

TFT in Normal Pregnancy

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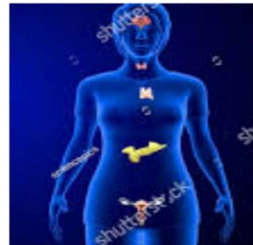
Professor of Endocrinology

Introduction

There are many **physiologic changes in pregnancy**. Some mimic the signs, symptoms, or laboratory finding of disease in the nonpregnant woman **yet are normal in pregnancy**.

Physiological Changes During Pregnancy

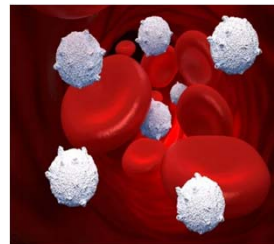
✓ Endocrine system



✓ Gastrointestinal



✓ Hematologic



✓ Cardiovascular system



✓ Respiratory system



✓ Renal system



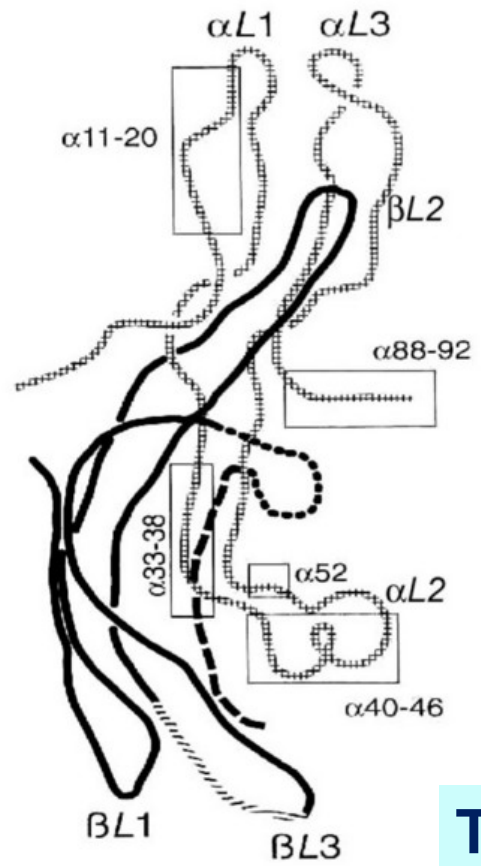
Changes in Endocrine Glands in Pregnancy



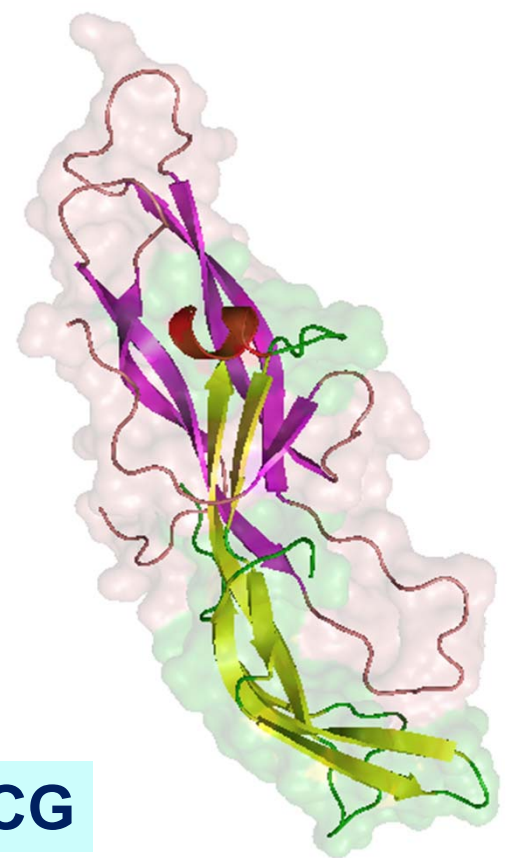
hCG

Human chorionic gonadotropin is structurally similar to the TSH and has a direct stimulating effect on the TSH receptor.

Clinical Endocrinology. 2022;96:3–11.



