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April 26, 2018

Objectives

1. Do women need testosterone?
2. What are the signs and symptoms of testosterone deficiency and excess in women?
3. Laboratory testing and how to interpret testosterone lab values
4. Treatment modalities for testosterone deficiency women
5. What are the complications of testosterone treatment in women and how to correct them?

Marie R:

CC: 65 y/o female w hx of poorly controlled thyroid s/s, hot flashes, night sweats, vaginal dryness, depression, poor libido, fatigue. "Feels slow."

PH· Depressive disorder
HTN
Hypersomnia with sleep apnea, *mild, not on CPAP*
Hypothyroidism
Morbid obesity, BMI not known (HCC), *sip gastric bypass*
Primary localized osteoarthrosis, lower leg
Urinary incontinence

FH: Alcoholism, Dementia

Meds:

Aspirin 81 mg, Ginkgo
Escitalopram Oxalate (Lexapro) 20 MG Oral Tablet
Levothyroxine Sodium 137 MCG Oral Tablet
Prilosec 20 mg
Tolterodine Tartrate (Detrol LA) 4MG Oral Capsule Extended Release 24 Hour

Marie R:

BP 108/68 Pulse 80 I Temp (Src) 98.7 (Tympanic) I Resp 181 Ht 5' 3.7" (1.618m) I Wt. 215 lbs 14.4 oz (97.932kg) IN BMI 37.41 kg/m2 I BSA 2.1 m2 I Sa0 2 97[room air[%

PE: General: Normotensive, in no acute distress.

Eyes: PERRLA, EOMI full, conjunctiva clear, eyebrows nearly absent

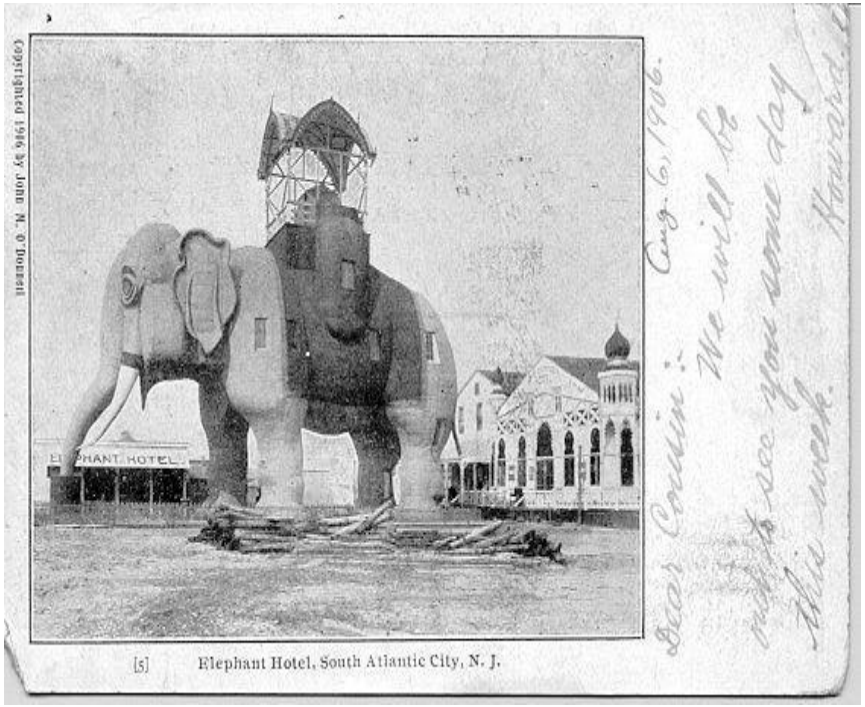
Neuro: Hyporeflexia biceps, patellar

Vaginal atrophy, some evidence of lichen sclerosus

2/26/17	*Marie*	*Median*		*Marie*	*Median*
Testosterone Free	1.3 pg/ml	2-4 pg/ml*	TSH	4.30	<2.5
Testosterone Total	19.0 ng/l	<44 ng/ml*	free T3	1.9	>2.5
DHEA-S	77 ug/dl	195 ug/dl*	free T4	1.42	>1.5
Estrone (E1)	42 pg/ml	< 200 pg/ml*	rT3	328	80-250
Estradiol (E2)	<0.5 pg/ml	90 pg/ml*	T3/rT3	0.58	>1.06
Progesterone	0.10 ng/ml	5-7 ng/ml*	TPO	462	<35
Pregnenolone	108 ng/dl	100 ng/dl*	TAG	179	113
EP Ratio	420	< 250			
P/E Ratio	inf	100-500			

Other: 25 OH D 41, Homocysteine 14.2, Hct 37.5, cRP 2.07

Stop: The Elephant In The Room: Is Testosterone FDA Approved for Women?





10 Most Common Off Label Use Drugs in USA

SSRIs	**Premature ejaculation, hot flashes, tinnitus (ringing in the ears)**
Prazosin	**Post Traumatic Stress Disorder**
Amitriptyline	**Fibromyalgia, migraines, eating disorders, pain after shingles infection**
Statins	**Rheumatoid arthritis**
Clonidine	**Smoking cessation, hot flashes, attention deficit/hyperactivity disorder (ADHD), Tourette's Syndrome, RLS**
Aripiprazole	**Dementia, Alzheimer's Dx.**
Gabapentin, anti seizure	**Peripheral Neuropathy esp. DM, Migraine H.A. Hot Flashes**
Topiramate-anti seizure	**Bipolar disorder, depression, weight, alcohol dependence**
Risperidone	**Alzheimer's disease, dementia, eating disorders, PTSD**
Trazodone	**Insomnia, anxiety, bipolar dx.**

Testosterone Myths vs. Facts

Testosterone is the most abundant active sex steroid throughout a woman's female lifespan.

T maintains muscle and bone strength, restores sex drive and libido.
T improves overall feeling of well being, reduces "bad" cholesterol.
T replacement leads to increase bone and muscle mass.
T deficiency leads to dry eyes, pale faces, thinning of inner 1/3 of eyebrow.

Myth: Testosterone Replacement Increases the Risk of Breast Cancer.
Fact: More than Double the Risk of Breast Cancer Without Testosterone

Women who received 300-mcg patches showed significant improvement in sexual function, mood, and general well being.

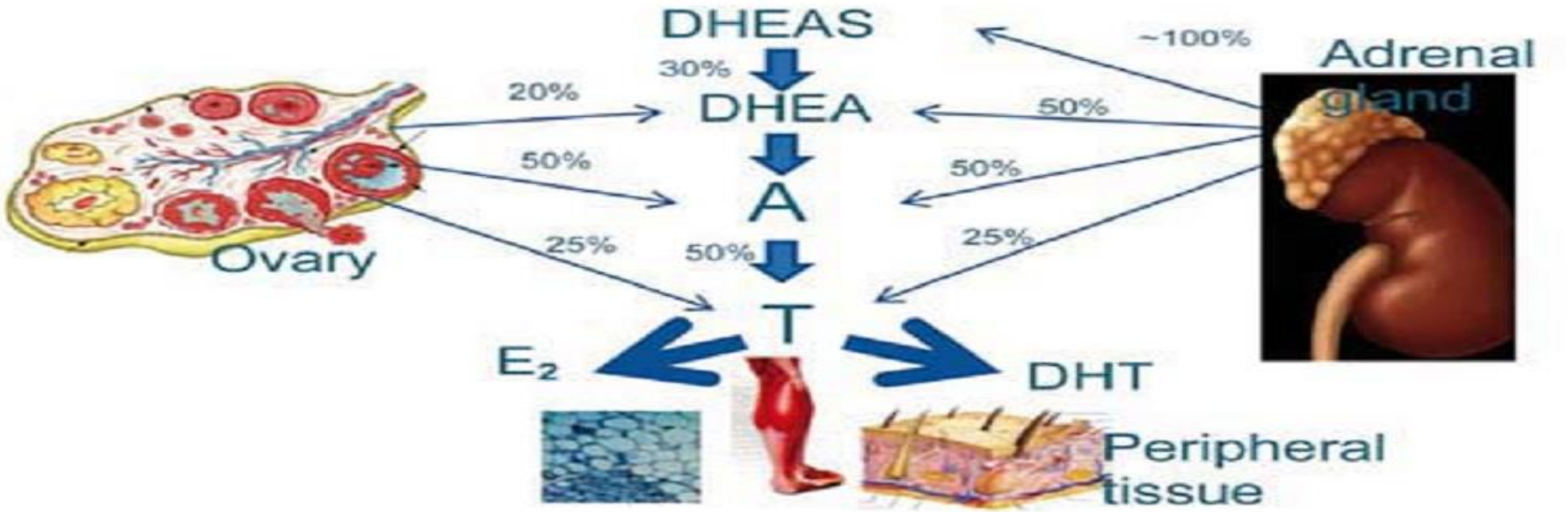
Myth: Testosterone masculinizes females.
Fact: Testosterone does not have a masculinizing effect on females.

Myth: Testosterone causes hoarseness and voice changes.
Fact: There is no evidence that T causes hoarseness or irreversible vocal cord changes in women.

Myth: Testosterone causes hair loss.
Fact: Testosterone increases scalp hair growth in women.

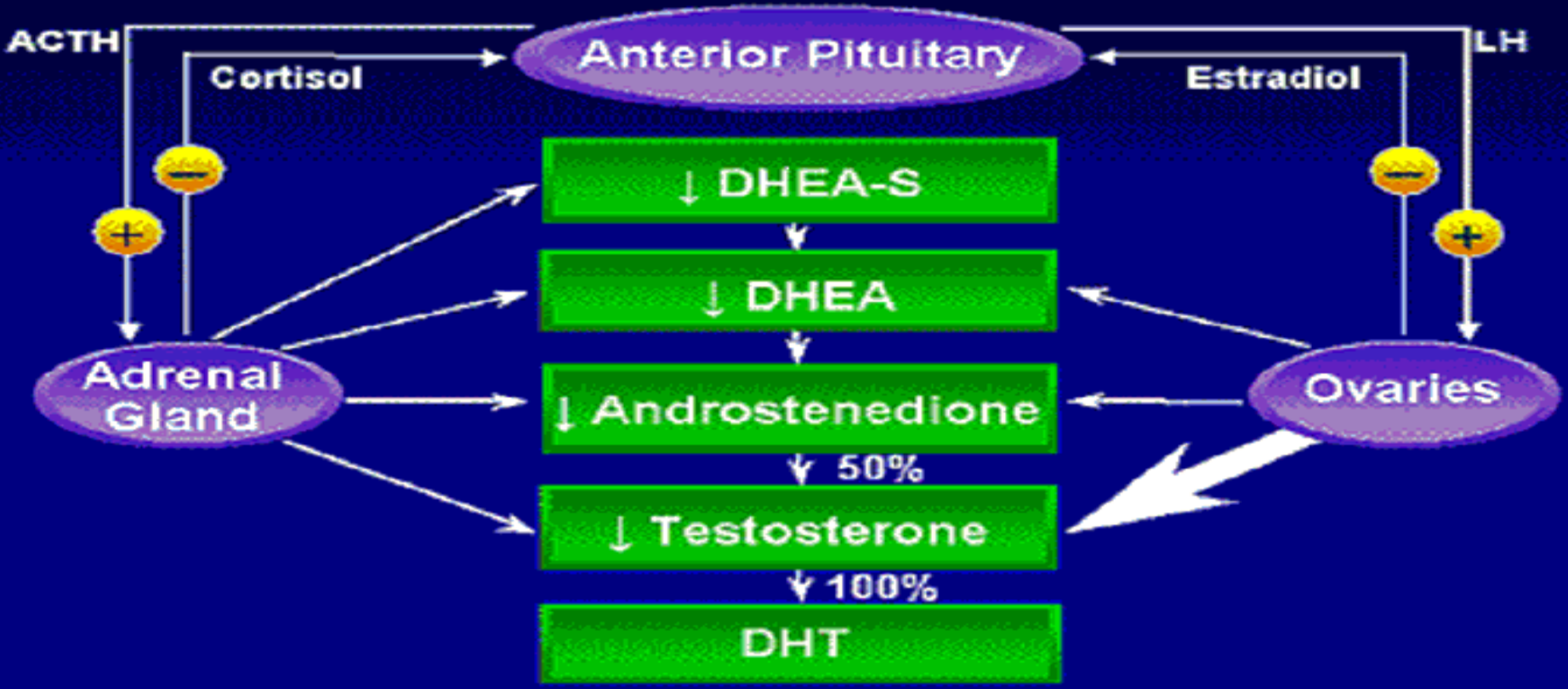
Myth: Testosterone causes liver damage.
Fact: Non-oral T does not adversely affect the liver or clotting factors.

