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THYROID DISEASE

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Learning Objectives

- Epidemiology
- Embryology
- Anatomy and Physiology
- Functions
- Pathology and Lab
- Changes in Pregnancy
- Treatment

Epidemiology

- Second MC endocrine disease affecting women of reproductive age
- Hyperthyroidism affects 0.2% of pregnancies
- Incidence of Thyroid CA in pregnancy is 1/1000
- MCC hypothyroid in pregnant/postpartum women is Hashimoto's
- Incidence of hypothyroid in pt with type 1 DM is 5-8%
- 25% risk of developing postpartum thyroid dysfunction with type 1 DM

Embryology

- Endodermal origin
- Epithelial proliferation in floor of pharynx
- Descends in front of pharyngeal gut
- Gland remains connected to tongue by thyroglossal duct
- Duct solidifies and disappears
- Remnant is thyroglossal duct cyst

Embryology continued…

- Concentration of Iodine begins ~ 10-12 weeks
- Controlled by TSH by 20 weeks
- Fetal levels of TSH, TBG, FT_4 and FT_3 reach adult levels ~ 36 weeks

Placenta…To cross or not cross?

- Cross
  - TRH
  - Iodine
  - TSH receptor immunoglobulins
  - PTU/Methimazole
  - T_4 and T_3
    - Minimal
- Not Cross
  - TSH

Anatomy…Arterial Supply

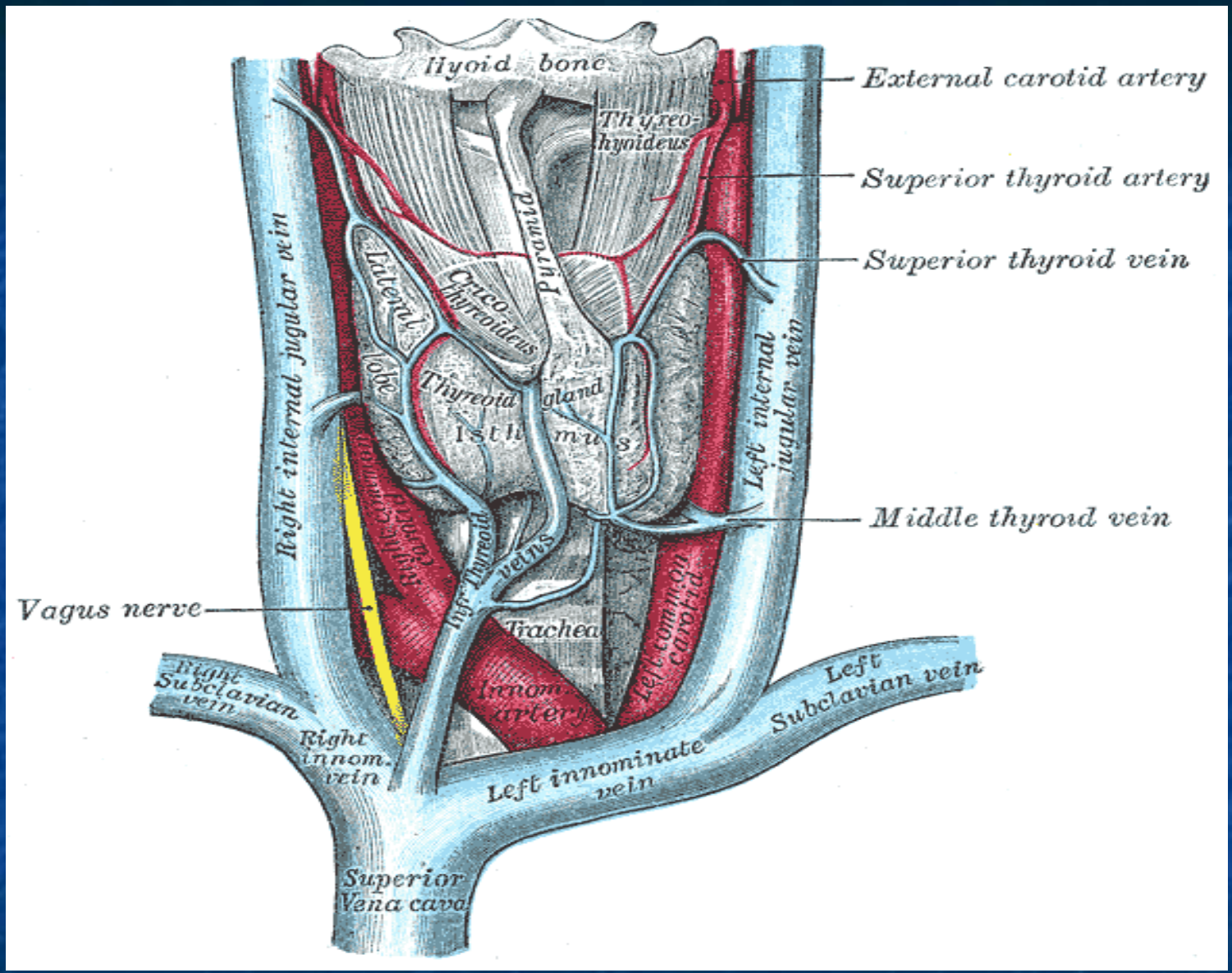
- Superior Thyroid Artery
  - Branch of External Carotid
- Inferior Thyroid Artery
  - Branch of Subclavian Artery