TSH

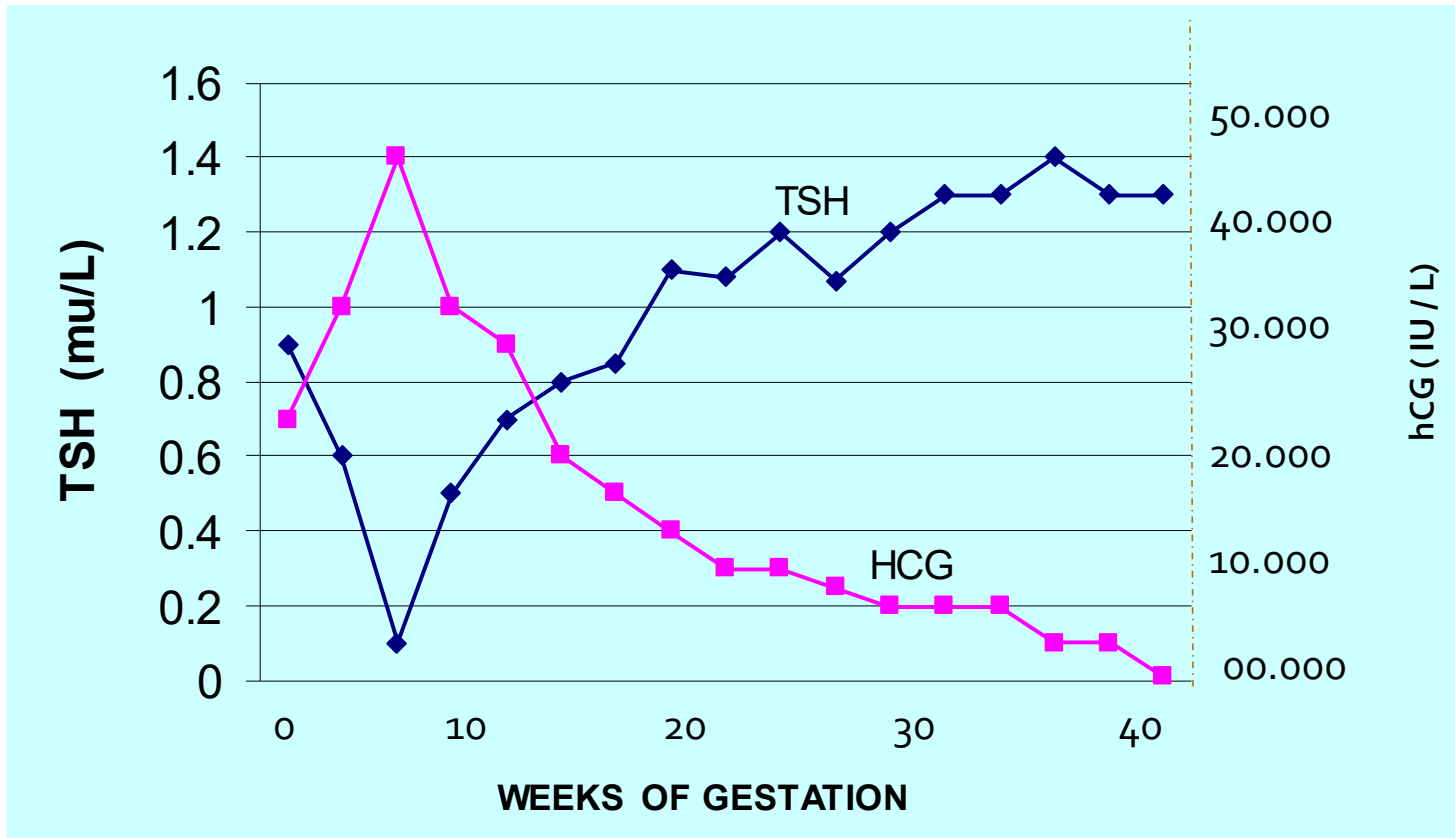


hCG

hCG

hCG levels peak at the end of the first trimester resulting in a transient increase in FT4 and FT3 levels and a fall in TSH levels. A serum TSH below 0.1 mIU/L may be present in 5% of women by 11 weeks gestation.

Clinical Endocrinology. 2022;96:3–11.