Figure 1 - steroidogenesis in the ovaries, adrenal glands and peripheral tissues of the principal hormones related to female sexual function



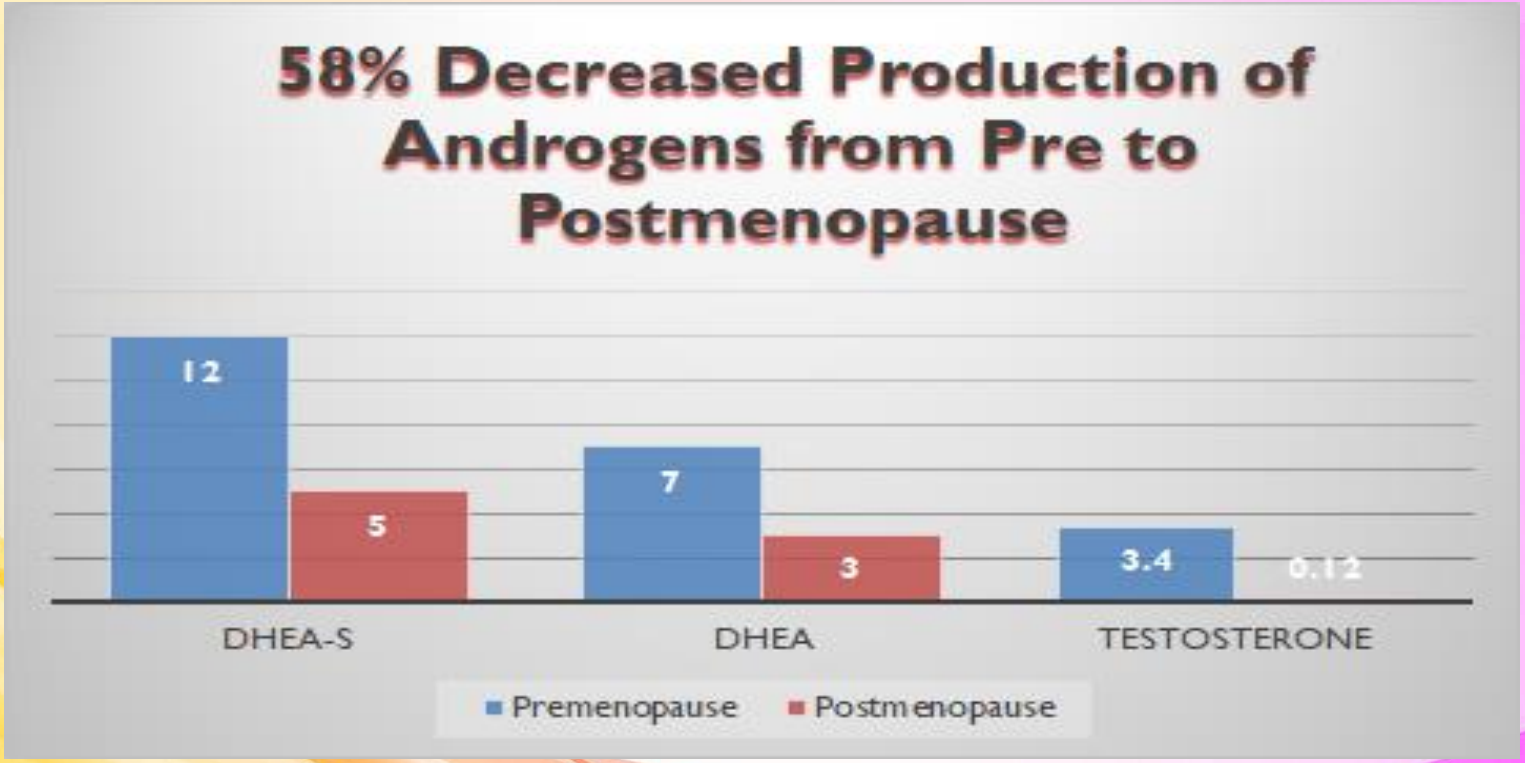
E2= estradiol and DHT= dihydrotestosterone DHEA= dehydroepiandrosterone
DHEAS= dehydroepiandrosterone sulphate A= androstenedione and T= testosterone

Androgens After Menopause



Buster JE, et al. In: Lobo RA, ed. *Treatment of the Postmenopausal Women: Basic and Clinical Aspects*. 2nd edition. Philadelphia, Pa: Lippincott, Williams & Wilkins; 1999: 142.

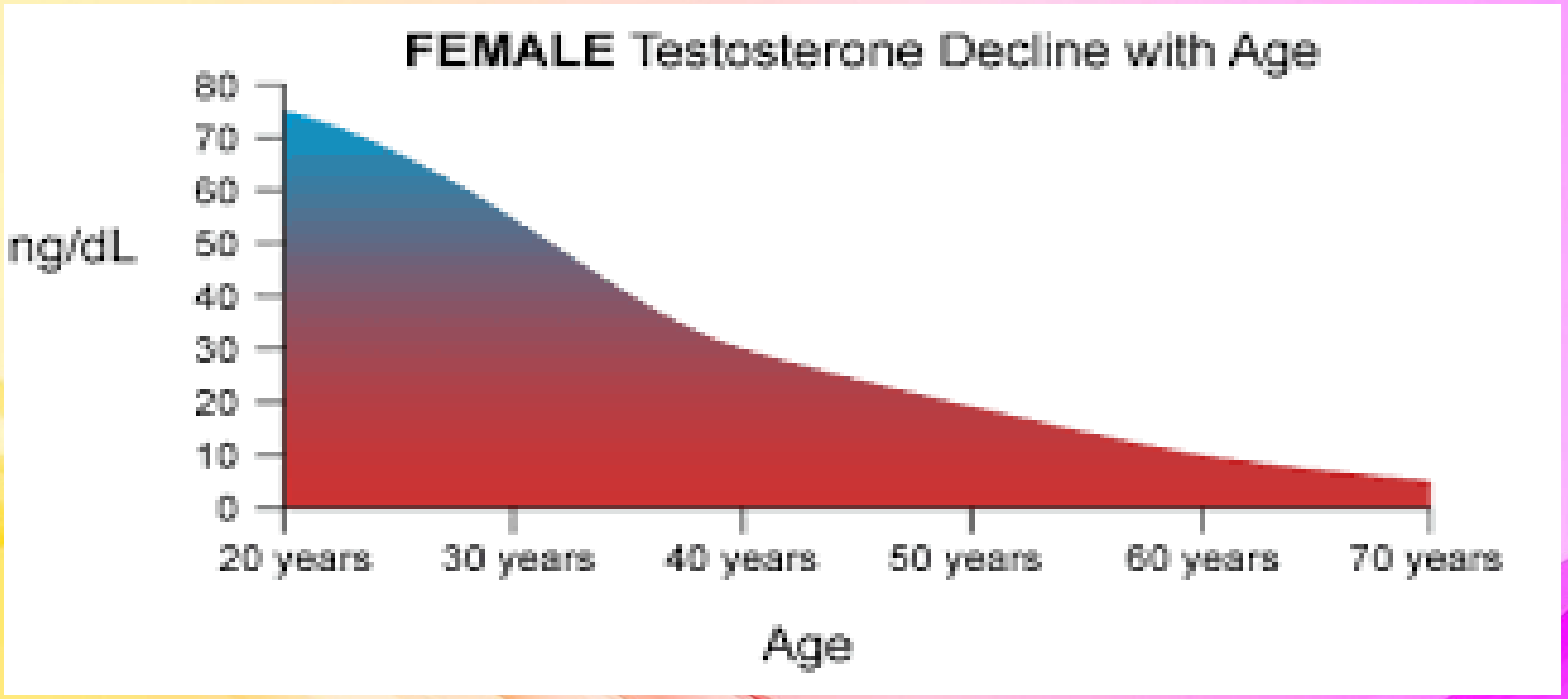
Androgen Production After Menopause



Vermeulen in , Hormones stéroïdiennes,

Médecine de la Reproduction from Mauvais-Jarvis, Ed. Flammarion - Paris, 1997: p. 99: table 7-V

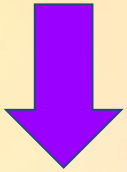
Menopausal T Levels ⬇ From 3.4 mg/d to 0.12 mg/ Day



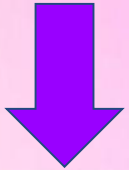
Benefits of Testosterone Therapy in Women

- **Maintains Bone Strength, Bone Density**
- **Improves Muscle Tone**
- **Increases Energy and Endurance**
- **Improves Body Composition**
- **Maintains Skin Turgor, Collagen Production, Texture**
- **Restores and Reinvigorates Sexual Desire**
- **Stabilizes Emotional Well Being**

Benefits of Testosterone Therapy in Women



- Visceral Fat
- Fat Deposition
- Cellulite and Wrinkles
- Mental Fatigue
- Depression



- "Sore-Body" Syndrome
- Vaginal Dryness
- Moodiness and Irritability
- Vertigo, Lightheadedness
- LDL Cholesterol

Symptoms Testosterone Deficiency

- Chronic Fatigue
- Memory Issues
- Decreased Libido
- Muscle Weakness
- Heart Palpitations
- Bone Loss
- Incontinence
- Fibromyalgia
- Aches and Pains
- Brain Fog
- Depression
- Blunted Motivation
- Diminished Sense of Well Being
- Thinned Skin
- Vaginal Dryness

Signs Testosterone Deficiency

- Dull, Flat Dry Eyes
- Pale Skin
- Loose, Sagging Facial Muscles
- Dull, flat hair
- Muscle Atrophy
- Diminished/absent body hair

