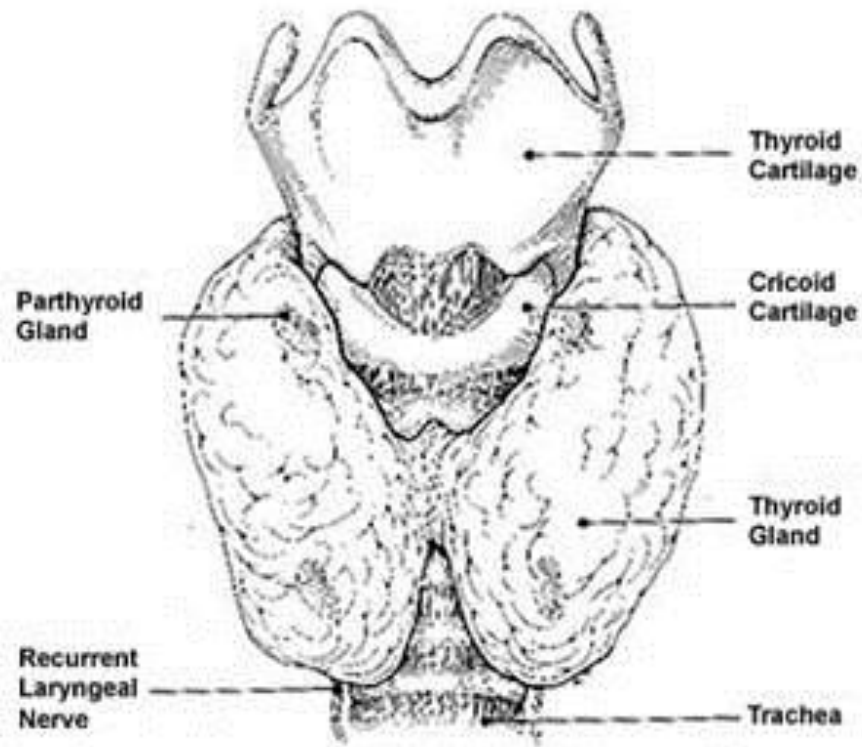

Case Studies of Hormone Management Problems

Ron Rothenberg MD



Thyroid Case Studies

-
- 59 year old woman
 - Depression for past 6 months, no previous history, recent suicide attempt
 - Questionable improvement on several SSRI's and TCA's. Now on Lithium as only psych med
 - PMH: hypertension, menopause 11 years ago
 - Other meds: atenolol
 - History:
 - Insomnia, no appetite, anxiety, depression, panic attacks
 - No weight gain, no cold intolerance
-

Physical Exam

- 160/95, 95, 16, 98 oral
 - Anxious, weepy, alert, oriented, thin
 - Thyroid exam - ? Enlargement
 - Remainder normal
 - Diagnostic tests?
-

-
- CBC, Metabolic panel, OK
 - CRP 6.5 Homocysteine 14.5
 - TC 210 LDL 140 HDL 40
 - TSH 4.1,
 - Free T3 2.6
 - Free T4 1.0
 - TPO 95 (positive)
-

-
- 1. Do patients symptoms R/O hypothyroidism?
 - Weight loss, Hypertension, temp OK
 - 2. What about her meds?
 - 3. What is the probable cause?
 - 4. Could thyroid replacement “cure” the patients depression?
 - 5. Initial treatment?
-

-
- 38 T4
 - 9 T3
 - What if patient does not want a porcine product?
-

-
- 1. Although classical symptoms are weight gain and hypothermia, hypothyroidism can present with “paradoxical symptoms”
 - 2. Both Lithium and beta blockers can inhibit deiodination of T4 to T3
 - 3. TPO positive and physical findings suggest Hashimoto’s thyroiditis
-

Treatment

- Desiccated Porcine thyroid or equivalent
 - Start with 1 grain 1q AM and increase to 2 grain q AM or divided AM and noon after about a week depending on how patient feels and presence of side effects
 - How much T3 and T4 in Porcine product per grain?
-

-
- Compounded T4/T3 Porcine equivalent
 - What if patient tells you she has read that only T3 is active and she just wants T3?
-

- Teach about thyroid conversion, that even if she is not a good converter she will convert some long half-life T4 to T3 and her treatment will be smoother. But if she doesn't want T4...
- Compounded extended release T3
- Start with about 10.0 micrograms and increase to 15-20 micrograms
- What is the problem with regular T3? liothyronine etc

-
- Half life too short
 - “Crash” if you miss a dose
 - Do we just treat one hormone or one disease?
 - To digress, what other hormones would you check and by what method and what about lifestyle?
 - How would you evaluate PUFA status?
-

-
- Nutrition – Zone type diet, follow glucose and insulin and Hg A1C etc
 - Exercise – aerobic and resistance
 - Nutraceuticals
 - Estrogens, Progesterone, Testosterone, Cortisol, DHEAS, Growth Hormone, Insulin
 - AA/EPA ratio
 - Anything else bothersome in her lab, how do you improve it?
-

-
- CRP
 - Homocysteine (back to this)
 - Lipids
-

CRP

- Optimize thyroid and other hormones
- Low dose Aspirin?
- Antioxidants/Vitamins
- Inuit dose Omega 3 PUFA, optimize AA/EPA ratio to less than 1.5, educate about omega 6's and 3's in diet
- Lifestyle: Decrease stress,
- Moderate exercise
- Control of Glucose and Insulin
- Eliminate chronic bacterial infections

-
- The patient is hypertensive, could thyroid replacement make BP worse or does that rule out hypothyroidism?
-

