Black Country Pathology Services

Subclinical hypothyroidism: impact of assay and reference range differences on the diagnosis and management

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Introduction:

- Subclinical hypothyroidism (SCH) is indicative of mild to moderate thyroid failure and is defined as a serum thyroid-stimulating hormone (TSH) level above the upper reference limit and a normal serum free thyroxine (fT4).
- We assessed the commutativity of Roche and Abbott TSH and fT4 assays in the diagnosis and management of SCH. These assays are used by approximately 75% of clinical laboratories in the United Kingdom.

Methods:

- Consecutive SCH patient samples (a raised TSH <10mIU/L and a normal fT4) were identified from primary care from two neighbouring hospital laboratories over 10 days.
- Exclusion criteria: pituitary disease, pregnant women, children (<18 years), and patients taking levothyroxine or anti-thyroid drugs.
- Samples were stored between 2-8 °C until analysed. TSH and fT4 were measured in duplicate within 24 hours at both sites on a Roche cobas e801 in one laboratory and on an Abbott Architect i2000 SR in the other laboratory.
- Both laboratories use manufacturer provided assay-specific reference intervals and these were applied for the interpretation of results.

Results:

- 93 SCH patients were identified, 40 using the Abbott assay and 53 using the Roche assay over 10 days.
- Roche TSH and fT4 results were respectively 40±15% and 16±7% higher ($p<0.001$) compared to the Abbott results.
- Of the 53 patients with SCH on the Roche assays, 40 (75.5%) had normal thyroid function and 13 (24.5%) had SCH when analysed using the Abbott assays.

Table 1: Comparison of the Roche cobas and Abbott Architect thyroid assays in the diagnosis of subclinical hypothyroidism.

	Analysed using Abbott Assays		
Subclinical hypothyroidism on Roche assays	Normal Thyroid function	Subclinical hypothyroidism	Biochemical indication for thyroxine replacement
n=53	40 (75.5%)	13 (24.5%)	0 (0.0%)
	Analysed using Roche Assays		
Subclinical hypothyroidism on Abbott assays	Normal Thyroid function	Subclinical hypothyroidism	Biochemical indication for thyroxine replacement
n=40	0 (0.0%)	28 (70.0%)	12 (30.0%)

- Of the 40 patients with SCH on the Abbott assays, 28 (70%) had SCH and 12 (30%) had results indicative for levothyroxine replacement when analysed on the Roche assays. Of the 12 patients indicated for levothyroxine replacement, 4 had a TSH >10 mIU/L, 5 had a low fT4, and 3 had both a TSH >10 mIU/L and a low fT4.
- Of the total 93 patients, only 41 (44%) were concordant for SCH on both the methods.

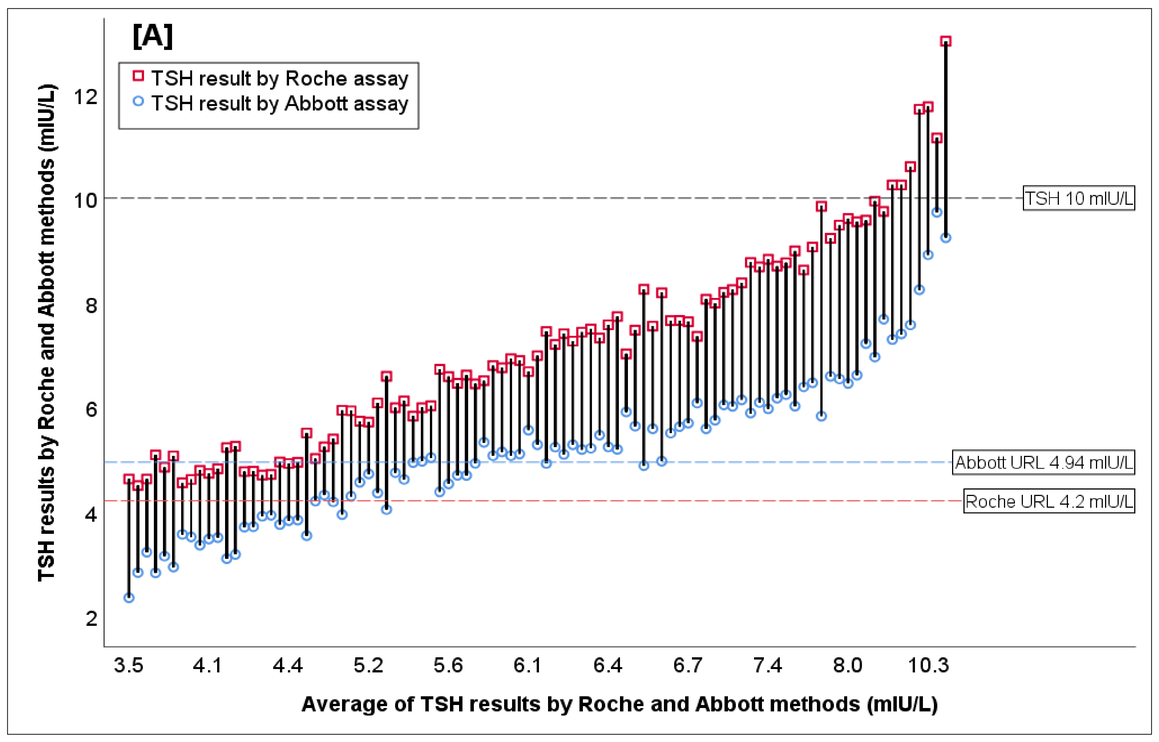

Figure 1: TSH (A) and fT4 (B) results analysed by Roche and Abbott assays on samples with subclinical hypothyroidism on at least one of the two analytical platforms (n=93). URL and LRL are the upper and lower reference limits.

Conclusions:

- The diagnosis and management of subclinical hypothyroidism is strikingly different when using TSH and fT4 assays provided by Abbott Laboratories and Roche Diagnostics.
- Between assay differences and variations in manufacturer provided reference ranges significantly affect the diagnosis and management of subclinical hypothyroidism.