Kyphosis

"Jiggly" Abdominal Muscles

Cellulite

Varicose Veins

Clitoral Atrophy

Genital Regression

Etiology of Testosterone Deficiency

- Menopause
- Adrenal Fatigue
- Depression
- Chemotherapy
- BCP
- Statins



EFFECTS OF TESTOSTERONE REPLACEMENT


Vaginal Dryness
Muscle Development
Skin Texture
Collagen Production
Energy Boost
Wrinkle Reduction
Skin Texture
Sexual Desire
Skin Turgor
Reduces Incontinence
Weight Loss
Anti Depressant
Bone Density
Bone Strength
T
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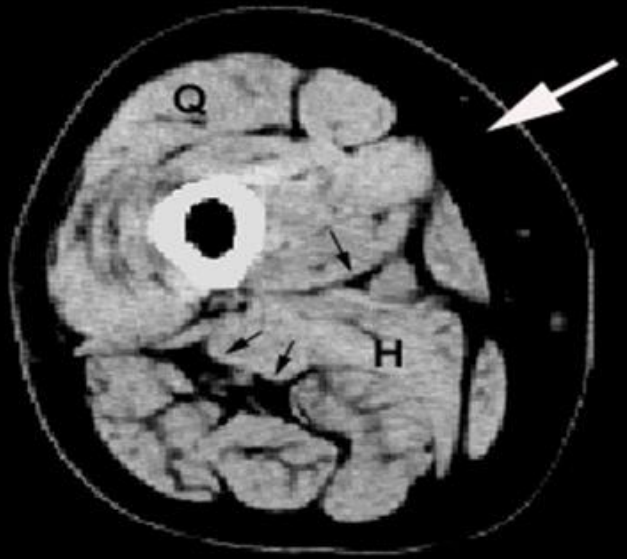
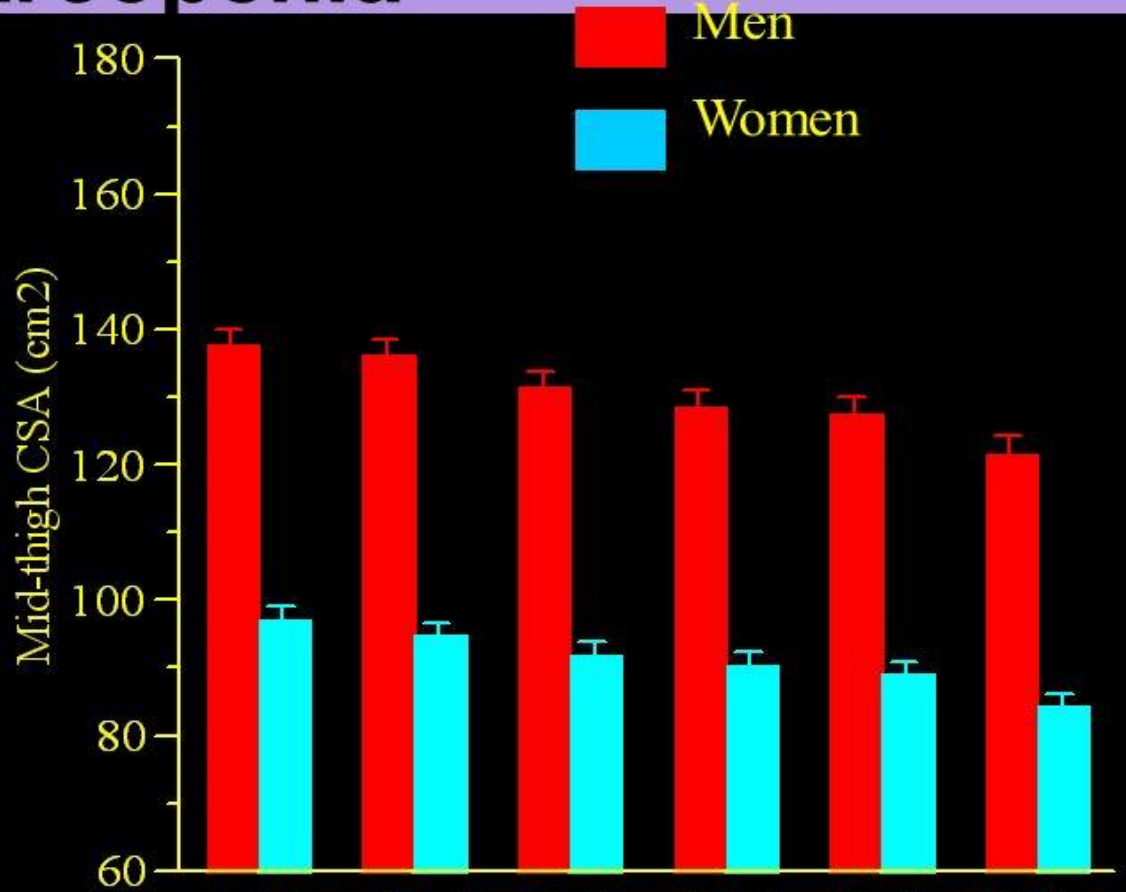
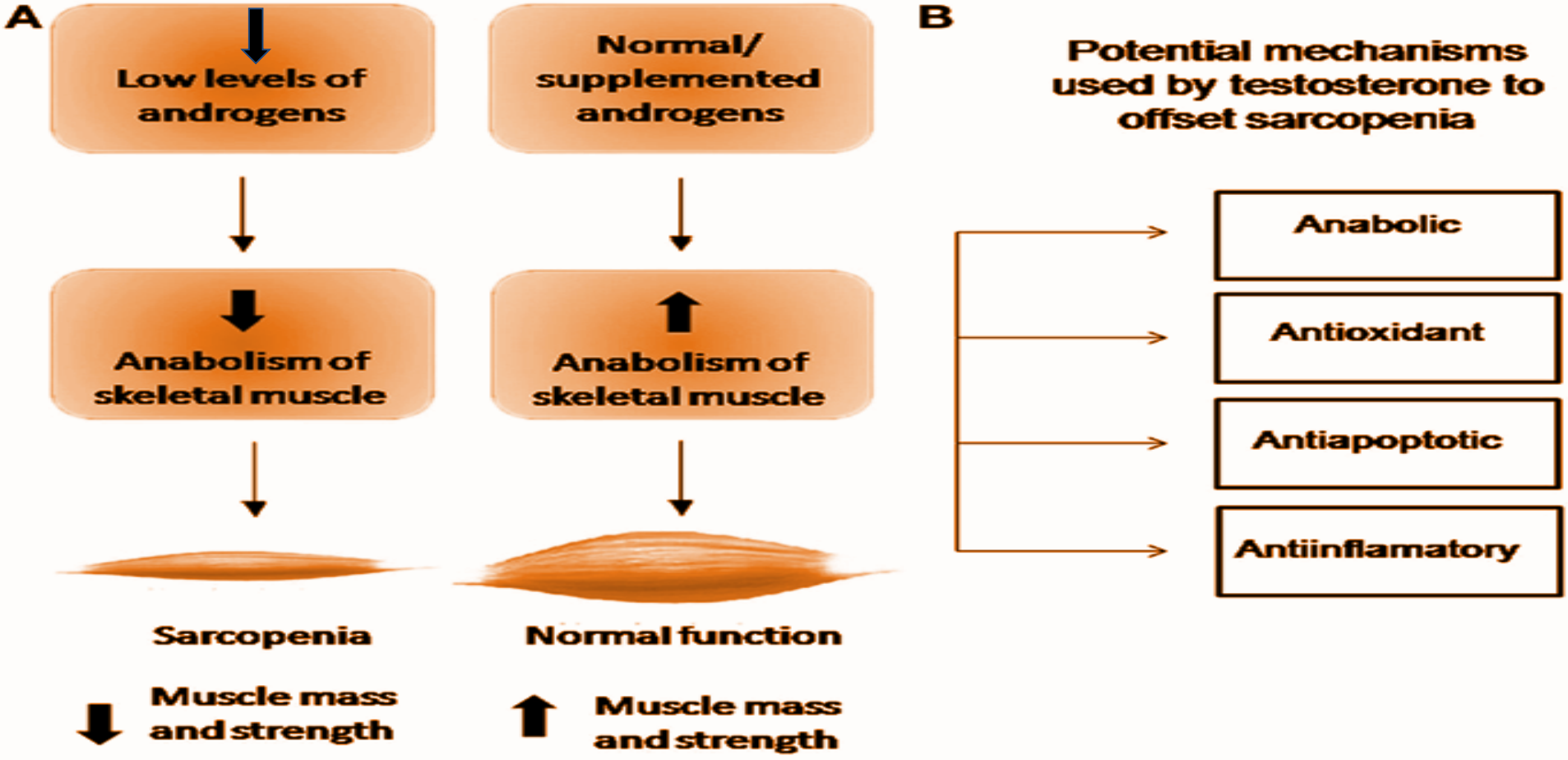
We Lose Muscle as We Age
"Sarcopenia"





Skeletal Muscle Mass Correlates Significantly With T Levels



Testosterone and Sarcopenia

Physiologic Testosterone Levels improve BMI & leg press strength >/= 48.7%

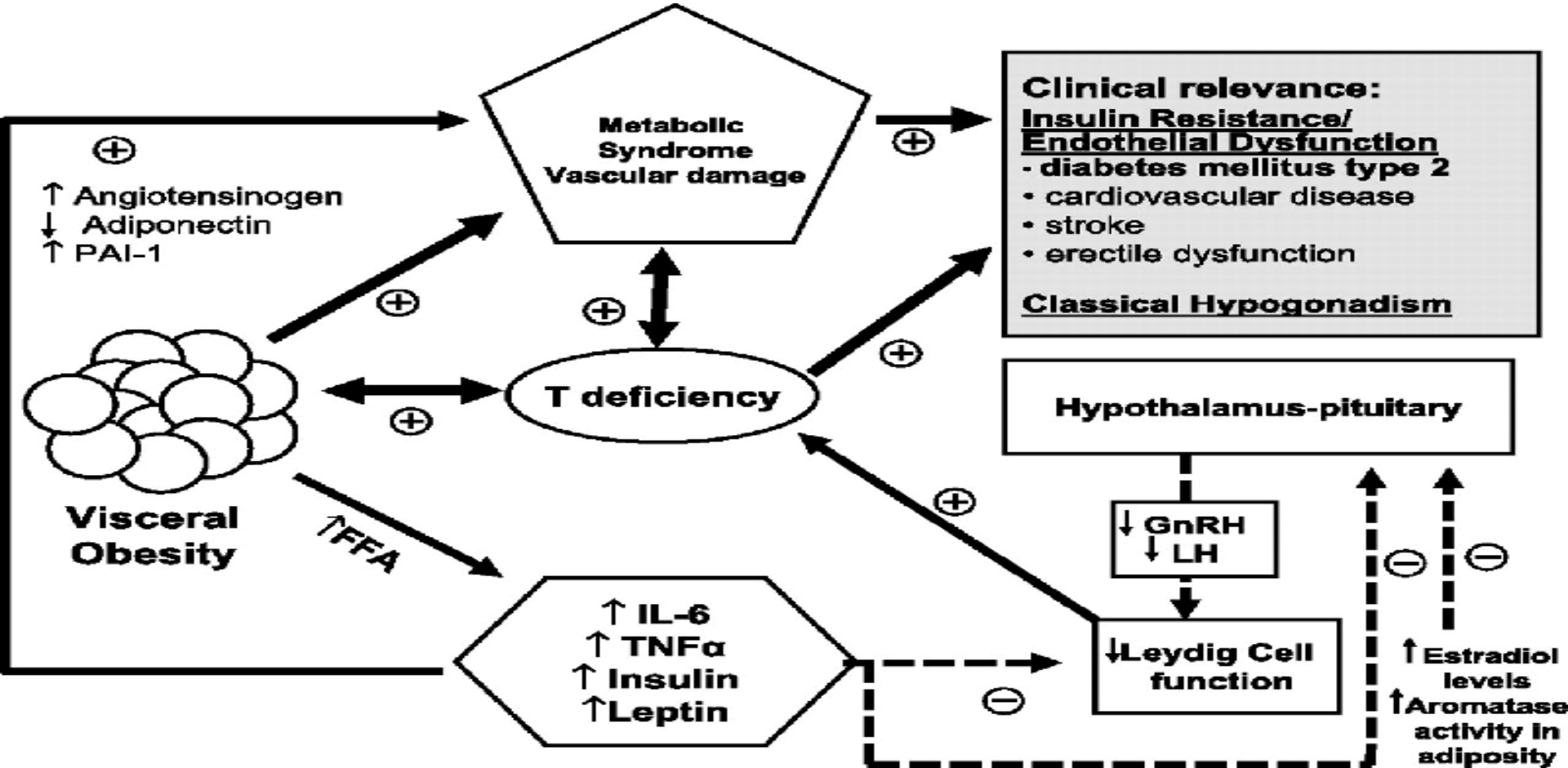
Hogervorst E, Williams J, Budge M, Barnetson L, Combrinck M, Smith AD. Serum total testosterone is lower in men with Alzheimer's disease. Neuro Endocrinol Lett. 2001 Jun;22(3):163-8.

Lean Body Mass BMI, Body Fat, & Fat Mass

Direct Positive Association With Serum T Level

Sowers MF, Beebe JL, McConnell D, Randolph J, Jannausch M. Testosterone concentrations in women aged 25-50 years: associations with lifestyle, body composition, and ovarian status. Am J Epidemiol. 2001 Feb 1;153(3):256-64. Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI, USA. mfsowers@umich.edu .

Testosterone and Obesity



Testosterone and Obesity

Restoration of Testosterone to Therapeutic Levels (6 Mo. Study)

Significant Reductions in :

Weight (5.4%)

Abdominal Fat (2.2%)

Gluteal-femoral Fat (0.9%)

Total Body Fat (2.1%)

BMI (4.6%)

van Kesteren PJ, Asscheman H, ...Gooren LJ. Mortality and morbidity in transsexual subjects treated with cross-sex hormones. Clin Endocrinol (Oxf). 1997 Sep;47(3):337-42. Harvard Medical School, Boston n=13

Testosterone and Cellulite Reduction

Testosterone (1.42-2.85 mg/d)=40-90 mg/Month

(May increase to 150 mg/mo. if severe.)