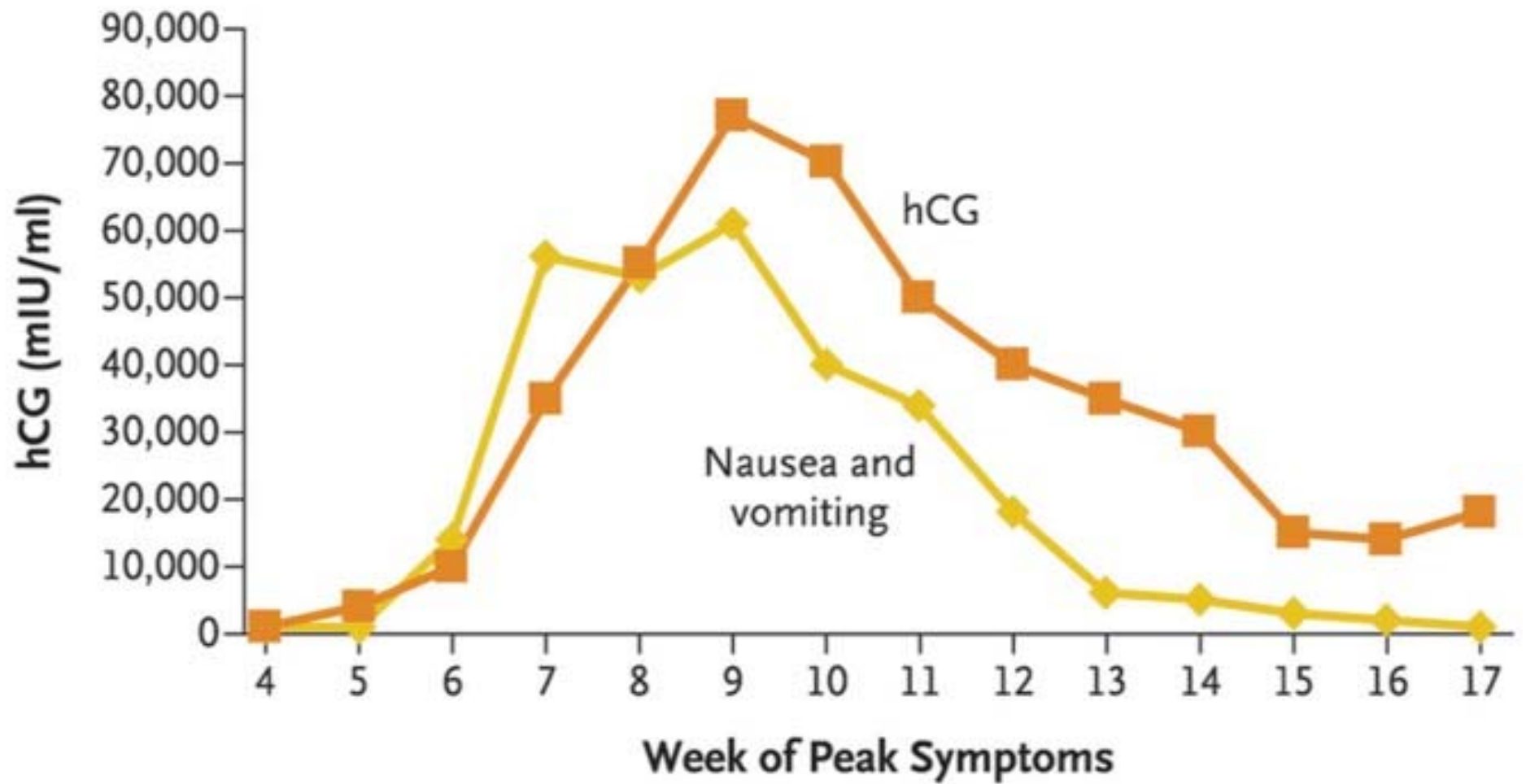


Gliouer D (2000). *Thyroid Disease During Pregnancy*. in: *The Thyroid*

A decrease in basal TSH of **0.1 mU/L** was observed for every **10,000 IU/L** increment in hCG.