-
- Hypertension associated with Hypothyroidism that can be improved in 50% of treated patients
 - Is elevated homocysteine associated with hypothyroidism?
 - Treatment?
-

-
- Yes
 - B6. B12, Folic Acid, Trimethylglycine
-

-
- On 2 grains desiccated porcine thyroid
 - Repeat exam
 - Depression improved, off psych meds, BP improved but any thoughts on a different anti-hypertensive?
-

-
- If patient does not have a must have indication for beta blockers, she might feel better (more energy, better fat burning with exercise, etc) and have better T4 to T3 conversion on an ARB or other.
 - Repeat Lab
-

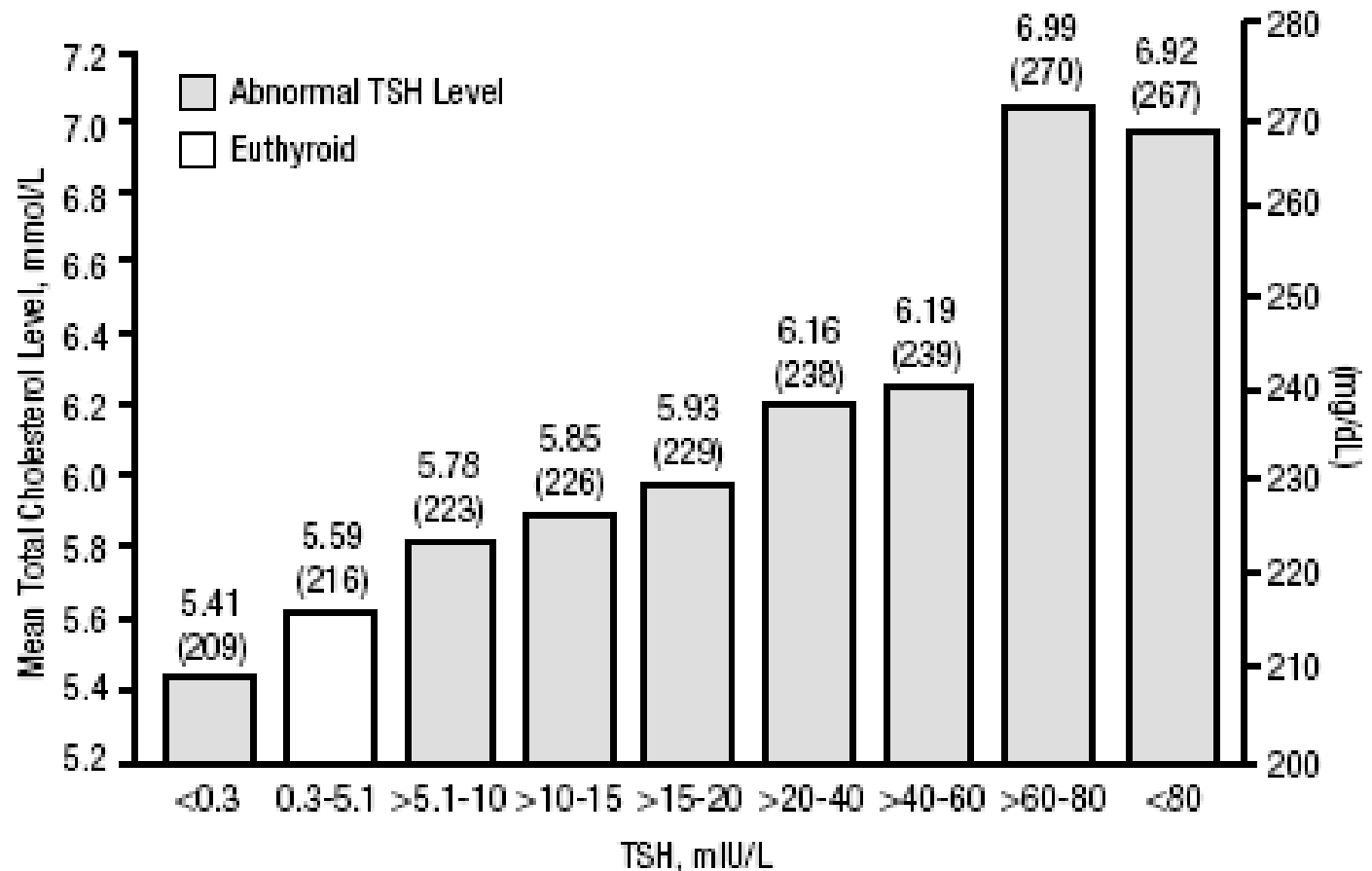
- CBC, Metabolic panel, OK
- CRP 2.5 Homocysteine 10.5
- TC 190 LDL 105 HDL 55
- TSH 2.6
- Free T3 3.6
- Free T4 1.2
- TPO > 95 (positive)
- Depression improved, on a anti-aging program
- ~~BP improved 140/85~~

-
- Lipids improved, what is the relationship of thyroid function to cholesterol



Canaris GJ, et al. The Colorado thyroid disease prevalence study. *Arch Intern Med.* 2000;160:526-534.

To convert mmol/L to mg/dl mult x 39



Are we there yet?