+

Finasteride: 2.5-10 mg/day

+

Daily thigh exercises

Or

Testosterone Cream 1% + Cellulite Day Gel/Cellulite NIght Gel

Testosterone and Cellulite Reduction

Cellulite Day Gel

Glycolic Acid 10% (W/W)/Lactic Acid 8% (W/W) Topical Day Gel

Apply to area in am (240g compounded bland)

Cellulite Night Gel

Ginkgo Biloba 0.024%/Green Tea Extract 0.2%/Lipoic Acid 3% Topical Cream

Apply to area at night (240g compounded blend)



Testosterone and Lipid Reduction

STUDY: Parenteral Testosterone 1x a week for 3 weeks.

RESULTS: At the 4th week significant decreases in:

- ***Total Cholesterol (p = 0.003)***
- ***Lipoprotein a (p =0.0003)***
- ***Apolipoprotein A-I (p < 0.0001)***
- ***HDL-cholesterol (p < 0.0001)***
- ***Serum albumin (p = 0.002)***

Davis SR, Walker KZ, Strauss BJ. Effects of estradiol with and without testosterone on body composition and relationships with lipids in postmenopausal women. Menopause. 2000 Nov-Dec;7(6):395-401

Lippi G, Guidi G, Ruzzenente O, Braga V, Adami S. Effects of nandrolone decanoate (Deca Durabolin) on serum Lp(a), lipids and lipoproteins in women with postmenopausal osteoporosis. 19 postmenopausal women Scand J Clin Lab Invest. 1997 Oct;57(6):507-11. di Analisi Chimico-Cliniche e Microbiologiche, Università degli studi di Verona, Italy.

Testosterone and Atherosclerosis

Higher Total Testosterone & SHBG *Inversely* related to Carotid ASVD.

Lowest to Highest Quartile

Total SHBG	Total Testosterone
62% Decrease in Carotid Intimal Thickness	52% Decrease in Carotid Intimal Thickness

No associations found between ASVD & estrone, DHEA-s, or androstenedione.

Golden SH, Maguire A, Ding J, Crouse JR, et al. Endogenous postmenopausal hormones and carotid atherosclerosis: a case-control study of the atherosclerosis risk in communities cohort. Am J Epidemiol. 2002 Mar 1;155(5):437-45.

Worboys S, Kotsopoulos D, Teede H, McGrath B, Davis SR. Evidence that parenteral testosterone therapy may improve endothelium-dependent and -independent vasodilation in postmenopausal women already receiving estrogen. J Clin Endocrinol Metab. 2001 Jan;86(1):158-61

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DHEA-S, Androstenedione & Free Testosterone are inversely associated with IMT thickness of common carotid arteries in 101 pre- & postmenopausal women.

(Bernini GP, Sgro' M, Moretti A, Argenio GF, Barlascini CO, Cristofani R, Salvetti A. Endogenous androgens and carotid intimal-medial thickness in women. J Clin Endocrinol Metab 1999 Jun;84(6):2008-12)

Testosterone and Coronary Artery Disease

In postmenopausal women reduced serum testosterone is associated with coronary artery disease independent of other CAD metabolic risk factors.

(↓ Testosterone = ↑ Coronary Artery Disease)

Lowest to Highest Quartile

Free Total Testosterone	Total Testosterone
24% Reduction in Coronary Artery Dx.	30% Reduction in Coronary Artery Dx.

Kaczmarek A, Reczuch K, Majda J, Banasiak W, Ponikowski P. The association of lower testosterone level with coronary artery disease in postmenop. women. Int J Cardiol. 2003;87(1):53-7.

Testosterone and Bone Density

1.25 mg sublingual micron. testosterone to HRT sign. increases hip BMD. P < 0.05

Testosterone = Bone Density

Lumbar Spine		*Hip*	
BHRT	**2.2%**	**BHRT**	**0.4%**
BHRT W Testo.	**1.8%**	**BHRT W Testo.**	**1.8%**

Miller BE, De Souza MJ, et al. Sublingual administration of micronized estradiol and progesterone, with and without micronized testosterone: effect on biochemical markers of bone metabolism and bone mineral density. Menopause. 2000 Sep-Oct;7(5):318-26.

Testosterone and Rheumatoid Arthritis

50 mg testosterone propionate intramuscularly every 2 weeks for 1 year improved general well-being of postmenopausal women with active rheumatoid arthritis & was well tolerated:

Improved ESR, Dutch Health Assessment Questionnaire, & Pain Scores.

Lowest to Highest Quartile

R.A. w Placebo	*R.A. w Testo*
4% Improved	21 % Improved

Booji A, Biewenga-Booji CM, et al. Androgens as adjuvant treatment in postmenopausal female patients with rheumatoid arthritis. Ann Rheum Dis. 1996 Nov;55(11):811-5

Testosterone and Dysmenorrhea

Testo. Propionate 10 mg for 3 days before Menses

Frequently before treatment, pain was maximal when flow was heaviest, after androgen blood flow was less. To keep the effects, it is necessary to continue the treatment

92% Improved

Cinberg BL. New-York State J Med. 1942; 42: 2138

Salabar JA, Del castillo EB. Med (Buenos Aires). 1942; 2: 483

Testosterone and Menorrhagia

Testosterone Propionate 25-50 mg 2 x / week x 5 Wks.

Testosterone injections controlled in 50 % of cases excessive bleeding during menstruations.

43% Improved Premenopausal Bleeding
42% Improved Metrorrhagia

Husslein H. Zbl f Gynäkol. 1943; 67: 581

Testosterone and Uterine Fibroids

- *Bleeding symptoms:*
  - *Heavy (59.8% vs. 37.4%)*
  - *Prolonged (37.3% vs. 15.6%)*
  - *Bleeding between periods (33.3% vs. 13.5%)*
  - *Frequent periods (28.4% vs. 15.2%)*
  - *Irregular and predictable periods (36.3% vs. 23.9%).*

- *Pain Symptoms:*
  - *Bladder pressure (32.6% vs. 15.0%)*
  - *Chronic pelvic pain (14.5% vs. 2.9%)*
  - *Painful sexual intercourse (23.5% vs. 9.1%)*
  - *Pain occurring mid-cycle, after and during menstrual bleeding (31.3%,16.7%, 59.7%, vs. 17.1%, 6.4%, 52.0%).*
- *53.7% of women => negative impact in the last 12 month on their sexual life (42.9%), performance at work (27.7%) and relationship & family (27.2%).*

Testosterone and Uterine Fibroids

Testosterone treatment => & stabilized myomas, promoted secondary changes in nodes & sclerosis

RESULTS: Histol., histochem., morphom. & biochem. Studies:

> ***Androgen & progestagen treatment => & stabilized myomas, promote secondary node changes & sclerosis***

Therapeutic effects of androgens (greater) > effects of progestogens

Testosterone and Lichen Sclerosus

Testosterone for lichen sclerosus achieved a high *(66-90%)* symptomatic response.

- **Painful intercourse**
- **Painful defecation.**
- **Intense vulvar pruritus**
- **=> excoriation of the vulva**
- **Loss of vulvar structure**
- **Fusing of labia**
- **=> covering of the clitoris**

1. Ayhan A, Tuncer ZS, Kaya H. Vulvar dystrophy: an evaluation of 285 cases. Eur J Gynaecol Oncol. 1997;18(2):139-40. Hacettepe University, Ankara, Turkey.
2. Joura EA, Zeisler H, et al. Short-term effects of topical testosterone in vulvar lichen sclerosus. Obstet Gynecol. 1997 Feb;89(2):297-9.
3. Paslin D. Androgens in the topical treatment of lichen sclerosus.Int J Dermatol. 1996 Apr;35(4):298-301 University of California at San Francisco USA.
4. Zarcone R, Vicinanza G, Bellini P, Cardone A. Drug treatment in vulvar lichen sclerosus. Minerva Ginecol. 1996 Oct;48(10):441-4. II Università degli Studi, Napoli

Testosterone and Urinary Incontinence

6 to 12 weeks to months of testosterone 0.5% ointment topically around the urethra opening stress incontinence 85-99% (Never say always)

Enuresis

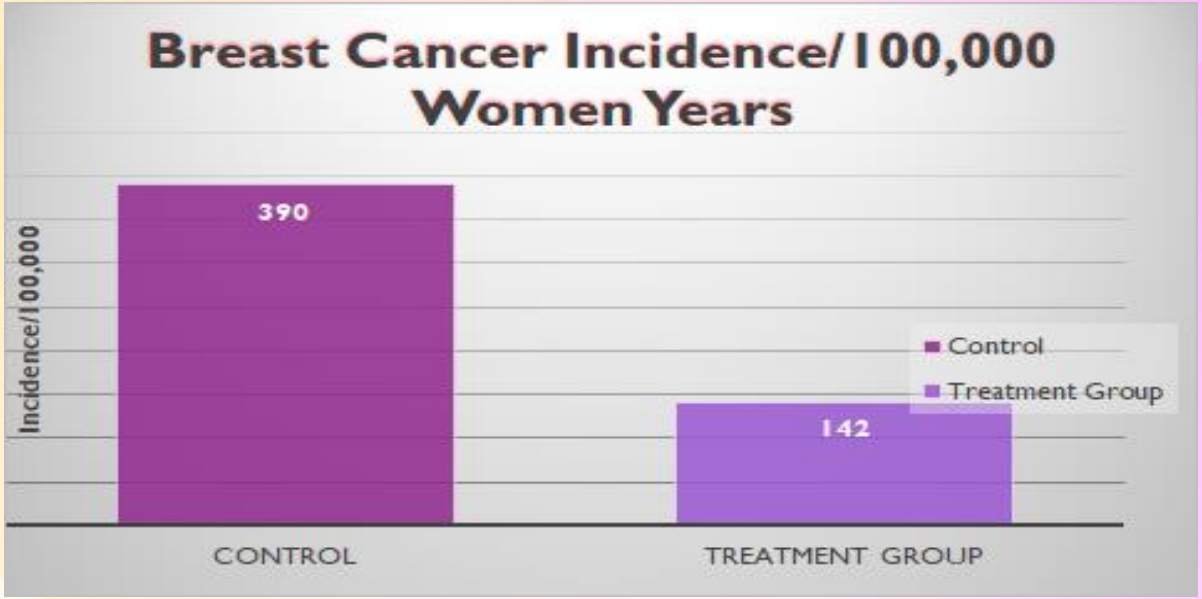
Rx: Testosterone Propionate 10 mg IM/d x 3 weeks