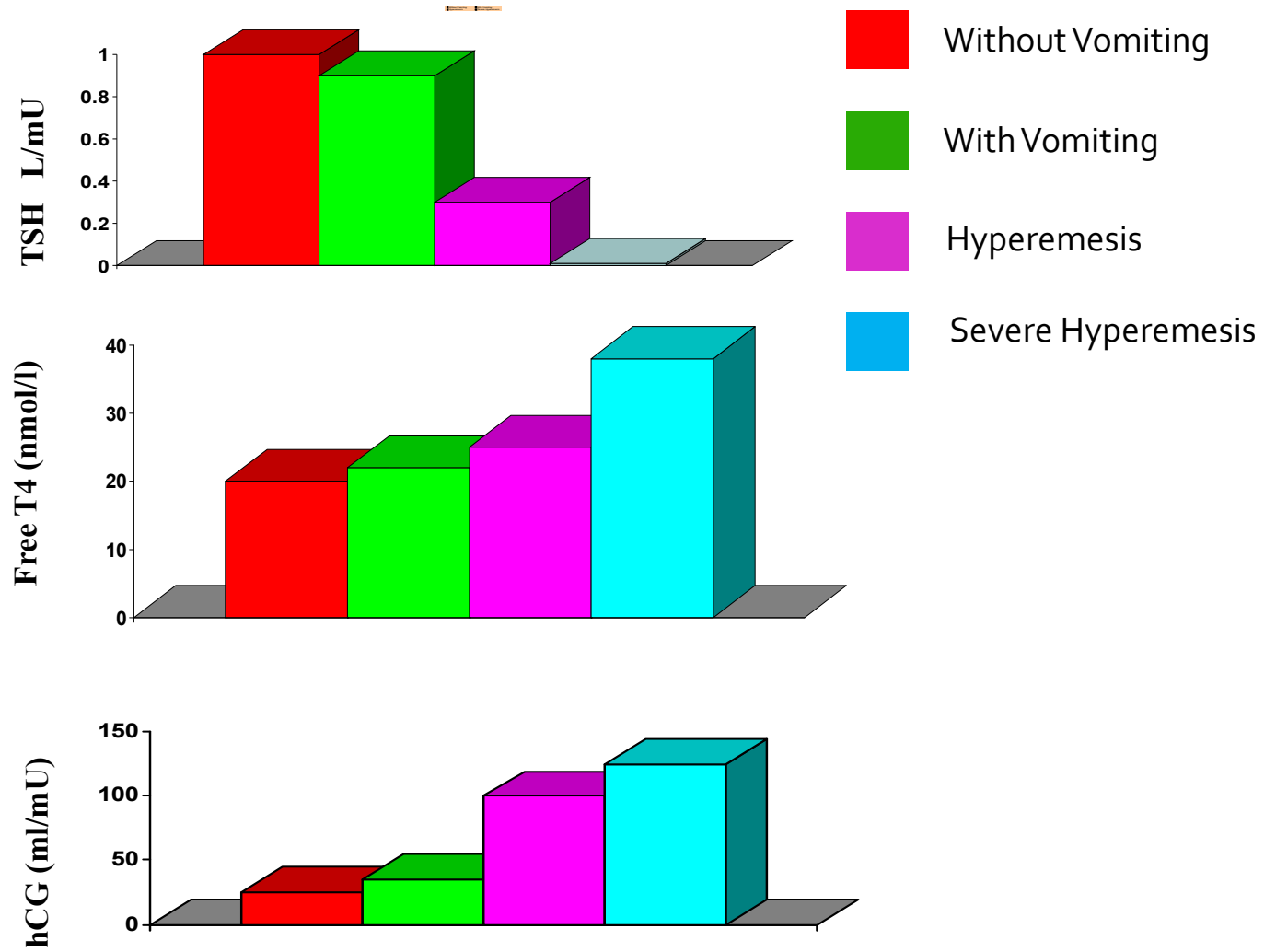
In a report of 63 women with extremely high hCG concentrations (>200,000 IU/L), TSH was <0.2 microU/mL in 67 percent of samples and free T4 was above 1.8 ng/dL in 32 percent of samples.

All women whose hCG was greater than 400,000 IU/L had a suppressed TSH concentration.



Goodwin TM, The Role of hCG in Transient Hyperthyroidism of Hyperemesis gravidarum.