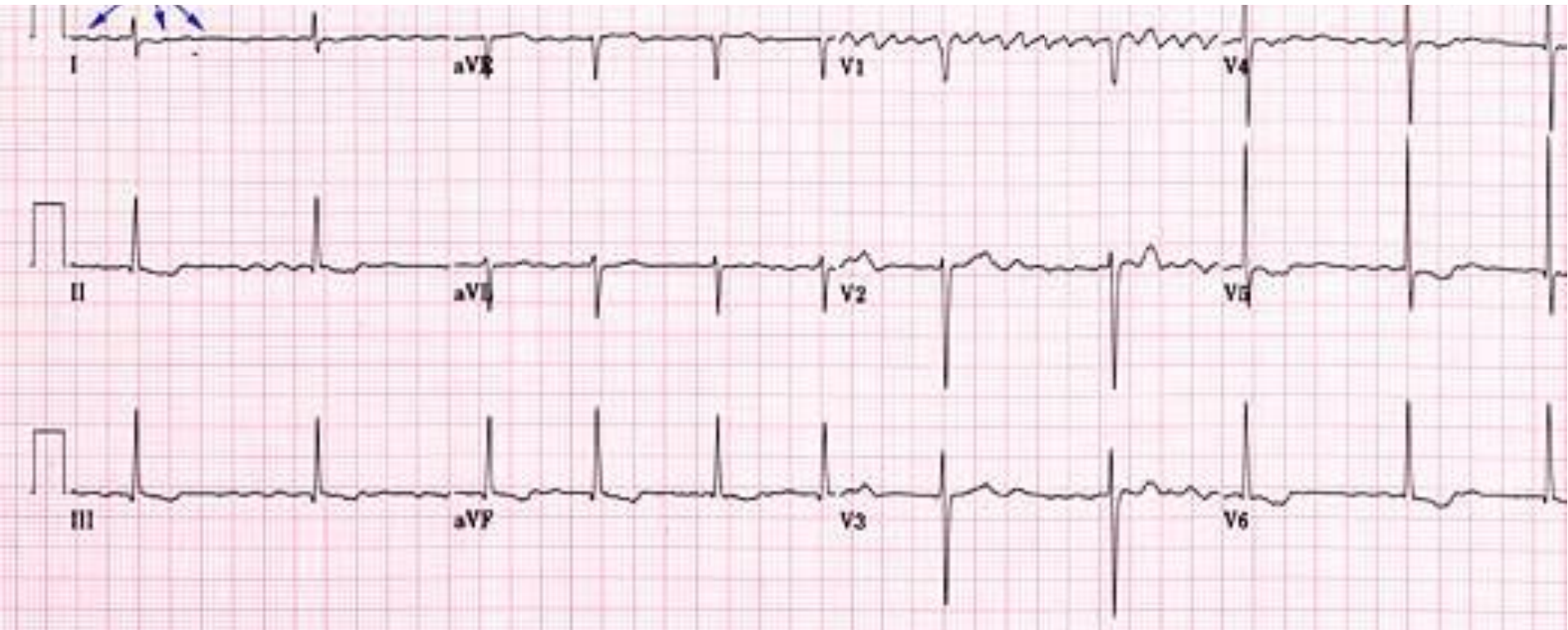
- Quit while you're ahead or add more thyroid?
 - How do you feel?
 - Energy?
 - Temperature?
 - Depression?
 - Palpitations?
 - Increase dose to 3 grains and re-evaluate patient and lab.
-

-
- Repeat lab
 - TSH 0.9
 - Free T3 3.9
 - Free T4 1.1
 - How would we determine if the patient is loosing bone?
-

-
- Urine NTX should be < 50 .
 - Pt felt so great on 3 grains that she increased dose to to 3 grains BID since she knows that T3 has a short half life.
 - C/O Palpitations
 - Evaluation of above symptom?
-

-
- EKG if normal sinus rhythm then Holter monitor or event monitor, repeat thyroid studies
-

EKG – Interpretation?



-
- Atrial Fib with controlled ventricular response.
 - Risks?
-

-
- CVA
 - Conventional treatment?
-

Conventional treatment

- Decrease thyroid dose
 - Lovenox, Coumadin
 - Medical or electrical cardioversion if acute onset, ablation
 - 2-4 weeks anti-coagulation before cardioversion if onset unknown
 - Echo to r/o atrial clots
 - Patient states she does not want “rat poison” treatment
 - Functional medicine treatment to prevent CVA and or convert rhythm?
-

Prevent thrombotic CVA

- Aspirin
 - Omega 3 PUFA - 8 gms EPA + DHA per day
 - Hypnosis cardioversion?
 - Magnesium
 - Nattokinase
 - Fibrinolytic from fermented soy
 - Cesarone MR et al. Prevention of venous thrombosis in long-haul flights with Flite Tabs: the LONFLIT-FLITE randomized, controlled trial. *Angiology*. 2003 Sep-Oct;54(5):531-9.
-
- Metabolic Cardiology Treatment?