Anatomy…Veinous and Lymphatics

- Superior, Middle, and Inferior Thyroid Veins
- Paratracheal Lymph Nodes
- Inferior Deep Cervical Lymph Nodes

Anatomy…Nerves

- Superior, Middle, Inferior Cervical Sympathetic Ganglia
- Follow Arterial Supply

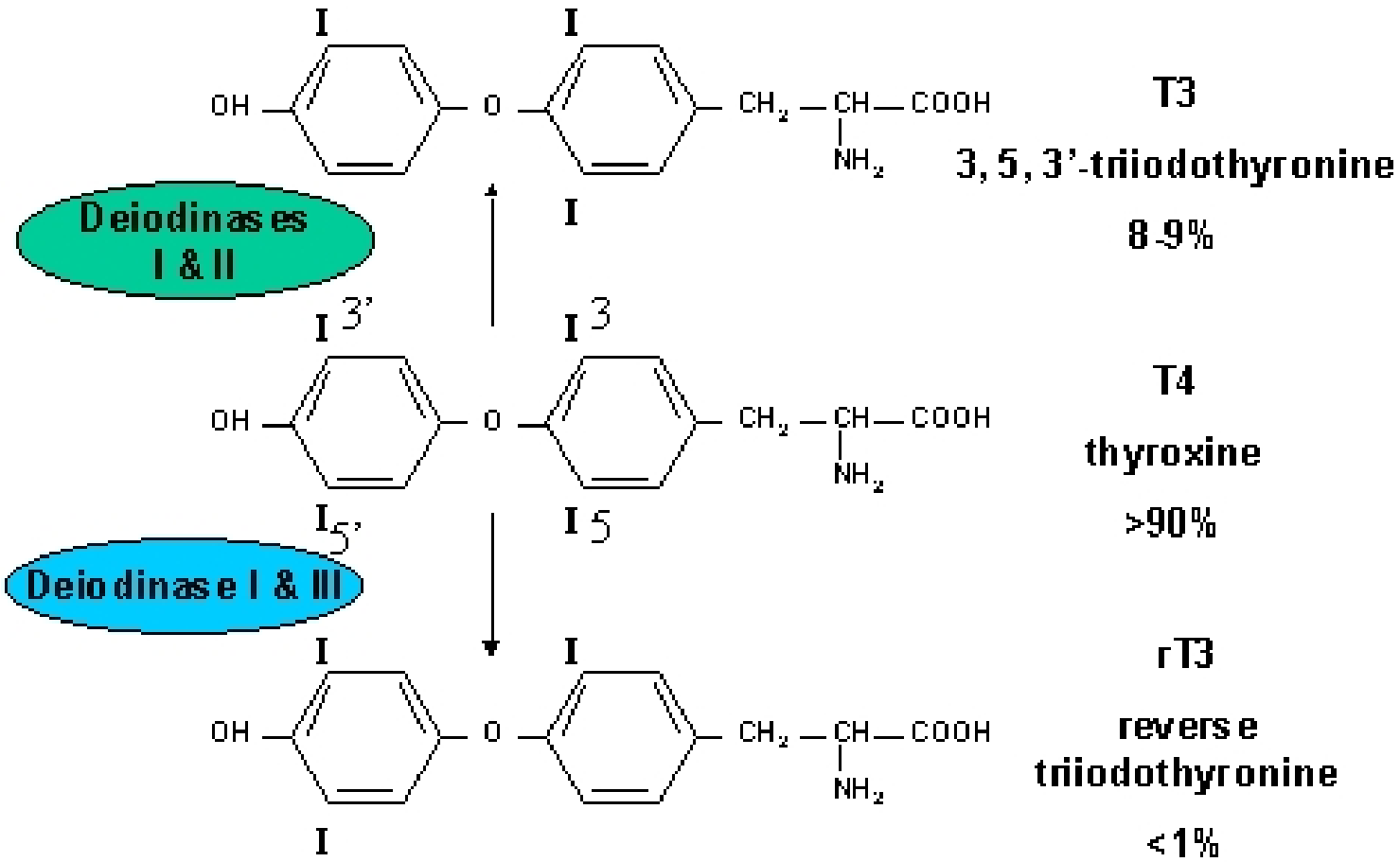


www.bartleby.com/107/illus1174.html

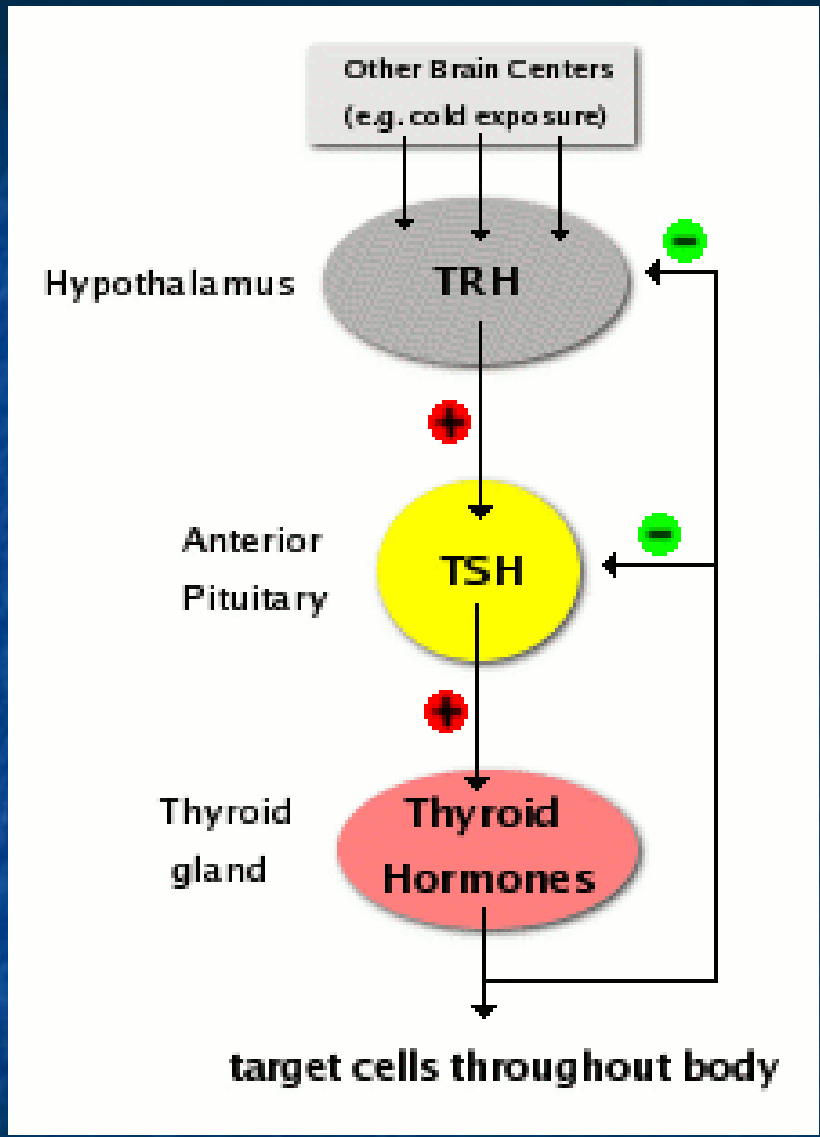
Physiology

- TRH
- TSH
- TSH Receptor Abys
  - TSI
  - TBII
- Thyroid Hormones
  - Triiodothyronine (T_3)
  - Thyroxine (T_4)
  - Reverse Triiodothyronine (reverse T_3)

THYROID HORMONES



http://perth.uwlax.edu/biology/faculty/maher/Jthryoid/img003.jpg



arbl.cvmbs.colostate.edu/hbooks/pathphys/endocrine/thyroid/control.html

Thyroid Functions

- Cardiovascular...↑ *B* adrenergic receptors
- GI…↑ peristalsis and vitamin A
- CNS…mentation and development
- MS…protein metabolism, growth and maturation
- Respiratory…↑ surfactant synthesis
- CHO metabolism

Definitions

- Goiter
  - Enlargement of the thyroid gland
- Hypothyroid
  - Inadequate thyroid hormone production
- Thyroiditis
  - Inflammation of the thyroid gland
- Thyrotoxicosis