Jclin Endocrinol metab



TBG

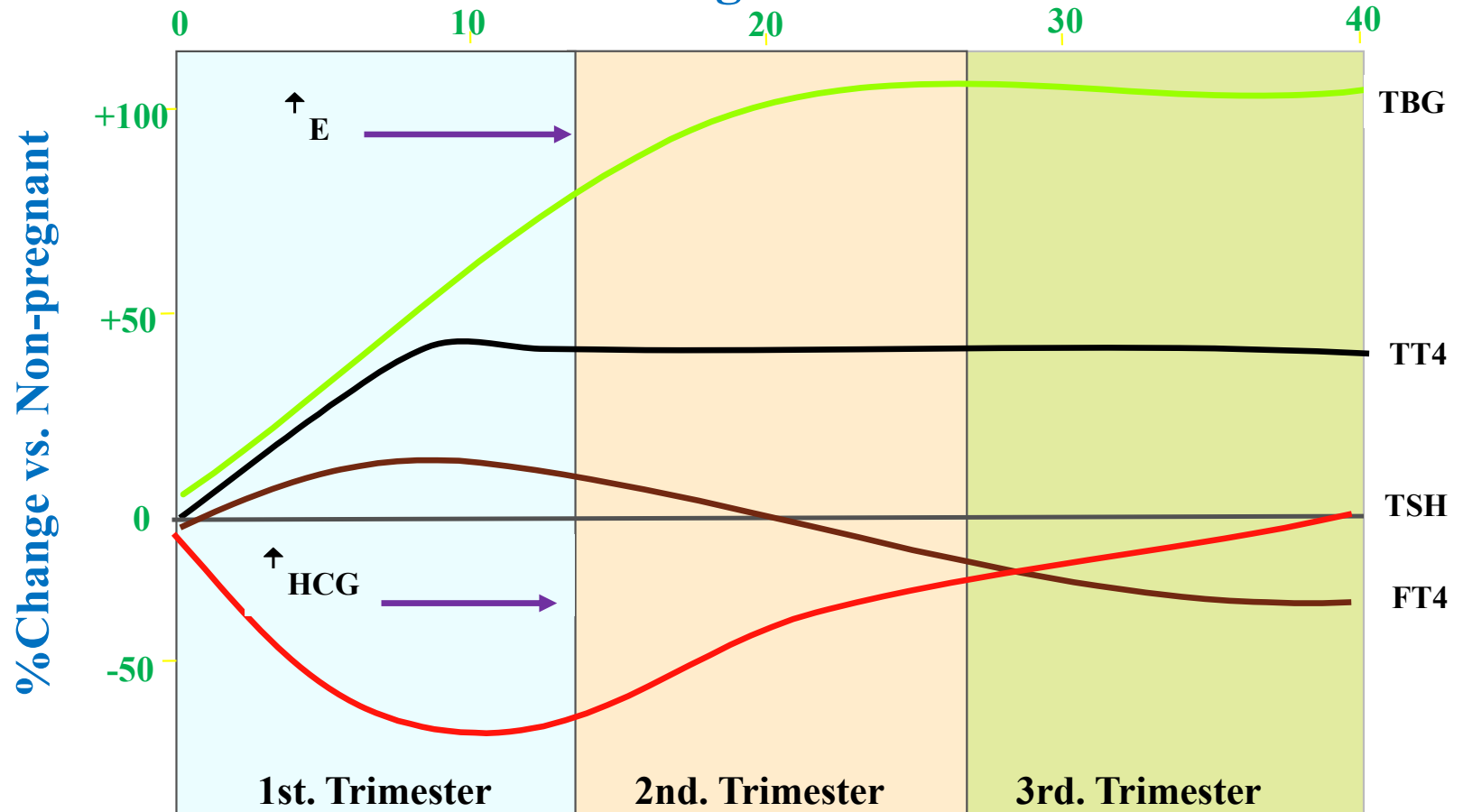
In pregnancy, half life of TBG increases from 15 min to 3 days and concentration becomes 3 times by 20 weeks.

Secondary to an **estrogenic stimulation** of TBG synthesis and **reduced hepatic clearance** of TBG.

Clinical Endocrinology. 2022;96:3–11.