Age 3.5-14

	Cured	Improved	No Change
Boys	56%	30%	14%
Girls	50%	43%	7%

Shultz FW et al, J Clin Endocr, 1943, 3:403-407

Testosterone and Breast Cancer Risk

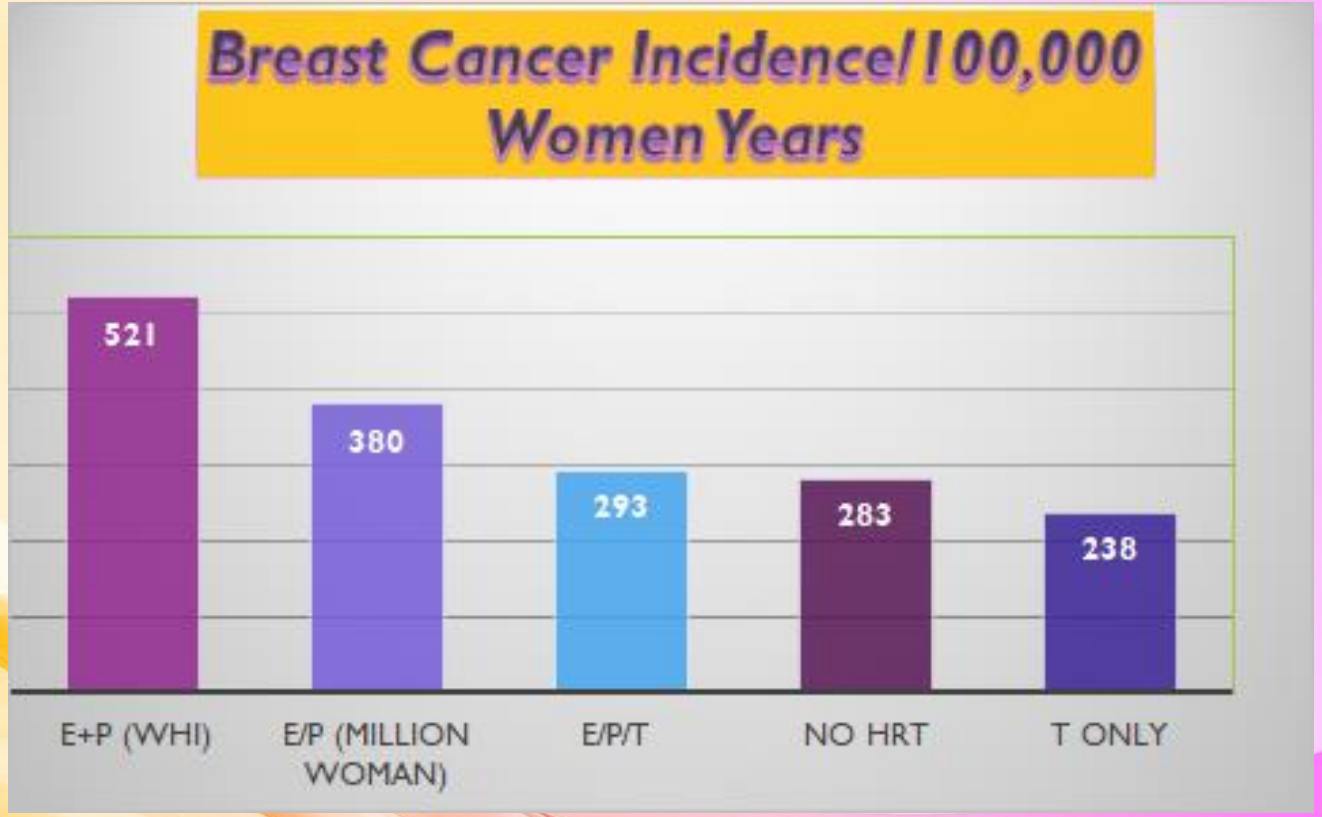


More than double the Risk of Breast Cancer Without Testosterone P < 0.00

Glaser and Dimitrakakis. Reduced Breast cancer incidence in women treated with subcutaneous testosterone, or testosterone with anastrozole: a prospective, observational study. Maturitas 2013 Dec;76(4): 342-9

Dimitrakakis C, Jones RA, Liu A, Bondy CA. Breast cancer incidence in postmenopausal women using testosterone in addition to usual hormone therapy. Menopause. 2004 Sep-Oct;11(5):531-535

Lowest Risk of Breast Cancer is in T Treated Patients



Dimitrakakis C, Jones RA, Liu A, Bondy CA. Breast cancer incidence in postmenopausal women using testosterone in addition to usual hormone therapy. Menopause. 2004 Sep-Oct;11(5):531-535.

Testosterone and Hot Flashes

Hot flashes are related to ↑ TSH, ↑ FSH and ↓ E2

To Protect vs Hot Flashes ↑ testosterone & DHEA-S

Serum androgens = signif. predictor of recovery from hot flashes 1 yr after RX.

Overlie I, Moen MH, Holte A, Finset A. Androgens and estrogens in relation to hot flushes during the menopausal transition. Maturitas. 2002 Jan 30;41(1):69-77. Department of Behavioural Sciences in Medicine, University of Oslo, P.O. Box 1111, Blindern, N-0317 Oslo, Norway.

Testosterone and Mood

Mood measured as one maintaining composure, energy and enthusiasm

Estrogen/Testo Combo	**+++++**
Estrogen Only	**+++**
Untreated	**----- (Negative Mood)**

Testosterone/Estrogen Patients clearly faired better than estrogen alone who in turn faired better than placebo.

Sherwin BB. Affective changes with estrogen and androgen replacement therapy in surgically menopausal women. J Affect Disord. 1988 Mar-Apr;14(2):177-87. Department of Psychology, McGill University, Montreal, Quebec, Canada

Testosterone and Sexual Activity

	Events/Week
Estrogen/Testo Combo	1.4
Estrogen Only	0.72
Untreated	0.5

(Schiavi BB et al. Psychosomatic Medicine 1987, 49: 397-409)

Lab Studies

“ The Optimal Physiological Level”

Hormone levels should be centered around the median level of its acceptable range.

The ideal net effect is that the levels are close to the median of the range

Lab Studies

“ *The Optimal Physiological Level”*

Female

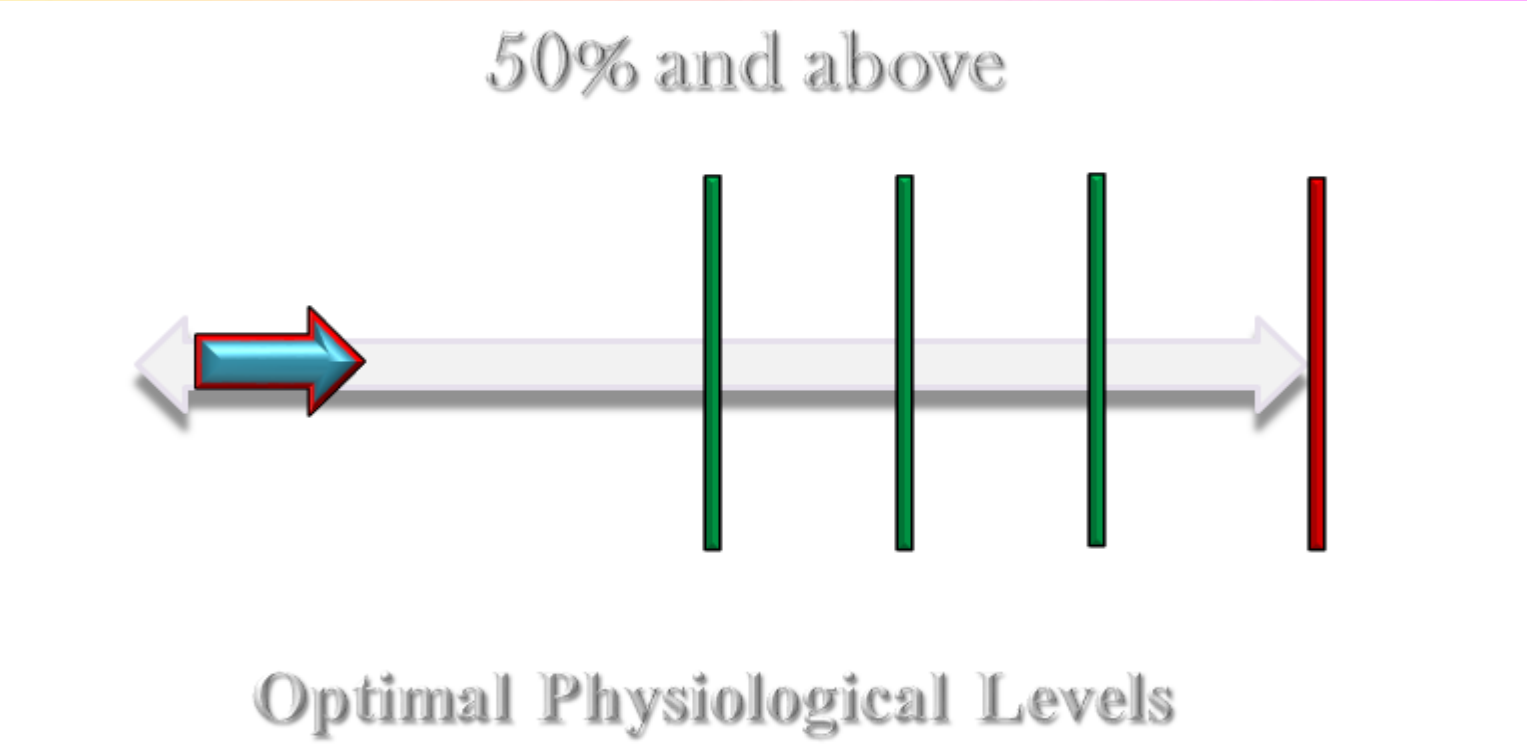
Total Testosterone Range (15-70)=85/2 = 44.5 Median

Free T Range (0.2-2.6)= 1.4 Median

Range lowered July, 2017 due to obesity crisis showing improvement w low testosterone levels

Lab Studies

Goal is Upper ½ to ¾ of Median



Serum Lab Values w Medians

Hormone	Median Female	Range
DHEA-S	277 ug/dL	F (30-260)
Total Testosterone	44 ng/ml	F (15-70)
Free Testosterone	2-4 ng/m	F (0.2-2.6)
DHT	<15 ng/dL	F (<30)
SHBG	<75 ng/dL	F (20-130)

Serum Lab Values

Hormone	Median Female	Range
Estrone	<100 pg/mL	F (<100)
Estradiol	90 pg/ml	F (<54) Postmenopausal
Progesterone	5-7 ng/m	F (0.1-0.8) postmeno.
Pregnenolone	<205 ng/dL	F (250-500)
Vitamin D 3	>60 ng/dL	F (30-100)

Serum Lab Values

LH	**6.2 mIU/ml (Day 21 or postmenopausal)**	**F (Phase Dependent)**
FSH	**8.6 mIU/ml**	**F (Phase dependent)**
Prolactin	**13.75 ng/ml**	**F (2.5-19)**

Testosterone Saliva Labs/Transdermal Rx.

Normal: 34–148 pmol/L
Goal is around 70–100 pmol/L

Saliva Lab Test	Testosterone Cream
<30 pmol/L	1-2 mg
30-40 pmol/L	0.75 mg-1 mg
40-60 pmol/L	0.5-0.75 mg
60-75 pmol	0.25-0.5 mg
>75	No Testo

- ***Change Site Daily*** **(Will grow black hairs if site repeated)**
- ***Apply to thigh or buttocks*****-Rub in for 1-2 minutes**
- ***Can Transfer*** ***for up to 2 hours*****-Gentlemen callers, Lady friends, Children, Goldfish, Golden Retrievers, The Gardner**

- Female Hormone Protocol By Pamela W. Smith, MD, MPH, MS

fppt.com

Testosterone Deficiency Calculation

Serum Total Testosterone/SHBG

	Test	Normal	T Deficient
Male	**Serum tot. testo/SHBG** **(free testo index in mmol)**	**20** **90-100**	**<17** **<80**
Female	**Serum tot. testo/SHBG** **(free testo index in mmol)**	**8** **8**	**<6** **<6**

Marie R:

BP 108/68 Pulse 80 I Temp (Src) 98.7 (Tympanic) I Resp 181 Ht 5' 3.7" (1.618m) I Wt. 215 lbs 14.4 oz (97.932kg) I BMI 37.41 kg/m2 I BSA 2.1 m2 I Sa0 2 97[room air[%

PE: General: Normotensive, in no acute distress.

