Method-related interference in thyroid function assays

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Aims

To assess potential assay interference as the cause of aberrant thyroid-stimulating hormone (TSH) and free thyroxine (FT4) results.

Methods

It is well documented that immunoassays, in general, are inherently vulnerable to different types of interference, including heterophilic antibody interference that has been known for decades. At present, immunoassays using fully automated platforms are the methods of choice in the clinical laboratory, especially for the measurement of analytes such as hormones that are present in the range of ng/L or less. In the past few years, many reports emerged worldwide emphasising the increased incidence of immunoassay interference in thyroid function assays, particularly in patients on biotin supplementation or in the presence of anti-streptavidin antibodies. Unfortunately, the frequency of such interference, its magnitude and the potential consequence of erroneous results that may significantly and adversely affect clinical management is rather difficult to assess.

As part of clinical authorisation, aberrant results which were not consistent with the clinical details (eg high FT4 in the thyrotoxic range associated with a normal or high TSH) were further investigated. Thyroid function tests (TFTs) are performed on the Roche Cobas 8000, using a chemiluminescence immunoassay that utilises biotin–streptavidin interaction in an immunometric sandwich reaction. 53 samples from 47 patients (34 female, 13 male, age range 4–91 years, mean+SD 49.5+26.8 years) with peculiar results that were not consistent with the clinical details were referred to another independent laboratory for analysis using a different method and platform (Siemens Advia Centaur XP) to exclude potential interference.

Results

Method-related interference was noted more frequently with the FT4 assay than the TSH assay: 19 (36%) of 53 samples compared with six (12%) of 51 samples examined. Furthermore, method-related interference was more pronounced with the FT4 assay, with five (26%) of the 19 samples with grossly elevated FT4 (56, 59, 93, 97, >100 pmol/L) demonstrating essentially normal concentrations when assayed by the other method.

Conclusions

This study underlines the limitation of immunoassays and the potential interference. In order to prevent misdiagnosis and inappropriate treatment, close interactive collaboration between the physician and the laboratory is essential in order to correlate hormonal assay results with patient clinical status. The laboratory should have a clear protocol to identify and investigate possible interference in TFTs and other endocrine assays. Healthcare professionals should be aware of such interference and challenge the laboratory if the results are not consistent with the patient's clinical status. ■

Conflict of interest statement

Authors declare no conflict of interest.

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