Metabolic cardiology in AF

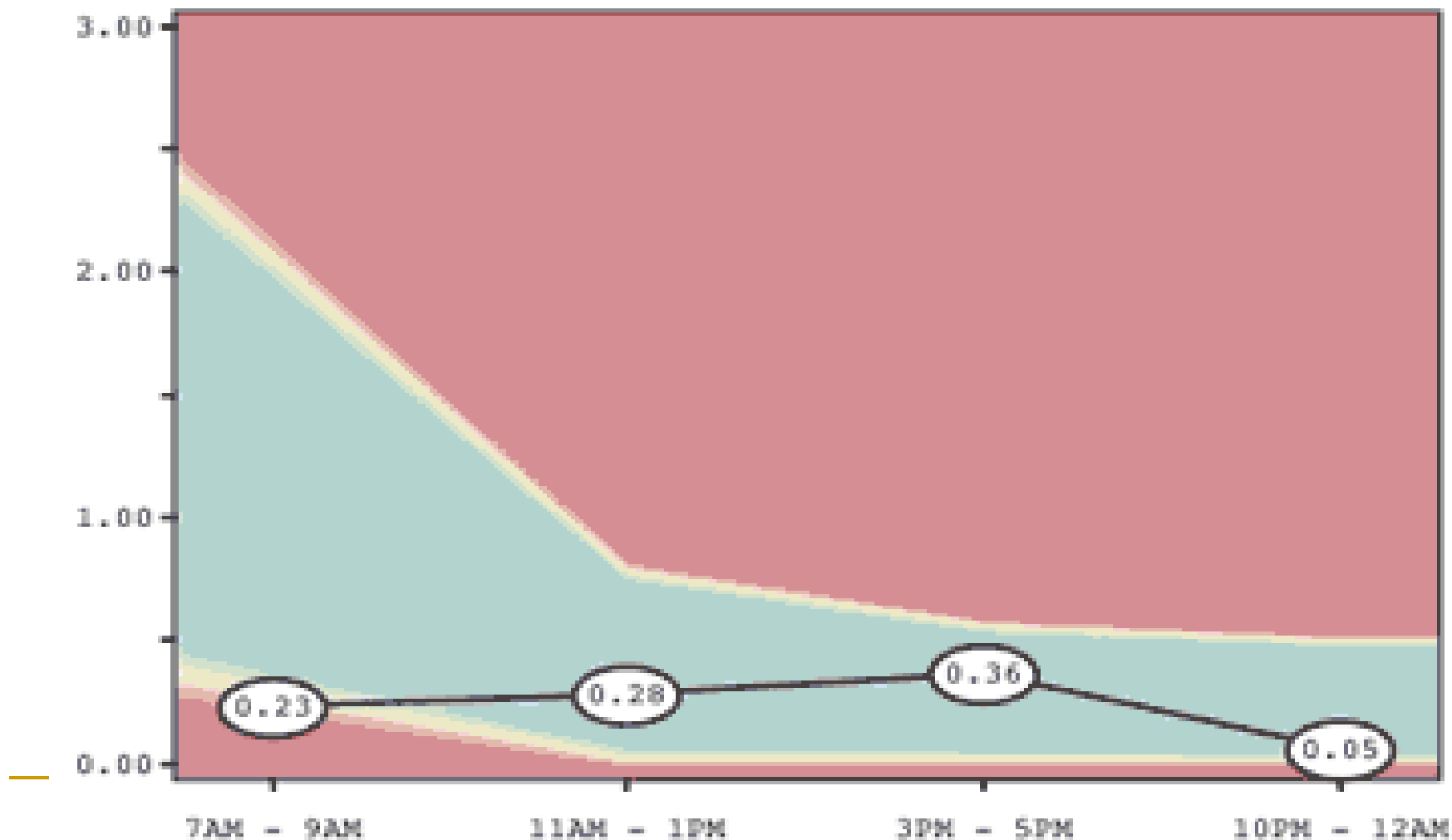
- Coenzyme Q-10
 - L-carnitine
 - D-ribose

 - Get more energy out of the cardiac myocytes
-

Another situation

- Thyroid optimized, patient still depressed, panic attacks, tired, no energy.
 - What endocrine gland has to be functioning for thyroid hormone to function?
 - What diagnostic test might help?
-

Salivary cortisol – interpretation?



-
- AM cortisol below reference range suggests adrenal fatigue.
 - Treatment?
-

-
- Lifestyle, Antioxidants
 - Adrenal Precursors, Extracts or
 - Cortisol tid or bid compounded extended release
-

TRT plan?

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 1.9, 2.1
(1.5-9.3 mIU/mL)
- What is the Bioavailable T?
- What dose and route for TRT?

-
- Use Bioavailable calculator
 - 261 (120-600)
 - Transdermal gel
 - 100 mg/day
 - T cypionate IM
 - 100 mg/week
 - Pellets
 - HCG
 - Any other immediate treatment?
 - Nutraceutical?
 - Lifestyle?
-

Other treatment:

- Preventive
 - Balanced antioxidants + nutraceuticals
 - Saw palmetto with or without
 - Pygeum, Urtica
 - Lycopene in diet and supplement
 - Lifestyle
 - Once you have all this extra strength and energy
.....exercise program
 - Hormonally correct diet
 - Stress Reduction
 - What follow up is needed?
-

Follow up – 3 months

- History and physical
 - How do you feel in general?
 - BP, edema?
 - Libido? Erections?
 - Voiding?
 - Mood, energy
 - Sleep
 - Body composition
 - PSA, H and H,T, Free T, Bioavailable T, ST,E2,DHT
-

New patient – E2 different

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 75 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 1.9, 2.1
 - Urine NTX 20 (<50)
 - Any difference in initial treatment?

-
- Aromatase inhibition
 - P4
 - Zinc
 - Chrysin.....or
 - E2 decrease
 - Calcium-d-glucarate.....or
 - Anastrozole (Arimidex)
 - 0.5 mg once a week
 - Patient continues on anti-aging lifestyle and TRT, Rx'd with Anastrozole
 - Body fat decreases from 24 to 16%
 - Repeat labs
-

- ❑ Total T 900 ng/dl (300-1000)
- ❑ Free T 24 (8-30)
- ❑ SHBG 20 (20-60)
- ❑ Albumin 4.5 (4-5)
- ❑ E2 <1 (15-45)
- ❑ PSA 0.9 (<4)
- ❑ FSH, LH 0.3, 0.5
- ❑ Urine NTX 95 (<50)
- ❑ What happened? Solution?