TSH is Lower Particularly in 1st trimester

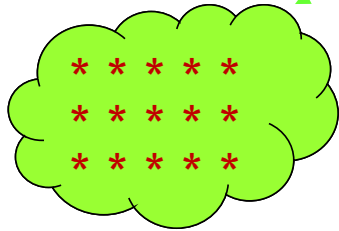
weeks gestation



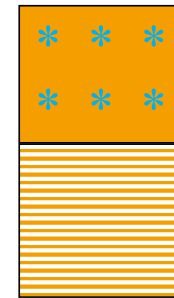
TBG normal

T₃RU

T₃*



Resin
T₃RU = 25 %



AS

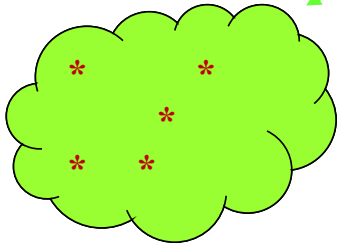
% binding

TBG

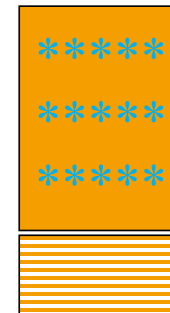
TBG in pregnancy

T_3RU

T_3^*



Resin
 $T_3RU = 5\%$



AS

% binding

TBG

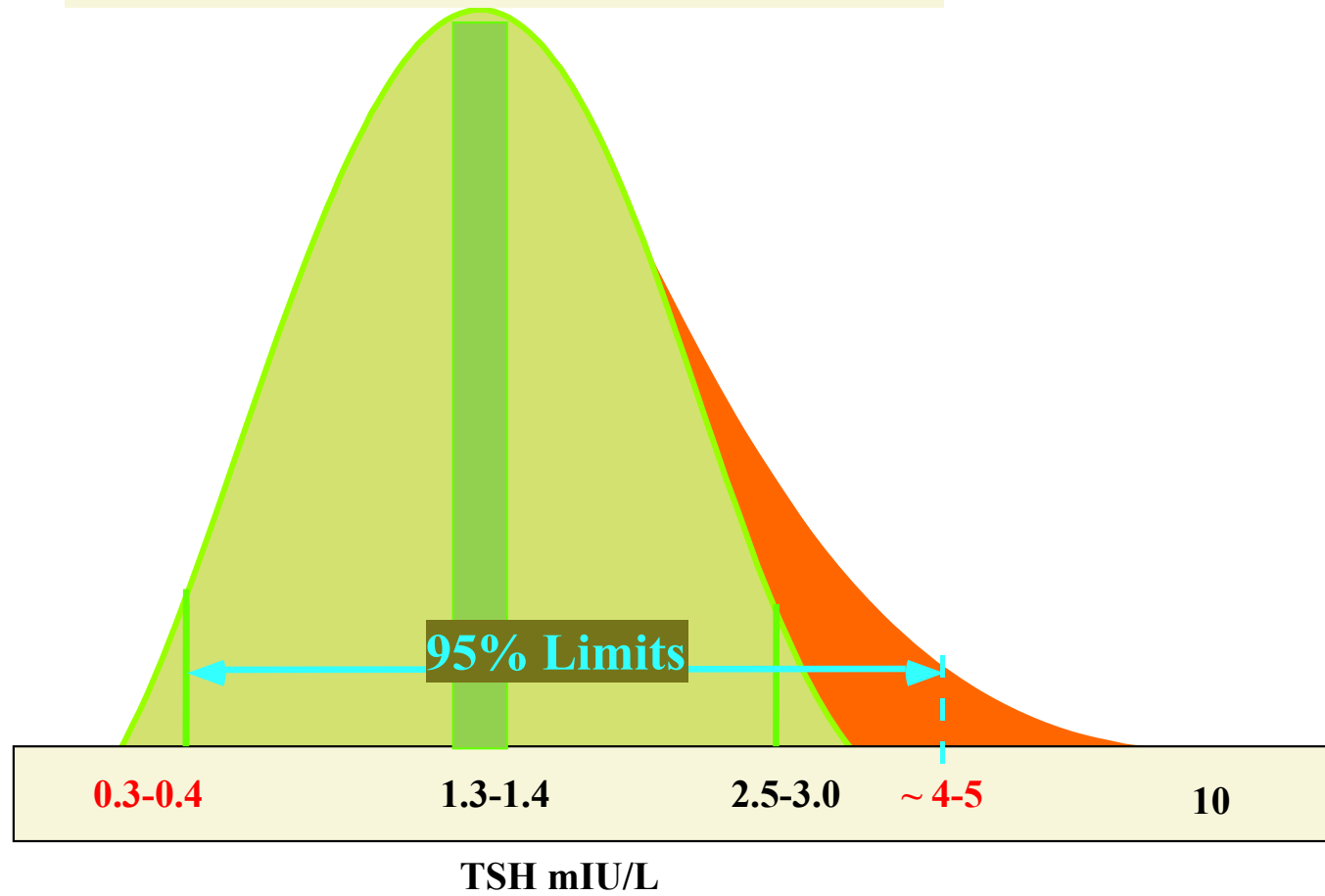
FT₄I : T₃RU × TT₄

Normal 4 - 12

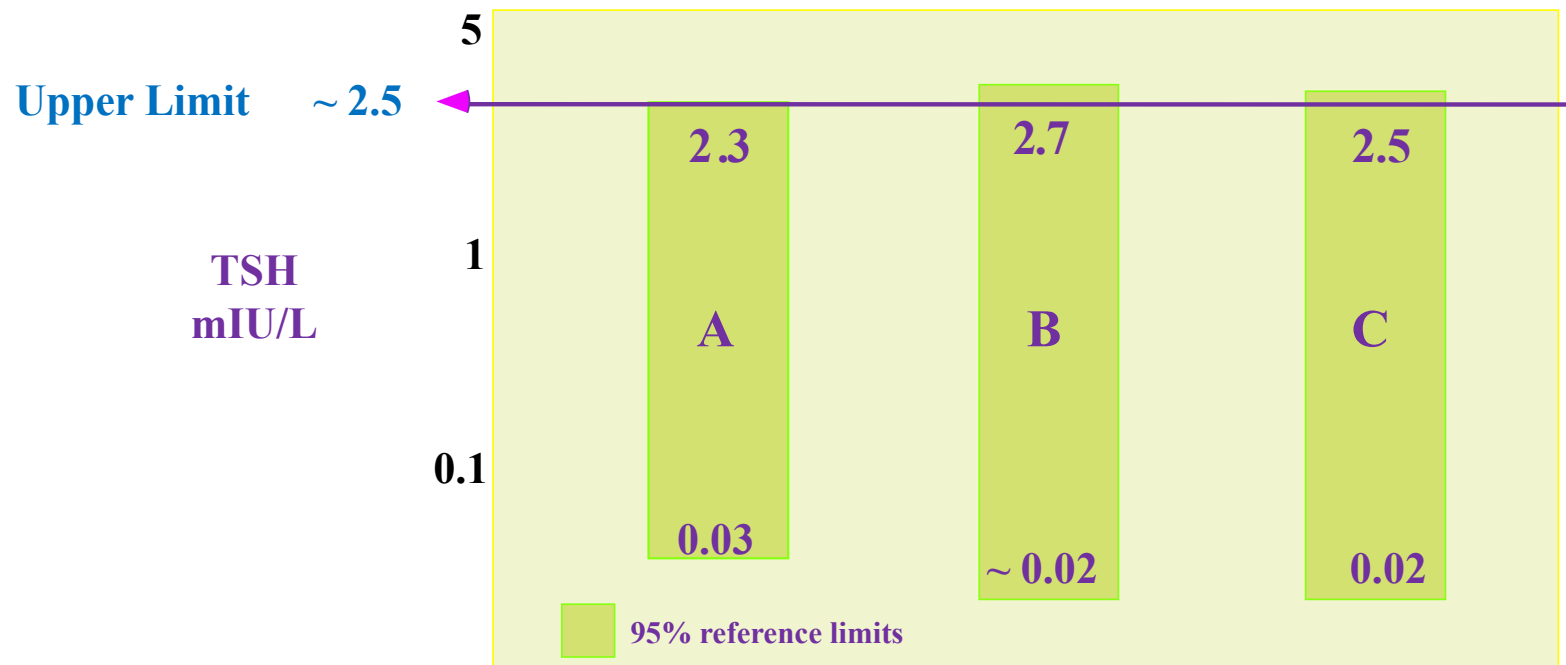
Clinical Diagnosis

The clinical diagnosis of thyrotoxicosis may present difficulties during gestation, since many symptoms and signs are commonly seen in normal pregnancy, such as mild palpitations, heart rate between 90 and 100 beats/min, mild heat intolerance, shortness of breath on exercise, and warm skin.

TSH Population Reference Range



1st trimester TSH in normal pregnancy



A n = 343 (Hong Kong) Panesar et al Ann Clin Biochem 38:329, 2001

