Interpreting Minor Variations in Thyroid Function or Echostructure:

Treating Patients, Not Numbers or Images

Guy Van Vliet, MD[a,*], Johnny Deladoëy, MD, PhD[a,b]

KEYWORDS

• Overt • Thyroid • Children • Hypothyroidism • Hyperthyroidism • Ultrasonography • Nodule • Incidental

KEY POINTS

- The results of 5% of any laboratory test are outside the reference ranges.
- Without intervention, these results are often within the reference range when repeated.
- Diagnosing Hashimoto thyroiditis does not require ultrasonography imaging.

MINOR VARIATIONS IN THYROID FUNCTION

Introduction

The measurement of serum hormone concentrations on automated analyzers in clinical biochemistry laboratories allows rapid turnaround times, which may have contributed to practitioners requesting these ever more frequently. Because of the high prevalence and nonspecific clinical presentation of thyroid diseases, evaluation of thyroid function figures prominently on the list of blood tests requested. At our institution, a mother-child tertiary care center, serum thyrotropin (TSH) is measured in 55 samples every day, almost 10 times more than serum cortisol (A. Djemli, personal

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[a] Department of Pediatrics, Endocrinology Service and Research Center, Centre Hospitalier Universitaire Sainte-Justine, 3175 chemin de la Côte-Ste-Catherine, Montréal, Quebec H3T 1C5, Canada; [b] Department of Biochemistry, University of Montreal, 3175 chemin de la Côte-Ste-Catherine, Montréal, Quebec H3T 1C5, Canada
* Corresponding author. Centre Hospitalier Universitaire Sainte-Justine, Room 1719, 3175 chemin de la Côte-Ste-Catherine, Montréal, Quebec H3T 1C5, Canada.
E-mail address: guy.van.vliet@umontreal.ca

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communication, 2013). Ordering clinicians should be aware of intra-assay and interassay variability when interpreting these results. Beyond that, most practitioners are aware that serum cortisol has marked circadian variation, but may not know about the less striking but nevertheless potentially significant circadian rhythm of serum TSH (discussed later). The changes in normal thyroid hormone parameters during growth require better appreciation, but ethical limitations in drawing blood from normal children has hampered the establishment of age-related references ranges.[1,2]

Isolated Hyperthyrotropinemia

Subclinical hypothyroidism is often defined by an increased serum TSH level with a normal serum free thyroxine (fT_4) level. We argue that the descriptive term isolated hyperthyrotropinemia is more appropriate and that subclinical hypothyroidism should only be used for individuals with high TSH and low fT_4 levels but neither sign nor symptom of hypothyroidism. In addition, serum TSH levels in normal individuals decrease progressively with age (**Fig. 1**) and the use of adult reference intervals results in many young children being labeled as having isolated hyperthyrotropinemia.

Aside from age-related changes, there is a nocturnal surge in TSH.[3] This surge may lead to an erroneous interpretation of TSH level being abnormal: a 10-year-old girl was evaluated in our emergency room for an anxiety attack after seeing a horror movie. Because of tachycardia, a sample was drawn at 2:00 AM to rule out hyperthyroidism and serum TSH level was 9.33 mU/L (with a normal fT_4 level of 9.78 pmol/L); there was no goiter on examination, a repeat serum TSH test at 2:00 PM on the same day

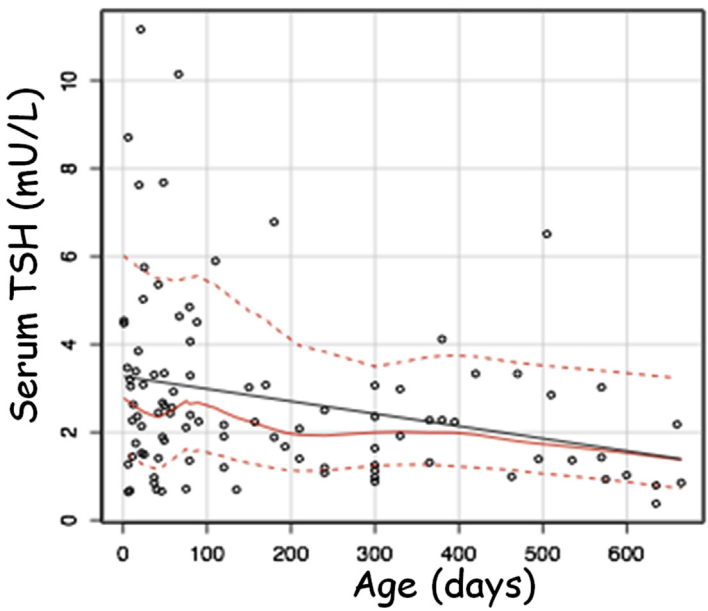

Fig. 1. Serum TSH levels in normal infants as a function of age in days. Scatter plot of individual values (*dots*), regression (*full black line*), lowest fit (*full red line*) and 5th to 95th confidence intervals (*striped red lines*). (*Adapted from* Djemli A, Van Vliet G, Belgoudi J, et al. Reference intervals for free thyroxine, total triiodothyronine, thyrotropin and thyroglobulin for Quebec newborns, children and teenagers. Clin Biochem 2004;37(4):328–30; with permission.)