Eyes: PERRLA, EOMI full, conjunctiva clear, eyebrows nearly absent

Neuro: Hyporeflexic biceps, patellar

Vaginal atrophy, some evidence of lichen sclerosis

2/26/17	*Marie*	*Median*			*Marie Median*
Testosterone Free	1.3 pg/ml	2-4 pg/ml*	TSH	4.30	<2.5
Testosterone Total	19.0 ng/ml	<44 ng/ml*	free T3	1.9	>2.5
DHEA-S	77 ug/dl	195 ug/dl*	free T4	1.42	>1.5
Estrone (E1)	42 pg/ml	< 200 pg/ml*	rT3	328	80-250
Estradiol (E2)	<0.5 pg/ml	90 pg/ml*	T3/rT3	0.58	>1.06
Progesteron	0.10 ng/ml	5-7 ng/ml*	TPO	462	<35
Pregnenolone	108 ng/dl	100 ng/dl*	TAG	179	113
EP Ratio	420	< 250			
P/E Ratio	inf	100-500			

Other: 25 OH D 41, Homocysteine 14.2, Hct 37.5, cRP 2.07

The Big Picture (Gordon, M. TBI, San Diego, 2015)

	Estradiol	Estriol	Progesterone	Testosterone	Application
Starter	0.2mg	2.0 mg	100 mg	1 mg	Vaginal
Breast Tender	0.1 mg	2.0 mg	100 mg.	1 mg	Vaginal
Fatigue	0.2 mg	2.0 mg	50 mg.	1 mg	Vaginal
Libido	0.2 mg	2.0 mg	100 mg.	2 mg	Transdermal
Basic	0.2 mg	2.0 mg	100 mg.	No	Transdermal
Breast	0.1 mg	2.0 mg	100 mg.	No	Vaginal
Cancer	none	2.0 mg	100 mg.	1-2 mg.	Vaginal

Marie R:

Rx: Strategies

Transdermal :1. ***Bi-est 2.2 mg/Progesterone 100 mg/Testosterone 1mg/gm***

Disp: 30 gm

Sig: 1 gm/daily to inner arm, inner leg or if in proper base vaginally

2. **Bi-est 2.2 mg/gm, Progesterone 100 mg/gm, Testo 1 mg/g separately**
3. **Bi-est/Testo Combo; Progesterone P.O. @ Bedtime**

Oral:

1. **Progesterone Micronized**
   a. **Never Oral Testosterone**
   b. **Poor Choice for Estradiol.**

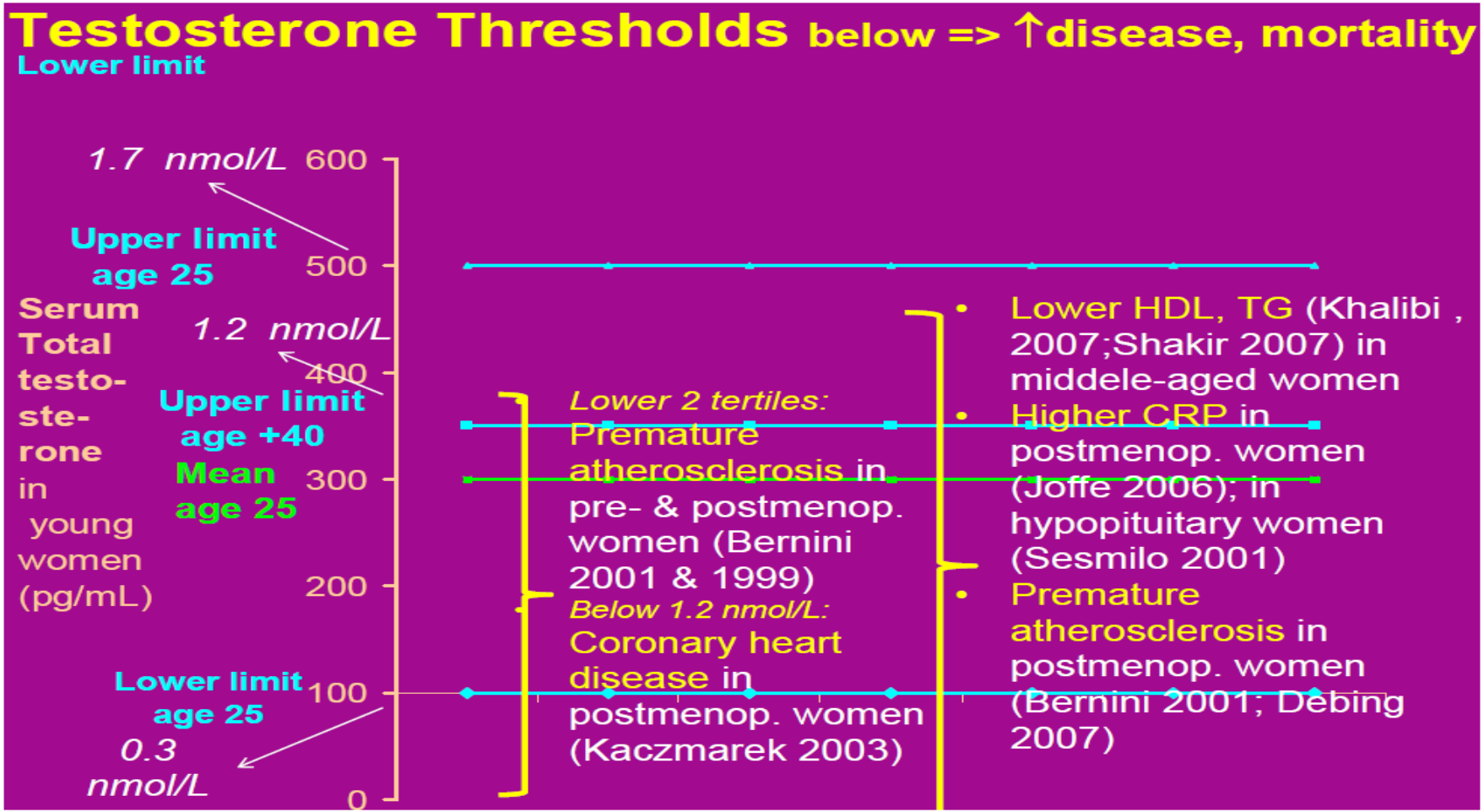
Injectable

1. **Testosterone 10-20 mg IM q 1-2 weeks**

Pellets

1. **Estradiol 6-25 mg**
2. **Testosterone 50-225 mg**

Testosterone Thresholds below => ↑disease, mortality



Testosterone Clinical Pearls

1. **Dry Eye Syndrome**-0.3% Testosterone with 0.5% Progesterone in cyclodextrin base. Dawson, T.L., Testosterone eye drops: “A novel treatment for dry eye disease,” Ophthalmology Times, November 15, 201

1. **Chronic Pain in Fibromyalgia**-White, H.,Robinson T.; “A novel use for testosterone to treat central sensitization of chronic pain in fibromyalgia patients,” International Immunopharmacology, Volume 27, Issue 2, August 2015, Pages 244–248

1. **Chronic Non Radicular Low Back Pain**-Dubick MN, Ravin TH, Michel Y, Morrisette DC; Use of localized human growth hormone and testosterone injections in addition to manual therapy and exercise for lower back pain: a case series with 12-month follow-up, Dove Press, 23 June 2015 Volume 2015:8 Pages 295—302
2. **Extreme Anxiety (Stage Fright, Presentation to AMMG)-Increase Dose** by 50% Short Term

Androgen Therapy

- Oral
- Transdermal or Transvaginal
- IM
- SQ Pellets
- Hormone Precursors
  - DHEA
  - Pregnenolone

Androgen Therapy

Oral ≠ NEVER

- **Oral testosterone is routed entirely to the liver**
- **Hepatotoxic, contraindicated**
- **Associated with worsening lipids (Transdermal = Lipid Neutral)**
- **Ask (Bodybuilder) Patients About "Stacking 'Roids" in Their Teens and Twenties**
  - **Never Say "Always" but >90% (Closer to 100%) Experience Liver Damage 20 years post "Rx."**

Androgen Therapy

Transdermal

Compounded cream (0.5-2.0 mg/gm)

- **Dose 1.25- 10 mg per day q AM**
  - **Starter Dose, Breast Tenderness, Fatigue 1.0 mg/d**
  - **Breast Cancer, Fatigue 1-2 mg/d**
  - **Fatigue, Libido 2.0 mg/d**

The Big Picture (Gordon, M. TBI, San Diego, 2015)

	Estradiol	Estriol	Progesterone	Testosterone	Application
Starter	0.2mg	2.0 mg	100 mg	1 mg	Vaginal
Breast Tender	0.1 mg	2.0 mg	100 mg.	1 mg	Vaginal
Fatigue	0.2 mg	2.0 mg	50 mg.	1 mg	Vaginal
Libido	0.2 mg	2.0 mg	100 mg.	2 mg	Transdermal
Basic	0.2 mg	2.0 mg	100 mg.	No	Transdermal
Breast	0.1 mg	2.0 mg	100 mg.	No	Vaginal
Cancer	none	2.0 mg	100 mg.	1-2 mg.	Vaginal

Transdermal Testosterone Rx.

- **Normal: 34–148 pmol/L (Saliva)**
- **Goal is around 70–100 pmol/L**

Saliva Lab Test	Testosterone Cream
<30 pmol/L	1-2 mg
30-40 pmol/L	0.75 mg-1 mg
40-60 pmol/L	0.5-0.75 mg
60-75 pmol	0.25-0.5 mg
>75	No Testo

- ***Change Site Daily*** **(Will grow black hairs if site repeated)**
- ***Apply to thigh or buttocks*****-Rub in for 1-2 minutes**
- ***Can Transfer*** ***for up to 2 hours*****-Gentlemen callers, Lady friends, Children, Goldfish, Golden Retrievers, The Gardner**

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Androgen Therapy

Intramuscular

T. cypionate injections 2.5-10 mg q. 1-2 weeks

T. cyp. 100mg/ml= 0.25-0.1 ml/wk

"Kibbles and Bits:" Dr. C's Favorite Method for Delivering Androgens

You Call Them "Pellets"

Compounded Pressed Cylinders

- Smaller than a grain of rice
- Made specifically by a PCCA certified compounding pharmacy.

FDA approved a 75-mg testosterone pellet in 1972.

Provide consistent, healthy hormone level

- 3-5 months in women
- 4-6 months in men.
- After two or three cycles, the pellets remain effective up to 6 months



"Kibbles and Bits:" Dr. C's Favorite Method for Delivering Androgens

You Call Them "Pellets"

Advantages:

- **Quickest Onset of Action-4-7 days**
  - **Creams-4-8 weeks. Injections 4 weeks**
- **Convenient**
  - **Rx. 2-3 times per year.**
- **Safety**
  - **No transference**
- **(Testosterone) Symptom Relief**
  - ***Superior* in relieving menopause symptoms, maintaining bone density, restoring sleep patterns, and improving sex drive, libido, sexual energy, response and performance. (1)**
- **Other Indications**
  - **Migraine and menstrual headaches, vaginal dryness, urinary incontinence, urgency.**
  - **Increases energy, lean body mass, strength, bone density, a sense of well-being, improves memory and concentration.**

1. Handelsman, DJ, Mackey, MA, Howe, C, et al.; An analysis of testosterone implants for androgen replacement therapy; Clinical Endocrinology: **Volume 47, Issue 3,** pages 311–316, September 199, http://onlinelibrary.wiley.com/wol1/doi/10.1046/j.1365-2265.1997.2521050.x/abstract

Pellets: Dr. C's Favorite Androgen Delivery Method

"Complications"

- **Breast Tenderness=Estrogen Excess or "Surge"**
  - **Rx: Double Progesterone Dose (P.O.) till relieved (5-10 days) &/or**
    - **Progesterone Cream 2-5% ½ gram to each beast nitely**
    - **Reishi mushrooms, Red clover, Black cohosh,**
    - **Chasteberry, Maca root**
- **Vaginal Bleeding**
  - **Rx: Micronized Progesterone 200 mg @ hs until bleeding stopped then:**
    - **Resume Pre-bleeding dose**
    - **Ultrasound Pelvis to R/O Endometrial Pathology**
- **Acne, Oily Skin and Hair, Chin Hair**
  - **Rx: Testosterone Excess- Spironolactone, Saw Palmetto, Metformin**

Pellets: Dr. C's Favorite Androgen Delivery Method

"Complications"

- ***Procedural Issues***
  - ***Infection (Never in 15 years and counting)***
  - ***Extrusion (3 cases, all in same week. Had to use a "foreign" instrument set due to supply)***
  - ***Bleeding, bruising (Apply pressure after insertion for 1 minute by the clock. If more than oozing remains, place 1-3 4-0 Vicryl, absorbable sutures)***
    - ***Post care instructions include:***
      - ***"No Pole Dancing, No Dance Contests x 48 Hours.***

Pellets: Dr. C's Favorite Androgen Delivery Method

Dosing Testosterone Pellets

- **Weight**
  - **<100 lbs (45 kg) 75 mg**
  - **·100-120 lbs (45-55 kg) 100-110 mg**
  - **·120-145 lbs (55-65 kg) 110-125 mg**
  - **·145-165 lbs (65-75 kg) 125-150 mg**
  - **·>75 kg 150-225 mg**
- **Symptoms**
  - **Increase Dose for Symptom Control**
    - **(Anxiety=E Dominance, Stress)**
      - **» T Pellet Relieves**
  - **Lower Dose**
    - **» Oily Skin, Hair, Acne**

Pellets: Dr. C's Favorite Androgen Delivery Method

Pellet *"Failures"*

Unless a Quality Control Issue, T Delivery is Consistent and Predictable

"Failure Issues"

1. ***STRESS***
2. ***MEDICATIONS***
3. ***DIET: Refined foods, processed carbohydrates, low fat=Pellet Failure***
4. ***LACK OF EXERCISE***
5. ***LACK OF SUNLIGHT: Low levels of Vitamin D***
6. ***ESTROGEN DOMINANCE***

Pellets: Dr. C's Favorite Androgen Delivery Method

Medications Leading to Treatment Failure

1. BP Meds
    a. Diuretics
    b. ACE Inhibitors, ARBS, Alpha Blockers, Beta Blockers, Calcium Channel Blockers
2. Statins
3. Antidepressants/Antianxiety Agents
    a. SSRI, MAOI
    b. Benzodiazepines
4. NSAIDS
5. Antihistamines
6. Anti Parkinson's Medications
7. PPI's, H-2 Antagonists
8. Muscle Relaxants
9. Chemotherapy Drugs

Menopause Rating Scale (MRS)

Which of the following symptoms apply to you at this time?