B n = 17,298 (USA) Casey et al Obstet Gynecol 105:239, 2005

C n = 115 Mestman (USA) ITC, Buenos Aires, Argentina, 10/2005

American Thyroid Association and the **American Endocrine Society** suggested the following reference range:

- ✓ **First trimester, 0.1 to 2.5 mu/l**
- ✓ **Second trimester, 0.2 to 3.0 mu/l**
- ✓ **Third trimester, 0.3 to 3.0–3.5 mU/l**



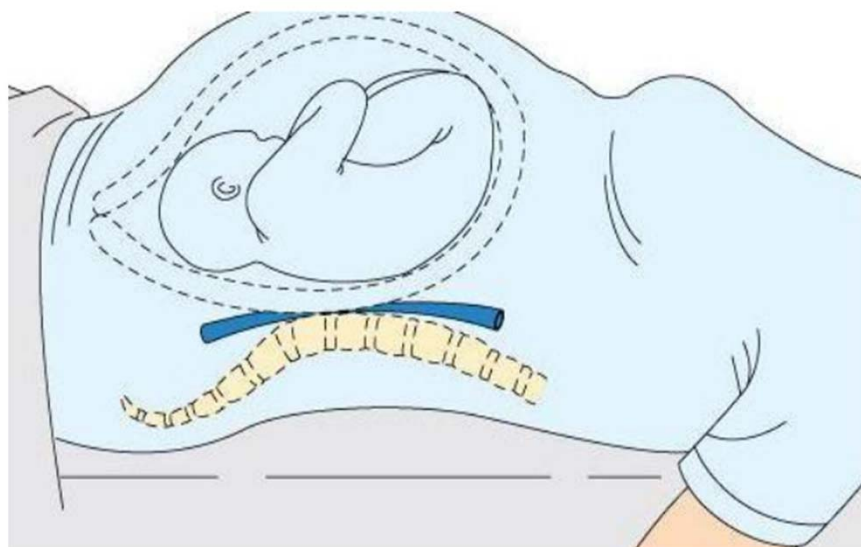
Recommendations

- 1- Trimester-specific reference ranges for TSH and T4 (total or free) should be established in **each antenatal hospital setting**.
- 2- If TSH trimester-specific reference ranges are not available in that laboratory, the following reference range upper limits are recommended: **first trimester**, 0.1 - 2.5 mU/l; **second trimester**, 0.2 - 3.0 mU/l; **third trimester**, 0.3 - 3.5 mU/l.
- 3- If TSH is elevated, **FT4 and TPOAb** should be determined.

It is a matter of discussion whether these reference ranges
should be used worldwide ?