-
- As body fat decreased, aromatization decreased and E2 decreased
 - E2 needed for BMD in men as well as in women
 - Anastrozole was needed initially but no longer
 - Nothing done wrong, the situation is dynamic and needs fine tuning.
 - Interesting that PSA went down, could it be from decreased E2?
-

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - Bioavailable T 261 (120-600)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
- Treated with compounded gel 100 mg per day

-
- Repeat labs
 - T 400
 - SHGB 25
 - Free T 9.5
 - Bioavailable T 223
 - E2 20
 - How do you feel? “Better”
 - What happened?
 - Treatment?
-

Possibilities

- 1. T to DHT conversion
 - Initial DHT 35
 - Repeat DHT 150
 - “Total androgen score” = $T + 3 \times \text{DHT}$
 - Before treatment
 - $500 + 3 \times 35 = 605$
 - After treatment
 - $400 + 3 \times 150 = 850$
 - Block DHT conversion or...
 - Good clinical results - don't change?

-
- 2. Serum testing not reflecting tissue or cellular levels
 - Saliva testing
 - Initial test 100 pg/ml
 - Repeat 400 pg/ml
 - 24 hour urine testing
-

-
- 3. Gel not being absorbed
 - Not compliant with dosing (unlikely)
 - Poor absorber
 - Confirm by saliva test
 - Switch to another delivery method
 - 4. Lab error – repeat labs

 - How could FSH and LH help to figure it out?
-

-
- Initial FSH/LH 2.6/4.5
 - If repeat were about the same probably no T or DHT getting to the pituitary
 - If repeat were low <0.3 , then T or DHT getting to the pituitary and feedback loop produced so probably adequate treatment.
-

-
- 50 yo man with ADAM sx. (same patient)
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - Bioavailable T 261 (120-600)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - Treated with compounded gel 100 mg once per day
 - Follow up: Labs, “How do you feel”
-

Repeat labs

- Total T 2900 ng/dl (300-1000)
 - Free T >47 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - Bioavailable T 2250 (120-600)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - What happened?
 - What questions will you ask patient?
 - What tests might help sort it out?
-

Possibilities

- Lab error – but if total and free run separately, both are elevated probably not lab error
 - Dosing error – applied 10 grams instead of 1 gm?
 - Question: Did you apply the gel the morning of the test and did you apply it to the antecubital area where the blood was drawn?
 - If so, that can produce a sky high false value
-

Remarried, wants to have children

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 1.9, 2.1
 - Treatment?
-

- HCG:

- Weekly method: 2000-5000 units subq per week. Can divide into 2 doses per week
 - Daily method: 250 units per day = 1750 units per week
 - Combined method: T IM once a week and HCG 250 units on day 5 and 6
 - Will this maintain or increase sperm count as above?
 - Repeat lab?
-

- Daily method used
 - Total T 895 ng/dl (300-1000)
 - Free T 22 (8-30)
 - Bioavailable T 523 (120-600)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 0.1, 0.1

Wants more children, What is different here, will HCG work?

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 8.9, 7.7



-
- FSH/LH already high making primary hypogonadism more likely and stimulating Leydig cells further may not produce more T.
 - Check sperm count?
 - Could try combined method or HCG method and see what happens in terms of T levels and sperm count
-

Concerned about testicle volume loss with T replacement

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 1.9, 2.1
 - Treatment?
-

-
- HCG or combined

Going to climb Mt. Everest

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 1.9, 2.1
-

-
- Pellets alone or + more after 2 months but mechanical problems at extreme conditions with gels or vials
 - 75 mg pellets 8-12
-

PSA Rise

- 50 yo man with ADAM sx.
 - Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - PSA 1 year ago 0.4
 - FSH, LH 1.9, 2.1
 - Plan?

-
- Repeat PSA
 - No ejaculation x 48 hours
 - If baseline value, just repeat in 3 months
 - If velocity of 1.0, urology consult
 - Urology consult possibilities
 - Watch and wait and repeat PSA
 - OK to start T and follow along with urology
 - Biopsy
 - If negative – OK to start T
-

45 y/o, Type 2 DM, Obese

- Total T 325 ng/dl (300-1000)
- Free T 4 (8-30)
- SHBG 65 (20-60)
- Albumin 4.1 (4-5)
- E2 125 (15-45)
- PSA 1.1 (<4)
- FSH, LH 1.9, 2.1
- HgA1C 7.1
- Fasting Insulin 28
- Why is E2 so high? Why is SHBG high?

-
- Bioavailable T 92 (120-600)
 - E2 high from aromatization from aromatase present in adipose
 - SHBG high from E2 high
 - Could try to treat with lifestyle and just Anastrozole, 0.5 mg per day
 - Or could treat with T + Anastrozole
-

Treatment with just Anastrozole and Lifestyle

- Total T 600 ng/dl (300-1000)
- Free T 11 (8-30)
- Bioavailable 272 (120-600)
- SHBG 40 (20-60)
- Albumin 4.3 (4-5)
- E2 20 (15-45)
- PSA 0.9 (<4)
- FSH, LH 1.9, 2.1
- HgA1C 6.1
- Fasting Insulin 16
- Comments?

-
- T, FT, Bioavailable T improved but not optimal
 - E2 improved, PSA lower
 - Diabetes control improved
-

- 50 yo man with ADAM sx.