  - State resulting from excess production/exposure to thyroid hormone
- Hyperthyroidism
  - Thyrotoxicosis caused by a hyperfunctioning thyroid gland
  - Excludes thyroiditis or excessive exogenous thyroid hormone

Hyperthyroidism…Signs and Symptoms

- Nervousness
- Tremors
- Tachycardia
- Frequent Stools
- Sweating
- Heat Intolerance
- Oligomenorrhea and Amenorrhea
- Goiter
- Weight Loss
- Insomnia
- Palpitations
- Hypertension
- Hair and Nail Changes
- Atrial Fibrillation

Differential Dx for Thyrotoxicosis

- Graves' Disease…MC (60-90%)
- Toxic Adenoma
- Toxic Nodular Goiter
- Factitious Hyperthyroidism
- Thyroiditis
- Struma Ovarii
- Choriocarcinoma

Graves' Disease

- Autoimmune with over activity of thyroid gland
- HLA-DR3 association
- Defect in suppressor T cells
- B cells synthesize thyroid-stimulating immunoglobulin (TSI)
  - Autoantibody against TSH receptor
  - Gland becomes over stimulated and loses negative feedback to T_3 and T_4

Graves' continued…

- Associations:
  - Viral/bacterial infections
  - Stress
  - Exposure to iodide

Graves'…Clinical Dx

- Signs/symptoms of thyrotoxicosis