2014 European Thyroid Association Guidelines for the Management of Subclinical Hypothyroidism in Pregnancy

پیشنهادات انجمن غدد ایران میزان TSH در خانمهای باردار



محدوده طبیعی TSH در زنان باردار ایرانی:

سه ماهه اول: $0.1 - 3.9 \text{ mu/l}$

سه ماهه دوم و سوم: $0.1 - 4.1 \text{ mu/l}$

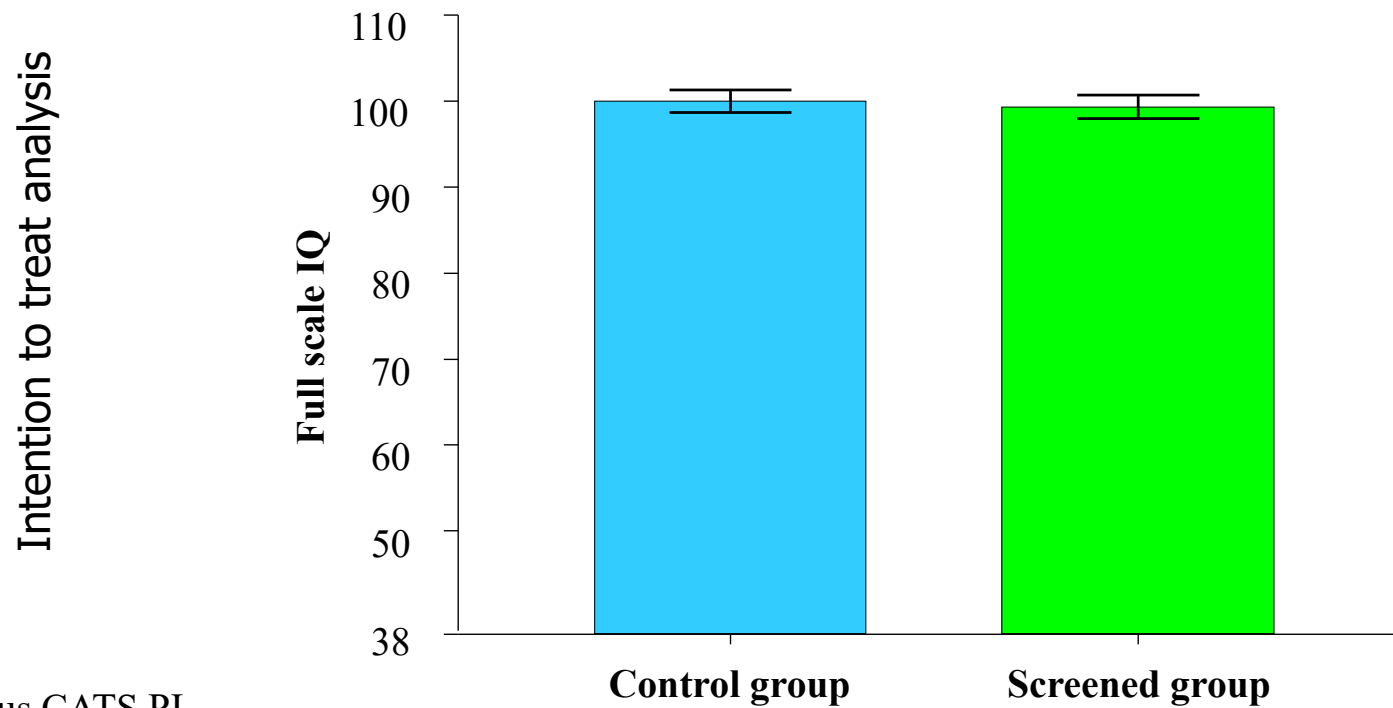
TSH in healthy pregnant women during the first trimester may be as low as **0.03 to 0.1 mU/L.**

Controlled Antenatal Thyroid Study (CATS)
**Effect of Treating Maternal Suboptimal Thyroid Function
on Child Cognition**

Large prospective randomized controlled trial of **L-thyroxine treatment** vs. **no treatment** in subclinical hypothyroid mothers starting in the 1st trimester.

Outcome: Maternal Levothyroxine during pregnancy did not improve child cognition at age 9.5 years.

CATS conclusion: No benefit of screening for hypothyroidism in pregnancy with respect to intellectual development of the child



From John Lazarus CATS PI

**Subclinical hypothyroidism in pregnancy:
intellectual development of offspring**

Dr Azizi

IQ level and cognitive performance of children born to **Levothyroxin-treated hypothyroid** mothers is similar in those whose mothers have maternal **subclinical hypothyroidism** during pregnancy compared with those whose mothers have **normal serum TSH** concentrations during pregnancy.

Thyroid. 2011 Oct;21(10):1143-7

Thank you!