- Total T 500 ng/dl (300-1000)
 - Free T 11.1 (8-30)
 - SHBG 30 (20-60)
 - Albumin 4.3 (4-5)
 - E2 25 (15-45)
 - PSA 1.5 (<4)
 - FSH, LH 1.9, 2.1
 - Hg/Hct 14.5/45
 - Treated with T cypionate 100 mg/week x 6 months
 - Repeat lab
-

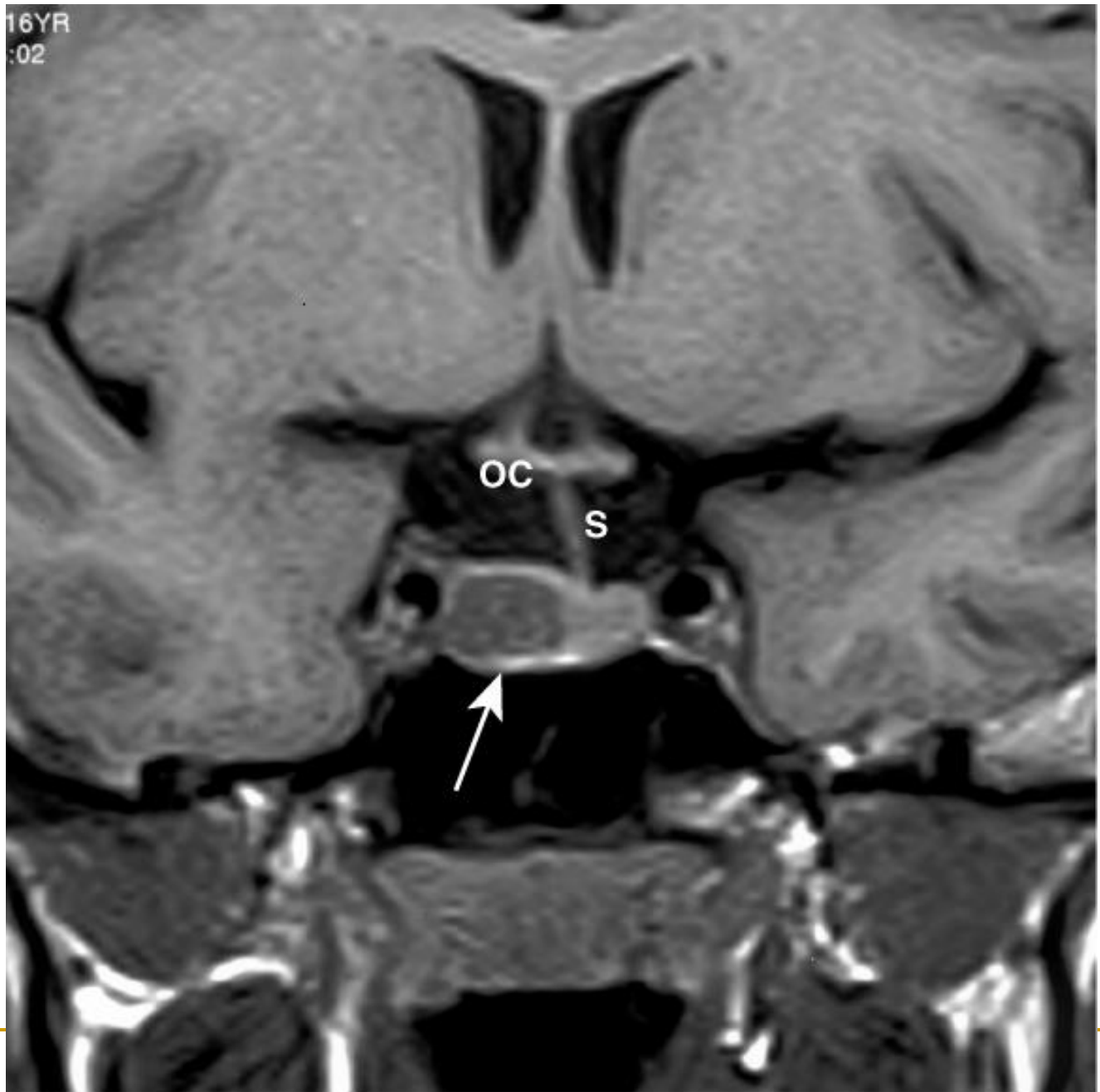
- ❑ Total T 850 ng/dl (300-1000)
- ❑ Free T 25 (8-30)
- ❑ Bioavailable T 586 (120-600)
- ❑ SHBG 20 (20-60)
- ❑ Albumin 4.3 (4-5)
- ❑ E2 25 (15-45)
- ❑ PSA 1.7 (<4)
- ❑ FSH, LH 0.1, 0.1
- ❑ Hg/Hct 17.9/59
- ❑ Treatment?

-
- Donate or discard 1 unit of blood q 6-12 months
 - Follow H and H q 3 months
-

- 35 yo man with ED and no libido
 - Total T 300 ng/dl (300-1000)
 - Free T 7 (8-30)
 - SHBG 25 (20-60)
 - Albumin 4.3 (4-5)
 - E2 20 (15-45)
 - PSA 0.5 (<4)
 - FSH, LH 0.4, 0.3
 - Additional history questions?
 - What lab tests will you order?

