



THYROID FUNCTION IN PREGNANCY

High Serum HCG Concentrations Cause TSH Suppression But Do Not Lead To Symptoms Of Hyperthyroidism

WHAT IS THE STUDY ABOUT?

During pregnancy, the placenta produces large amounts of a hormone, human chorionic gonadotropin (hCG), which is also the hormone that is measured in the standard pregnancy test. This hormone is closely related to TSH and can weakly bind to the TSH receptors present on the thyroid gland. When the concentrations of hCG are very high (ie >200,000), as can be seen in the first trimester of pregnancy, it may actually turn on the thyroid gland and cause it to make extra thyroid hormone (thyroxine [T₄] and triiodothyronine [T₃]) which, in turn, may turn off the production of TSH from the pituitary. In some individuals, this may cause signs and symptoms of hyperthyroidism. This study was designed to examine the relationship between high hCG levels in the blood, changes in thyroid hormone levels and the clinical features of hyperthyroidism.

THE FULL ARTICLE TITLE:

Lockwood CM et al. Serum human chorionic gonadotropin concentrations greater than 400,000 IU/L are invariably associated with suppressed serum thyrotropin concentrations. *Thyroid* 2009;19:863-8.

WHAT WAS THE AIM OF THE STUDY?

This study had three aims: (1) to see what concentration of hCG resulted in consistent suppression of TSH levels; (2) to see how the thyroid hormone levels change with changes in the hCG concentration; and (3) to study the clinical symptoms of patients with hCG levels above 200,000.

WHO WAS STUDIED?

63 women who contributed 69 blood samples that had hCG levels above 200,000 IU/L selected from a total of 15,597 hCG tests run at Barnes-Jewish Hospital in St. Louis and the University of North Carolina Hospitals in Chapel Hill, NC.

HOW WAS THE STUDY DONE?

The medical records of the 63 women were reviewed and the stored blood samples were analyzed for TSH and free thyroxine content.

WHAT WERE THE RESULTS OF THE STUDY?

Hyperemesis gravidarum, a condition of severe vomiting

often associated with high hCG levels, was found in 37% of the women. The remaining women had a variety of reasons for the high hCG levels. None of the patients had a prior diagnosis of hyperthyroidism. The TSH levels were suppressed below normal in all 10 women with hCG concentrations >400,000, and 8 of the 10 had elevated free thyroxine levels. In the entire group of blood samples, 22 (32%) had both low TSH and elevated free thyroxine concentrations. However, clinical signs and symptoms of hyperthyroidism were noted in only 4 of 63 subjects (6%), 2 of whom had hCG concentrations >400,000. Thus, most patients with hCG concentrations above 200,000 do not have symptoms of hyperthyroidism, including those whose TSH levels are suppressed and free thyroxine levels are elevated.

HOW DOES THIS STUDY COMPARE WITH OTHER STUDIES?

This study is consistent with numerous other studies have shown that pregnant patients with hyperemesis gravidarum or other causes of high levels of hCG may have a suppressed TSH with or without an elevation of free thyroxine, and yet may lack the clinical signs or symptoms of hyperthyroidism. This may be due to: 1) a short duration of the hyperthyroidism; 2) the fact that some of the symptoms of pregnancy, especially abnormal pregnancy, may mask the symptoms of hyperthyroidism; 3) differences in an individual's sensitivity to elevations of their thyroid hormones; and 4) physicians not considering that some of the patient's clinical symptoms may be due to hyperthyroidism.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

High levels of hCG may be associated with a suppressed TSH with or without an elevation of free thyroxine during pregnancy, especially those associated with hyperemesis gravidarum. However, the majority of the patients with biochemical hyperthyroidism are not recognized to have clinical hyperthyroidism. Although the reasons for the difference between the biochemical and clinical findings are not clear, it is important for doctors to be aware of this condition.

— Glen Braunstein, MD
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THYROID FUNCTION IN PREGNANCY, continued

ATA THYROID BROCHURE LINKS:

Hyperthyroidism: http://thyroid.org/patients/patient_brochures/hyperthyroidism.html

Thyroid and Pregnancy: http://thyroid.org/patients/patient_brochures/pregnancy.html

ABBREVIATIONS & DEFINITIONS

hCG — human chorionic gonadotropin—the major hormone produced by the placenta which is closely related to thyroid stimulating hormone (TSH). hCG can bind to the TSH receptors present in thyroid tissue and act like a weak form of TSH to cause the thyroid to produce and release more thyroxine and triiodothyronine. hCG is the hormone measured in the pregnancy tests.

Hyperemesis gravidarum — a condition during pregnancy in which the woman has severe nausea and continued vomiting that can lead to weight loss, electrolyte imbalance and dehydration. This usually occurs in the first trimester of pregnancy.

Thyroxine (T₄) — the major hormone secreted by the thyroid gland. Thyroxine is broken down to produce

Triiodothyronine which causes most of the effects of the thyroid hormones.

Triiodothyronine (T₃) — the active thyroid hormone, usually produced from thyroxine.

TSH — Thyroid stimulating hormone – produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.

Hyperthyroidism — a condition where the thyroid gland is overactive and produces too much thyroid hormone. Hyperthyroidism may be treated with antithyroid meds (Methimazole, Propylthiouracil), radioactive iodine or surgery.