low concentrations of Tg and high ATg titres but there is no threshold ATg titre below which the potential for interference can be excluded as figure 1 shows.

In specimens that are ATg negative, results from the new LC-MS/MS provide comparable results to the routine Roche Cobas immunoassay method. Whether in the presence or absence of antibodies, results have been demonstrated to be comparable to the LC-MS/MS Tg results of a major reference laboratory. See figure 2.

To obtain this assay for your thyroid cancer patient, please write "Thyroglobulin by Mass Spectrometry at St. Paul's Hospital" in the textbox of the outpatient requisition. This *should* result in the specimen being forwarded to St. Paul's Hospital for approval and analysis. If the final report does not specifically indicate that the analysis was performed by mass spectrometry at St. Paul's Hospital then there has been an error and you should direct questions about incorrect specimen routing to the lab that performed the collection.

There must be prior evidence of ATg in order for the LC-MS/MS analysis to be performed. Tg by LC-MS/MS can also be added on to a specimen that has been previously analyzed at St. Paul's Hospital by request, provided that the specimen has not been discarded. Please make add-on requests within 3 weeks of routine Tg analysis by calling 604 682 2344 ext 62526.

Specimen type and reference intervals are the same as those for routine thyroglobulin analysis. The minimum sample requirement is higher than the routine assay. The lower reportable limit is 0.5 ug/L.

Serum Thyroglobulin by LC-MS/MS
Specimen Type: Serum (Gold or Red Top)
Minimum Sample Volume: 550 uL

Please do not hesitate to contact me if you have any other questions.

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References:

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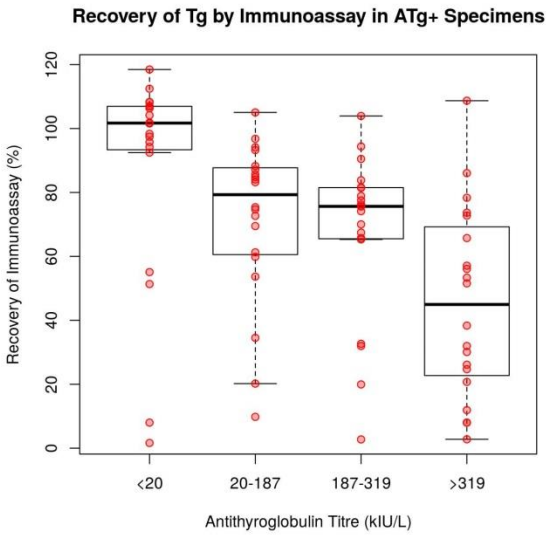

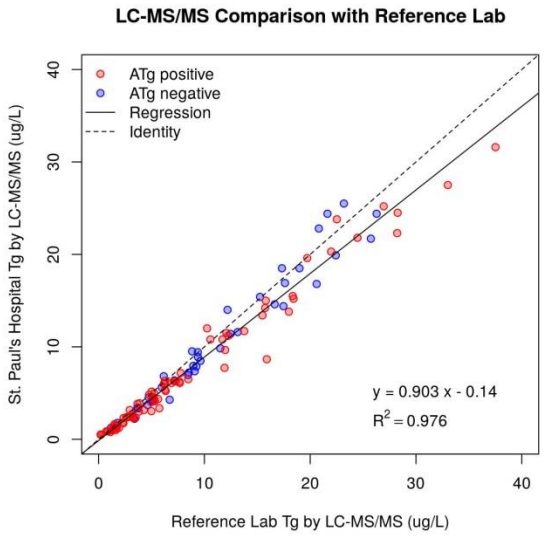

Figure 1 (left): Recovery (percent accuracy) of Tg results by routine immunoassay as a function of ATg titre for antibody positive specimens. Median titre was 187 kIU/L, interquartile range: [20, 319]. Figure 2 (right): Comparison of Tg results by LC-MS/MS performed at St. Paul's Hospital to Tg results by LC-MS/MS at a reference lab.