-
- T very low
 - If LH high – primary hypogonadism
 - If LH low – secondary hypogonadism
 - R/O Pituitary adenoma, prolactinoma
 - Snyder PJ Hypogonadism in elderly men-
-what to do until the evidence comes *N Engl J Med.* 2004 Jan 29;350(5):440-2.
-

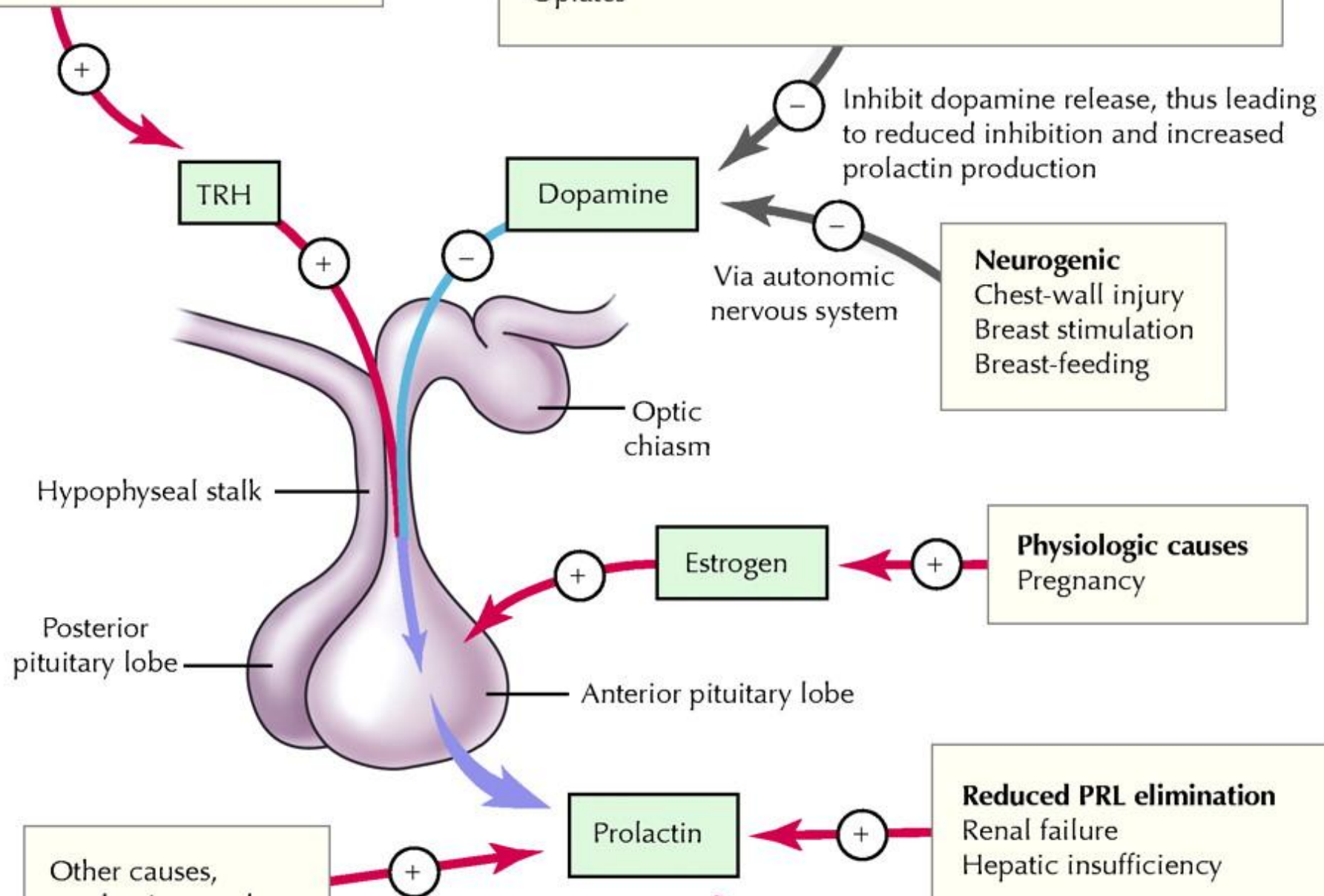
16YR
:02



Hypothalamic PRL stimulation

Primary hypothyroidism
Adrenal insufficiency

Neuroleptics: phenothiazines, haloperidol
Antihypertensives: calcium-channel blockers, methyldopa
Psychotropic agents: tricyclic antidepressants
Anti-ulcer agents: H₂ antagonists
Opiates



- 43 year old healthy female, healthy diet, regular exercise. Nonsmoker, no family h/o breast/uterine CA.

- increased anxiety, breast tenderness, bloating, increased PMS, poor sleep, feel warmer than usual, regular heavier cycles, low libido and abd weight gain
 - Pap and mammo 2 months ago wnl
 - Pelvic ultrasound done because of heavier flow-wnl.
-

Lab Values

drawn on day 21 of her cycle

- Estradiol 300
 - Progesterone 5
 - Total testosterone 25
 - Free testosterone 0.8
 - TSH 1.2
 - Free T4 0.9
 - Free T3 2.9
 - Salivary cortisol- early adrenal fatigue
-

Progesterone/Testosterone deficiency

- No Biest indicated at this time
 - Sleep a problem all month. Would consider-

 - Progesterone SR caps 50 mg days 1-13 at HS
 - Progesterone SR caps 150 mg days 14-start of cycle at HS
 - Low libido, abdominal weight gain-----
 - Testosterone 0.5% 5 mg/gm daily in am
-

-
- Support adrenals with nutraceuticals
 - Vitamin B complex, C, D
 - Omega 3's
 - Magnesium
 - Adaptagens- rhodiola, ginseng, licorice, ashwaganda
 - Adrenal extract
 - DHEA supplementation
 - Monitor thyroid levels
-

Break through Bleeding

- She calls in 1st month with complaint of bleeding early in cycle day 22, sleep is better
 - What would you do?
-

Options

- Reassure that hormone adjustment can cause cycle changes so advise to wait another couple cycles to see if symptoms persist.....
 - Increase progesterone if tolerated
 - Does she count the day she started bleeding as day 1? Or does she keep the count regardless of the bleeding?
 - Consider repeat pelvic ultrasound and/or endometrial biopsy
-

-
- She is now complaining of acne and oily skin
 - Decrease testosterone by 1/2 gram daily
 - ? DHEA for adrenal support – may need to change to 7 keto DHEA
 - ? Could it be the progesterone metabolizing to androstenedione
 - Monitor for persistent symptoms
-

Paradoxical reaction

- Progesterone can metabolize to androstenedione and increase estrogen dominance symptoms - the more you increase the progesterone the worse the symptoms become
 - Can decrease progesterone to 100 mg days 14 to start of cycle
 - Decrease testosterone by $\frac{1}{2}$ and monitor symptoms
-

- 58 year old female s/p TAH/BSO 2 yrs ago for Fibroids. Nonsmoker, too tired to exercise, diet poor, No family history of breast or uterine CA.

