

Advances in thyroglobulin measurement: exploring dried blood spot sampling and mass spectrometry for enhanced clinical utility

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In contemporary medical practice, human thyroglobulin (Tg) represents the primary tumour biomarker for detecting the recurrence of differentiated thyroid carcinoma (DTC) in patients who have undergone thyroidectomy. Tg is a large and highly glycosylated tissue-specific protein exclusively produced by both healthy and tumour thyroid follicular cells in the thyroid gland. Different techniques, including immunometric assays (IMA) and radioimmunoassays (RIA), have been implemented in clinical settings to gauge Tg levels in blood samples collected through venipuncture. However, the reliability of these methods is compromised by the presence of antibodies, including anti-thyroglobulin antibodies (Tg-Abs) and heterophile antibodies (HAs), resulting in frequent inaccuracies in the quantification of T due to either the under- or overestimation of the actual values. In recent years, liquid chromatography tandem mass spectrometry (LC-MS/MS) has emerged as a distinctive and alternative tool aimed at overcoming the challenges posed by antibody interference. Despite its potential, the effectiveness of LC-MS/MS has yet to be fully explored and, if performed, could improve our knowledge regarding the potentiality of this tool for the detection of Tg.

In this work, we present a workflow, based upon LC-MS/MS and SISCAPA technology, to quantify Tg in patients with thyroid cancer, indicating greater sensitivity and specificity with respect to the routinely available protocols. Moreover, this workflow is also currently being translated and tested for use with samples obtained with DBS (dried blood spot) devices, a simple, cost-effective, and minimally invasive alternative to those obtained by venipuncture. Based upon these findings, this LC-MS/MS and SISCAPA based approach not only shows the potential for improving the accuracy of Tg quantification but may also simplify this process for patients living in remote areas who could independently collect DBS samples for Tg monitoring.

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