- Ophthalmopathy
- Dermopathy

Graves'…Ophthalmopathy

http://www.muhealth.org/~daveg/thyroid/thy_dis.html

Graves'…Dermopathy

- http://www.ohiohealth.com/healthreference/reference/3C8F3995-E45A-406A-B785837268AEED7B.htm?category=questions

Toxic Adenomas

- Single Nodules
- Release excessive thyroid hormone
- Identified with radioactive scan
- “Hot Nodule”

Toxic Nodular Goiter

- Develops from multinodular goiter
- Nodules become autonomous
- AKA Plummer's disease

Factitious Hyperthyroidism

- Excessive intake/exposure to thyroid hormone

Thyroiditis

- Acute
- Subacute
- Painless

Acute Thyroiditis

- Usually bacterial
  - *Staph aureus*
  - *Strep pneumoniae*
  - *Strep pyogenes*
- Self limited after treatment

Subacute Thyroiditis

- AKA de Quervain's thyroiditis
- MCC painful thyroid gland
- Often follows viral infection
- Prevalent in females

Painless Thyroiditis

- Usually women 3-6 months postpartum
- Thought to be autoimmune
- May result in hypothyroidism

Others

- Struma Ovarii
  - Mature teratoma
  - Dominant tissue is thyroid
- Choriocarcinoma
  - Hcg may act like TSH