(X ONE Box For EACH Symptom) For Symptoms That Do Not Apply, Please Mark "None").

Symptoms:	none	mild	moderate	severe	extremely severe
Score =	0	1	2	3	4
1. Hot flashes, sweating (episodes of sweating)	☐	☐	☐	☐	☐
2. Heart discomfort (unusual awareness of heart beat, heart skipping, heart racing, tightness)	☐	☐	☐	☐	☐
3. Sleep problems (difficulty in falling asleep, difficulty in sleeping through the night, waking up early)	☐	☐	☐	☐	☐
4. Depressive mood (feeling down, sad, on the verge of tears, lack of drive, mood swings)	☐	☐	☐	☐	☐
5. Irritability (feeling nervous, inner tension, feeling aggressive)	☐	☐	☐	☐	☐
6. Anxiety (inner restlessness, feeling panicky)	☐	☐	☐	☐	☐
7. Physical and mental exhaustion (general decrease in performance, impaired memory, decrease in concentration, forgetfulness)	☐	☐	☐	☐	☐
8. Sexual problems (change in sexual desire, in sexual activity and satisfaction)	☐	☐	☐	☐	☐
9. Bladder problems (difficulty in urinating, increased need to urinate, bladder incontinence)	☐	☐	☐	☐	☐
10. Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse)	☐	☐	☐	☐	☐
11. Joint and muscular discomfort (pain in the joints, rheumatoid complaints)	☐	☐	☐	☐	☐

Nutritional Compounds to Increase T

1. **Chrysin 50 mg +Tribulus 250 mg capsule**
    a. Chrysin decreases aromatization
    b. RDT or Cream
    c. Compounded to increase Testosterone levels in Male and Females
2. **Tribulus added to Estradiol, Progesterone**
3. **Magnesium => bioavailable testosterone**
4. **Boron => 3 mg/day increases serum E2 & T, esp. in low Mg states**
5. **Oxytocin => testosterone production**
6. **Acetyl-L-carnitine, 2 grams/day => testosterone production**

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How Else Can We Raise T Levels?

7. **Mini-fast**
    a. **Decreased calorie intake**
8. **High Protein, Anti-inflammatory Diet**
9. **Amino acids: arginine, leucine, glutamine intake**
10. **Adequate Exercise**
11. **Adequate Sleep**
12. **Weight Reduction**
13. **Stress Reduction**

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How Else Can We Raise T Levels?

14. **MK-4 (menaquinone) 1-2 mg QD**
15. **Manganese (stimulates LHRH) 15 mg QD**
16. **Vitamin D 5000 IU QD**
17. **Magnesium 300-400 mg QD**
18. **Gold**
19. **Boron (Vitamin A, 50,000 I.U. QD)**
20. **Coconut Oil/Olive Oil**
21. **Zinc CItrate 30-60 mg/d**
22. **Arginine, Leucine, Glutamine**

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Dietary Do's and Don'ts

Do's

***1. Protein*-Animal based including poultry, beef, fish, pork and other red meats. Plant based proteins lower testosterone levels. Whey based protein shakes with 20 grams of protein, no sugar. (*Someone ask about our favorite protein drinks.*)**

2. *Carbohydrates-* Consuming cruciferous vegetables, broccoli, cauliflower, Brussels sprouts, cabbage, arugula, watercress, bok choy, turnip greens, collard greens, rutabaga, radishes, daikon, kohlrabi and kale, lower estrogen levels which inhibits testosterone production and function. Aim for a carb to protein ratio of about 2:1

3. *Fat-* Monounsaturated (nuts, olives, olive oil, seeds and avocados), and saturated fats (red meat, egg yolks and dairy) enhance serum testosterone level. Aim for 25-30% of your calories from fat.

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Dietary Do's and Don'ts

Do's

4. *Calories*-Consume 18-20 calories for every pound of bodyweight. Lower calorie diets decrease testosterone.

5. *Superfoods*-Foods that increase blood flow by generating nitrous oxide, dilating arteries and increasing strength. Work three of these in daily.

Spinach, Raw Cocoa, Beets, Blueberries, Cranberries, Walnuts, Garlic, Grapes, Cayenne Peppers, Oranges, Watermelon, Honey, Black Tea, Pomegranates.

6. *Super Drinks*-Same principle, but in a drink or smoothie. No sugary drinks!

Orange Juice, Pomegranate Juice, Cherry Juice, Cranberry Juice, Red Wine.

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Dietary Do's and Don'ts

Don'ts

Over Eat-Too many calories results in fat accumulation especially in the abdomen, increased estrogen and lower testosterone levels.

1. *Protein*-excess protein versus carbohydrate intake causes testosterone loss. Remember the 1 gram per pound of bodyweight rule.
2. *Fat*-Limit fat intake to 25-30% of total calories. Remember your opposites. Polyunsaturated fats from salmon, mackerel, kippers and sardines, and other plant based oils, in the testosterone world, lowers T levels.
3. *Carbohydrates*-limit fiber intake to 35 grams per day. We are not just about testosterone, some fiber is needed, so we've threaded the needle including whole-wheat bread, fruits and vegetables in the appropriate ratios.
4. *Alcohol*-Limit to 5-10 ounces of red wine and not every day. Alcohol in general lowers testosterone levels.

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Fixing Marie

2/26/17

2/26/17	*Marie*	*Median*
Testosterone Free	1.3 pg/ml	2-4 pg/ml*
Testosterone Total	19.0 ng/ml	<44 ng/ml*
DHEA-S	77 ug/dl	195 ug/dl*
Estrone (E1)	42 pg/ml	< 200 pg/ml*
Estradiol (E2)	<0.5 pg/ml	90 pg/ml*
Progesteron	0.12 ng/ml	5-7 ng/ml*
Pregnenolone	108 ng/dl	100 ng/dl*
EP Ratio	420	< 250

Other: 25 OH D 41, Homocysteine 14.2, Hct 37.5, cRP 2.07

5/1/2017

- 5/1/17	*Marie*	*Median*
Testosterone Free	2.8 pg/ml	2-4 pg/ml*
Testosterone Total	32.1 ng/ml	<44 ng/ml*
DHEA-S	152 ug/dl	195 ug/dl*
Estrone (E1)	78 pg/ml	< 200 pg/ml*
Estradiol (E2)	<0.5 pg/ml	90 pg/ml*
Progesterone	2.1 ng/ml	5-7 ng/ml*
Pregnenolone	103 ng/dl	100 ng/dl*
EP Ratio	38	< 250

Other: 25 OH D 58, Homocysteine 12.5, Hct 39.5, cRP 1.47

Fixing Marie

Female Hormone Testing	Results	Range
Growth Hormone	0.03	5ng/ml*
Somatomedin C (IGF-1)	61	> 200 ng/ml
IGFBP-3	2600	>4000 ng/ml
DHEA-S	77	195 ug/dl*
Estrone (E1)	42	< 200 pg/ml*
Estradiol (E2)	<0.5	90 pg/ml*
Progesterone	0.10	5-7 ng/ml*
Pregnenolone	108	100 ng/dl*
EP Ratio	420	< 250
Homocysteine	14.2	<10

DHT	*11.*	*< 30ng/Dl*
SHBG	*88*	*< 75 pg/ml*
FSH	*27*	*7 mIU/ml**
LH	*31*	*5.1mIU/ml*
Prolactin	*9*	*14 ng/ml**
Zinc	*59*	*95mcg/dL*
Insulin	*5*	*<30mIU/L*
Vitamin D3	*41*	*>60 ng/dl**
ACTH	*4*	*35 pg/ml **
Cortisol	*19*	*< 15 ug/dl*

Testosterone Free	1.3	2-4 pg/ml*
Testosterone Total	19.0	<44 ng/ml*
cRP	2.07	<1.5

TSH	4.3	<2.5 mcu/ml*
T3, Free	1.9	> 2.5 pg/ml
T4, Free	1.42	> 1.5 ng/ml
rT3	328	80-250 pg/ml
T3/rT3 Ratio	0.58	>1.06
TPO	462	<35

Fixing Marie

Sleep ***(2 hours before bedtime)***

Vitamin D3 2000 IU 2 hours bedtime- (25 OH D 41)

Magnesium TAurate 100 mg 1-2 2 hours before bedtime

Melatonin 0.5 mg 1 2 before bedtime

CV, Nutritional Marker**-Homocysteine 14.2**

Rx. Methylated B6, B12, Folic Acid, TMG, Betaine 1 in am, 1 in pm

Thyroid Antibodies **TPO, TAG**

Rx. Plant Sterolins 1 in am, 1 in Pm

Inflammation

cRP 2.07 (normal, not optimal)

Rx Omega-3 Fatty Acids (Fish Oil) 1000 MG Oral Capsule BID

Curcumin 500 mg 1-2 in am , 1-2 in pm

Fixing Marie

Plan: **AIP Diet, Aerobic, Anaerobic Exercise 5x/wk 45 min/session**

Hormones: ***Bi-est 2.2 mg/Progesterone 100 mg/Testosterone 1mg/gm***

1 gm daily to inner thigh or inner arm

E/T Precursors **(DHEA-s 77 + Memory loss)**

DHEA 10 mg + 25 mg Pregnenolone/day

Insulin Resistance **(IR = 3.75)**

Ceylon Cinnamon, 1 tsp/d

Berberine 1/d

Urinary Incontinence- **(S/S Stopped after 2 weeks on Testosterone)**

Cranberry 1/d

Berberis vulgaris (10 drops in 4 oz. water 2x/d)

Thyroid

Levothyroxine Sodium 125 MCG 1 in am on an empty stomach

Liothyronine 5 MCG 1 in am, 1 @ noon empty stomach

Marie Goes to the Endocrinologist

5/10/17 D.O. Board Certified Endocrinologist

Energy is improved.

Weight decreased 8 #

Heat or cold intolerance now absent.

She has no hair loss, skin, or nail changes.

She no excess hair growth, oily skin, or acne.

Mood and sleep remains stable.

The patient denies headache, visual change, dryness or irritation of the eyes.

She denies neck or ear pain, dysphagia, or increasing hoarseness of the voice.

She denies anxiety , tremor, chest pain, heart palpitations, shortness of breath, peripheral edema, or cough.

Her bowel habits remain unchanged.

Postmenopause.

She denies numbness, tingling, proximal muscle weakness, difficulty with coordination, myalgias, or arthralgias, other than rare hand/foot, with past normal evaluations.

Marie Goes to the Endocrinologist

I had the pleasure of providing care fo[redacted]n 5/10/17. The following summary is provided to assist you in the continued care of this patient. If you have questions, please contact me via MedLink at 1(800)332-8901. Thank you for the opportunity to provide care to your patient.

Her main issue was malaise and fatigue. She saw a "hormonal specialist" and friend, Dr Clearfield, with whom she worked. He now moved to Reno, NV. He did testing (mainly vitamins and minerals) including anti-TPO and anti-TG Ab, free T3 and 4, and TSH, which was just elevated at 4.3. She does make thyroidal ab, and her FT4 was mildly low at 1.9. He adjusted her Lt4 and started her on LT3 5 mcg bid, as well as DHEA-s, testosterone, and progesterone, in addition to numerous vitamin supplements seen below. Dr Clearfield's number is 775-359-1222; she consults him by phone.