- severe hot flashes, night sweats, vaginal dryness with dyspareunia, mental fogging and decreased work performance, mild headaches and agitation, Weight up 20 pounds, fatigue and low libido
 - Pap and Mammo done 1 year ago wnl.
-

Lab tests

■ Estradiol	15
■ Progesterone	0.3
■ Testosterone	10
■ Free Testosterone	<0.2
■ TSH	4
■ Free T4	0.7
■ Free T3	2.3
■ TPO	200
■ FBS	102
■ A1C	5.8
■ Insulin	15
■ Salivary Cortisol	mild adrenal fatigue

What would you treat her with?

Estrogen/testosterone deficiency

- She has severe estrogen deficiency--
 - Biest 80/20 5 mg/gm 1 gm daily in am and may need to increase to bid if sx persist .
 - Progesterone 5% -50 mg/gm 1 gm at HS. She still needs to balance with progesterone even with mild symptoms, but as sleep is not an issue may use cream—
-

-
- She has moderate testosterone sx so may use—
 - Testosterone .5% 5 mg/gm 1 am daily in am again,
 - For the first 3 months she should use this continuously. When sx are controlled
 - can cycle with the calendar
 - Use continuous
-

What about thyroid and adrenals?

- Many schools of thought
 - Support adrenals first then add thyroid,
 - Treat together with other hormones
 - Vitamin B complex, C, D, Omega 3's, Magnesium
 - Adaptagens- rhodiola, ginseng, licorice, ashwaganda
 - Add adrenal extract, DHEA
 - Desiccated porcine thyroid 1 grain daily then twice daily
 - Follow up with salivary and thyroid testing in 3 months.
-

-
- 50 year old female with irregular cycles, history of PCOS, diabetes and HTN
 - Non smoker, walks daily, watching diet.
 - Hot flashes, night sweats, Poor sleep, fatigue, constant PMS, Fatigue
 - Meds- Metformin 500 mg daily, Lotensin 5 mg daily
 - Pap and Mammo are wnl.
-

Labs

- Estradiol 55
- Progesterone 3
- Testosterone 66
- Free Testosterone 4.5
- DHEA S 400
- Insulin 6
- A1C 6
- TSH 1.5
- Free T4 1.0
- Free T3 300
- Salivary cortisol mild adrenal fatigue
- What would you treat her with?

Estrogen/Progesterone deficiency

- She has mild to moderate estrogen deficiency
 - Biest 2.5 mg/gm 1 gm daily in am days 1-25
 - She has moderate progesterone deficiency
 - Progesterone 50 mg days 1-13 and 100 mg days 14-28 might be a good starting point
 - No testosterone at this point
-

What about thyroid and adrenals

- Thyroid ok for now- monitor
 - Adrenals may improve with progesterone and added sleep, but should consider
 - Vitamin B complex, C, D
 - Omega 3's
 - Magnesium
 - Adaptagens- rhodiola, ginseng, licorice, ashwaganda
 - Adrenal extract, DHEA already elevated
 - Follow up with salivary and thyroid testing in 3 months,
-

45 yo woman with low libido, low well being, fatigue

- Premenopausal
 - PMH neg
 - PE neg
 - E2, P4 pre-menopausal
 - T 40 (10-75)
 - SHBG 90
 - Free T 0.4 (1-7)
 - Bioavailable T 8 (2-20)
 - Diagnosis, Treatment?
-

Relative Androgen Deficiency

- T gel 1% = 10mg/gm
 - 1/2-1 gram per day
 - Titrate to side effects and lab tests
 - Instructions?
-

-
- Can increase hair growth in area of application (but not on head)
 - Rub into large surface area
 - Watch for early side effects – “teenage skin” and acne.
-

50 yo man with osteoarthritis

- Quality of Life – poor due to pain
 - California surfer who can't surf
 - Lifestyle – pretty good
 - Nutrition
 - Exercise – limited by oa
 - Stress reduction – needs help
 - PMH – o/w neg
 - Libido, erections – OK
 - Meds: Ibuprofen, oxycodone
-

- ❑ Total T 500 ng/dl (300-1000)
- ❑ Free T 11.1 (8-30)
- ❑ SHBG 30 (20-60)
- ❑ Albumin 4.3 (4-5)
- ❑ E2 25 (15-45)
- ❑ PSA 1.5 (<4)
- ❑ FSH, LH 1.9, 2.1
- ❑ Lipids OK
- ❑ CRP 6.5 optimal < 1
- ❑ Homocysteine 10.5 optimal <7
- ❑ DHEAS 80 optimal 250-600
- ❑ IGF-1 100 optimal 300-400
- ❑ Thyroid optimal
- ❑ Is T related to osteoarthritis, rheumatoid arthritis and pain?

Testosterone and pain

- Testosterone increases pain threshold
 - Opioid treatment decrease testosterone levels
 - Testosterone replacement therapy (TRT) improves pain and Quality of Life in men and women with pain syndromes
-