Hypothyroidism…Signs and Symptoms

- Fatigue
- Constipation
- Cold Intolerance
- Muscle Cramps
- Menstrual Irregularities
- Prolonged Reflexes
- Carpel Tunnel
- Hair Loss
- Dry Skin

Hypothyroidism

- Primary
  - Thyroid dysfunction…MC
- Secondary
  - Hypopituitarism
- Tertiary
  - Hypothalamic dysfunction

Types of Hypothyroid

- Hashimoto's (Goiter)
- Thyroid Surgery or Irradiation
- Iodine deficiency (Goiter)
  - MCC hypothyroidism worldwide
- Thyroiditis

Hashimoto's Thyroiditis

- MCC of hypothyroidism
- Autoimmune thyroiditis
- Women 30-50 years of age
- HLA-DR5 +

Antibodies in Hashimoto's

- Antimicrosomal abys
  - Against peroxidase
- Antithyroglobulin abys
  - Against thyroglobulin
- Autoantibodies against TSH receptor
  - Net effect is prevent TSH stimulation of gland

Associations with Hashimoto's

- Sjogren's
- SLE
- Pernicious anemia

Reidel's Thyroiditis

- Involves fibrous tissue replacement of the gland
- Rare

Changes in Pregnancy

- Thyroid Binding Globulin (TBG) increases in pregnancy
  - Secondary to decreased hepatic clearance and estrogen's stimulation of TBG synthesis
- Values influenced by TBG change during pregnancy

Let's Talk TBG

- Estrogen increases
- Androgen decreases
- Values influenced by TBG
  - TT_4
  - TT_3
  - RT_3U

Other Changes

- Plasma Iodide levels decrease in pregnancy
  - Fetal use
  - Increased maternal renal clearance
- Associated with increase in thyroid size (15%)

TFT's in Pregnancy and Disease

Maternal	TSH	FT4	FTI	TT4	TT3	RT3U
Pregnancy	No change	No change	No change	↑	↑	↓
Hyperthyroid	↓	↑	↑	↑	↑ or no change	↑
Hypothyroid	↑	↓	↓	↓	↓or no change	↓

Table 1, ACOG Practice Bulletin
Number 37, August 2002

Fetal Effects of Hyperthyroidism

- Treatment is key
- Less than adequate treatment may result in:
  - Increase in preterm deliveries
  - LBW
  - Possible fetal loss

Risks with Immune Mediated Thyroid Dysfunction

- Antibodies cross placenta
  - In Graves'
    - TBII
    - TSI
- In Graves'…1-5% of neonates have hyperthyroidism or neonatal Graves caused by maternal TSI
- Incidence low due to balance of antibodies with thioamide treatment

Neonatal Graves'

- Maternal abys cleared after thioamides
  - Results in delayed presentation
- Neonates of women Tx with ^{131}I or surgery at higher risk for developing Neonatal Grave's disease

Fetal Effects of Hypothyroidism

- Incidence of congenital hypothyroidism 1/4000
  - 5% of those identified clinically at birth
- High incidence of LBW
  - Preterm delivery
  - Preeclampsia
  - Placental abruption
- Unclear relationship between hypothyroidism and IUGR independent of other complications

Iodine Deficient Hypothyroidism

- Risk of congenital cretinism
- Treatment with iodine in 1st and 2nd trimesters significantly reduces abnormalities of cretinism

Cretinism

- Growth failure
- Mental Retardation
- Neuropsychologic deficits

Cretinism Cont…

www.emedicine.com/ped/topic501.htm

Treatment Options

- Levothyroxine
- Thioamides…Block organification of Iodide
  - Propylthiouracil (PTU)
    - Decreases conversion of T_4 to T_3
  - Methimazole
- Surgery
- Radioactive ablation

Considerations with Thioamides

- Both PTU and Methimazole may be used in pregnancy
- PTU and Methimazole are considered safe in breastfeeding
  - Methimazole appears in higher concentrations
- Watch for agranulocytosis
  - Fever
  - Sore throat

Thioamides Cont…

- Measure FT_4 and FTI every 2-4 weeks and titrate accordingly
- Goal is high normal range
- 90% see improvement in 2-4 weeks

Iodine 131

- Contraindicated in pregnancy
- Avoid pregnancy for 4 months after ^{131}I treatment
- Avoid breastfeeding for 120 days after ^{131}I treatment
- Gestational age key when counseling pregnant women exposed to ^{131}I

Still More Tx Considerations

- Reserve surgery for women resistant to thioamides
- May use *B* blockers for symptomatic treatment of thyrotoxicosis
  - Propranolol MC for symptomatic thyrotoxicosis

Levothyroxine in Pregnancy

- Same for the nonpregnant pt
- Goal is to normalize TSH
- Adjust dose at 4 week intervals
- Should check TSH levels every trimester in pts with hypothyroidism

Other Obstetrical and Thyroid Conditions

- Hyperemesis Gravidarum
- Gestational Trophoblastic Disease
- Thyroid Storm
- Thyroid CA
- Postpartum Thyroiditis

Hyperemesis Gravidarum

- Associated with biochemical hyperthyroidism, but not clinical
- Routine screening and treatment not recommended

Gestational Trophoblastic Disease

- Clinical hyperthyroidism in ~7% of complete hydatidiform moles
- Treat with *B*-blockers if hyperthyroidism is suspected
  - If no Tx, surgery may precipitate thyroid storm

Thyroid Storm

- Medical Emergency
- Occurs in ~ 1% of pregnant pts with hyperthyroidism
- Diagnostic signs and symptoms:
  - Fever
  - Tachycardia
  - Altered mental status
  - Vomiting and diarrhea
  - Cardiac arrhythmia

More on Thyroid Storm

- If suspected, draw lab
  - FT_4
  - FT_3
  - TSH
- Start treatment immediately

Treatment of Thyroid Storm in Pregnant Women

1. Propylthiouracil (PTU), 600–800 mg orally, stat, then 150–200 mg orally every 4–6 hours. If oral administration is not possible, use methimazole rectal suppositories.
2. Starting 1–2 hours after PTU administration, saturated solution of potassium iodide (SSKI), 2–5 drops orally every 8 hours, *or*

   sodium iodide, 0.5–1.0 g intravenously every 8 hours, *or*

   Lugol's solution, 8 drops every 6 hours, *or*

   lithium carbonate, 300 mg orally every 6 hours.
3. Dexamethasone, 2 mg intravenously or intramuscularly every 6 hours for four doses.
4. Propranolol, 20–80 mg orally every 4–6 hours, *or* propranolol, 1–2 mg intravenously every 5 minutes for a total of 6 mg, then 1–10 mg intravenously every 4 hours.

   If the patient has a history of severe bronchospasm:

   Reserpine, 1–5 mg intramuscularly every 4–6 hours

   Guanethidine, 1mg/kg orally every 12 hours

   Diltiazem, 60 mg orally every 6–8 hours
5. Phenobarbital, 30–60 mg orally every 6–8 hours as needed for extreme restlessness.

Data from Ecker JL, Musci TJ. Thyroid function and disease in pregnancy. Curr Probl Obstet Gynecol Fertil 2000;23:109–122; and Molitch ME. Endocrine emergencies in pregnancy. Bailliere's Clin Endocrinol Metab 1992;6:167–191

ACOG Practice Bulletin, Number 37, August 2002

Thyroid CA

- Incidence in pregnancy 1/1000
- Any nodule should be evaluated
- Up to 40% of nodules may be malignant
- Pregnancy does not affect outcomes
- Definitive Tx is surgery and radiation

Postpartum Thyroiditis

- May occur in 5% of women with no known thyroid disease
- Clinically
  - 44% hypothyroid
  - 33% thyrotoxicosis
  - 33% thyrotoxicosis followed by hypothyroidism

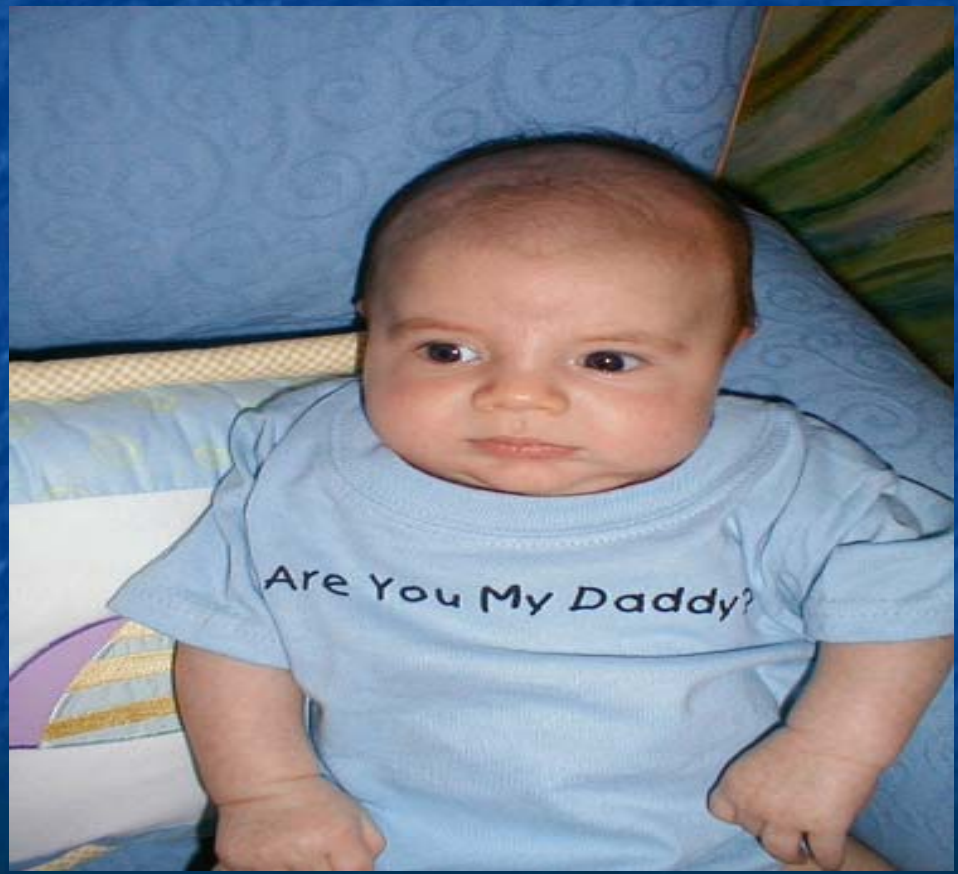
Postpartum Thyroiditis Cont…

- Dx by abnormal TSH or FT_4
- Screen symptomatic women only
  - Aby screening may be useful

Summary

- Thyroid affects multiple organ systems
- Pathology may be infectious, autoimmune, cancer, or combination
- Understand hormone levels change during pregnancy
- Adequate treatment is the key to preventing complications
- Recognize the many complications that may occur in pregnancy and respond accordingly

Questions?



References

- ACOG Practice Bulletin. Thyroid Disease in Pregnancy, Number 37, August 2002.
- Goljan, E.F. *Pathology*, Philadelphia, 1998, WB Saunders, Chapter 8.
- Berek, JS, Hacker NF. *Practical Gynecologic Oncology*, 3rd ed, Philadelphia, 2000, Lippincott Williams & Wilkins, Chapter 6.
- Moore KL, Dalley AF. *Clincically Oriented Anatomy*, 4th ed, Baltimore, 1999, Lippincott Williams & Wilkins, Chapter 8.
- Sadler TW. *Medical Embryology*, 7th ed, Baltimore, 1995, Williams & Wilkins, Chapter 16.

References Cont…

- Isselbacher KJ, Braunwald E, Wilson JD, et al. *Harrison's Principles of Internal Medicine*, 13th ed, New York, 1994, McGraw-Hill, Inc., Part 13, Section 1.
- Cunningham FG, Gant NF, Leveno KJ, et al. *Williams Obstetrics*, 21st ed, New York, 2001, McGraw-Hill, Chapter 50.