Note: free T3 is "Mildly Low" @ 1.9

"Just Elevated TSH Free T4 is 1.42

Marie Goes to the Endocrinologist

She feels better. Her energy is improved. Weight is stable. She has no heat or cold intolerance. She has no hair loss, skin, or nail changes. She no excess hair growth, oily skin, or acne. She has some loss of focus, but mood and sleep remains stable. The patient denies headache, visual change, dryness or irritation of the eyes. She denies neck or ear pain, perceived neck mass, dysphagia, or increasing hoarseness of the voice. She denies anxiety, tremor, chest pain, heart palpitations, shortness of breath, periperhal edema, or cough. Her bowel habits remain unchanged. Postmenopause. She denies numbness, tingling, proximal muscle weakness, difficulty with coordination, myalgias, or arthralgias, other than rare hand/foot, with past normal evaluations. No fx or OP/MBD. Cannot recall BMD.

Marie Goes to the Endocrinologist

Ms. nas Hashimotos. She also probably has untreated OSA, which is likely the driver of her sympto complex. Overall, I feel Dr. Clearfield is a shaman, preying on the placebo effect and some modest clinica side effects from drugs like T3 to "help" patients. In my opinion, its a shame he is a DO and he disgraces degree.

We reviewed there is NO legitimate peer reviewed literature supporting the use of androgens in women for any reason. She is only increasing her risk of hirsutism, and likely deriving no benefit.

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Neutraceuticals and the Endocrinologist

We reviewed there is a paucity of legitimate peer reviewed literature supporting the use of nutriceuticals, which are often proprietary and unregulated by the FDA (which means she may not be getting what she thinks she is getting in each dose), to treat human disease, with the exception of documented B12 and D deficiency. She probably is wasting her money and efforts taking these products, and may be having ADR from polypharmacy.

-

Heather N.

Cc: 28 y/o female % irregular menses, uncontrollable weight gain (132 to 166 in 9 months w no change in activity or diet), irregular menses. % hair more noticeable on upper lip and low back. Trying to get pregnant. Has had two spontaneous miscarriages at 9 and 14 weeks in past 18 months.

ROS: Acne, face, neck and shoulders, "frog" voice, irritable, especially if pt. Hasn't eaten for several hours, anxious, increasing fatigue, sugar and salt cravings.

Social: Husband left home due to patient erratic behavior. Patient is an RN, works in spa as a cosmetic injector. Body habitus is affecting her employment.

PE: 63 in, 166 #, BMI 29.41 BP 128/74, T 98.1, Pulse 68, R 20, PO2 94%

Heather N.

10/29/13

	Heather	*Median*
Testosterone Free	4.7 pg/ml	2-4 pg/ml*
Testosterone Total	51 ng/ml	<44 ng/ml*
DHEA-S	223 ug/dl	195 ug/dl*
Estrone (E1)	72 pg/ml	< 200 pg/ml*
Estradiol (E2)	68 pg/ml	90 pg/ml*
Progesterone	0.36 ng/ml	5-7 ng/ml*
Pregnenolone	99 ng/dl	100 ng/dl*
EP Ratio	388	< 250

8/3/17

	Heather	*Median*
25 OH Vit D	12 ng/ml	65 ng/ml
cRP	3.3 mg/L	<1.5 mg/L
FBS	106 mg/dL	84 mg/dL
Insulin	17 ulU/ml	<5 ulu/ml
Insulin Resistance	4.45	<2.9
HBA1C	6.2 %	<5.7 %
Homocysteine	13.6 uMol/L	<10 uMol/L
HCT	47.5 %	42%

S/S Testosterone Excess

- Acne
- Deepening Voice
- Irritability/Moodiness/Anger
- Loss of Hair or Unwanted Hair Growth
- Irregular menses
- Decreased HDL
- Anxiety
- Depression
- Fatigue
- Hypoglycemia
- Salt and sugar cravings
- Facial hair
- Insulin resistance
- Weight gain
- Increased risk of heart disease

Polycystic Ovary Disease

- Most common endocrine disorder in women of reproductive age.
- Affects 4-10% of the women in the U.S.
- Accounts for 75% of the women with amenorrhea.
- Accounts for 85% of women with androgen excess and hirsutism
- Treatable, but not curable
- Etiology: Chronic anovulation. Genetic Markers are Common.



Polycystic Ovary Disease

Diagnosis (must have 2 of 3)

1. **Oligoovulation and/or anovulation**
2. **Clinical or biochemical signs of excess androgen activity**
3. **Polycystic ovaries on ultrasound (> or equal 12 follicles 2-9mm or vol > 10 ml)**

Alexander, C., "Polycystic ovary syndrome: a major unrecognized cardiovascular risk factor in women," Rev Obstet Gynecol 2009; 2(4):232-39.

S/S

Obesity/Inability to lose weight

High hip to waist ratio (>0.85)

BMI >30

Oily skin/acne

Alopecia

Infertility/recurrent miscarriage

Depression/irritability/tension

Acrochordons (skin tags)

Acanthosis nigricans

Irregular or absent menstrual cycles

HBP

Insulin Resistance, DM, Hypoglycemia

Polycystic Ovary Disease

2 Commonly Seen Variants

Ovarian

- *Leaner*
- *Less hyperinsulinemic*
- *Difficult infertility*
- *High Testosterone, normal DHEA-S*

Ovarian and Adrenal

- *Obesity*
- *Hyperinsulinemic*
- *Oligomenorrhea or regular cycles*
- *High DHEAS & Testosterone*

Polycystic Ovary Disease



Testosterone, androstenedione

Insulin level/insulin resistance

LH:FSH ratio

Lipid profile

BP

DHEA levels

Estrone, Total Estrogens

IGF-1



Decreased SHBG

Adiponectin

Progesterone

Polycystic Ovary Disease

Insulin ↓ SHBG levels ↑ Circulating testosterone.

Ibid., King., Ibid., Tsilchorozidou.

Insulin + LH ↑ androgen the ovarian theca cells.

Estrogen Metabolism

↓ 2-hydroxylation and 17-alpha-oxidation

↑ Estrogen due to peripheral aromatization of Androstenedione. = **Estrogen Dominance**

Ibid., Speroff.

Hopkinson, Z., et al., "Polycystic ovarian syndrome: the metabolic syndrome comes to gynecology," BMJ 1998; 317:329-32.

PCOS, Prolactin and Stress

Prolactin

- 25% of women with PCOS have hyperprolactinemia.
- The hyperprolactinemia is due to the abnormal estrogen negative feedback from the pituitary.
- Elevated prolactin can contribute to high estrogen levels

Stress


Cortisol


Prolactin


Thyroid Function

Downstream RIsk from PCOS

Diabetes (7x Increase Incidence)

Heart DIsease (Increase PAI-1 = inc risk, AMI, HBP)

Infertility

Hormonally Related Cancers

Obesity



Homocysteine, cRP

Antioxidants leading to heart dx.

RX. PCOS

- Spironolactone
- Cimetidine
- Ketoconazole
- Leuprolide
- Finasteride
- Progesterone
- Low GI Diet
- Estrogenic BCP
- Fiber
- HCG
- Surgery
- Ovarian wedge resection
- Laparoscopic ovarian drilling

RX. PCOS

Reduce Stress

EFA/DHAs

Hydrate

Adaptogenic Herbs

Vitamin D3 (50-80 serum)

D-chiro-inositol (1200 mg/d)

Spearmint Tea

Inositol

N-acetyl cysteine

Black Cohosh

Chasteberry

Saw Palmetto

Nettle Root

Green Tea

Licorice Root

Maitake Mushrooms

Rx. Insulin Resistance

Berberine (200 mg BID)

Chromium picolinate (600-1200 micrograms)

Lipoic acid (200-600 mg)

CLA (1,000-3,000 mg)

Zinc (25-50 mg)

Taurine (1,000-3,000 mg)

Magnesium (400-800 mg)

Biotin (4-8 mg)

Vanadium (20-50 mg)

Vitamin D (Lab 50-80)

Rx. Insulin Resistance

Co-enzyme Q-10 (30-300 mg)

B complex (50-100 mg)

Vitamin C (1,000-3,000 mg)

Manganese (5-10 mg)

Inositol (d-chiro-inositol or d-pinitol)

N-acetylcysteine (NAC)

GABA

Lentils, chickpeas, broccoli decrease insulin

Fenugreek

Cinnamon

Gymnema Sylvestre

Detox

Weight Loss Surgery

Treating Testosterone Excess

Acne

- Saw Palmetto-240-260 mg. BID
- Metformin- 250-1000 mg/d
- Spironolactone-100 mg 1-2x/d
- Spearmint Tea

Hair Loss

- Reduce T 50%
- Increase Estradiol, Progesterone
- Finasteride 2.5 mg/d
- Platelet RIch Plasma
- Melatonin 1% Cream to Scalp Nitely x 6 mo.

Treating Testosterone Excess

Acne

Etio: Imbalance Between ↑ Androgens and ↓ E and P

Rx: Premenstrual Acne: Progesterone Alone

Continuous Acne: E (Days 1-25) and P (Nites 14-25)

Excess Hair Growth

Etio: ↑ Conversion of Testosterone to DHT

Rx: If E and P deficient-Replace

If E and P are adequate- ↓ T and DHEA

Add Finasteride 2.5 mg/d

Treating Testosterone Excess

Oily Skin and Scalp

Etio: Excess Sebum

Rx: Diet: Low glycemic, alkaline diet

Limit Sugar

Limit Dairy

Hormone RX:



Female Hormones (Estrogen and Prog.)



Male Hormones (Testo and DHEA)

Treating Testosterone Excess



Acid/Alkaline Food Chart

Most Acidic	Acidic	Acidic	Alkaline	Alkaline	Most Alkaline
Artificial sweeteners	Wheat	Oysters	Almonds	Kiwi	Lemons
Alcohol	Whole wheat	Shrimp	Amaranth	Lettuce	Limes
Beef	Barley	Salmon	Apples	Millet	Watermelon
Hot dogs	Oat bran	Sardines	Apricots	Molasses	Grapefruit
Bacon	Chicken	Yogurt	Avocados	Musk Melon	Asparagus
Milk	Turkey	Peanut butter	Bananas	Oranges	Broccoli
Cheese	Cod	Pecans	Beets	Peaches	Garlic
Ice cream	Haddock	Pinto beans	Cabbage	Pears	Onions
White flour	Eggs	Spelt	Carrots	Pineapples	Mangoes
White sugar	Butter	Kamut	Cauliflower	Sweet Potatoes	Papaya
White pasta	Corn	Peas	Celery	Squash	Parsely
Soft drinks	Corn oil	Pumpkin seeds	Cherries	Zucchini	Spinach
Box cereal	Currants		Cucumbers	Quinoa	Dandelion
			Parsnips	Okra	Kale
			Dates	Radishes	Swiss chard
			Flax seeds	Berries	Umeboshi plums
			Grapes	Sauerkraut	
			Green beans	Coconut Sugar	
			Mushrooms	Green tea	
			Tofu		
			Wild rice		
			Green tea		
			Maple Syrup		
			Raw honey		
			Ginger tea		

Heather N.

10/29/15

	Heather	*Median*
Testosterone Free	4.7 pg/ml	2-4 pg/ml*
Testosterone Total	51 ng/ml	<44 ng/ml*
DHEA-S	223 ug/dl	195 ug/dl*
Estrone (E1)	72 pg/ml	< 200 pg/ml*
Estradiol (E2)	68 pg/ml	90 pg/ml*
Progesterone	0.36 ng/ml	5-7 ng/ml*
Pregnenolone	99 ng/dl	100 ng/dl*
EP Ratio	388	< 250
Other:		
25 OH D	12	(50-80)
cRP	2.07	<1.0
BS 106, (<5), Insulin 17, (<5) IR 4.45, (<1.9) HBA1c 6.2 (<5.7)		
Homocysteine	13.6	<10
HCT	47	42

8/3/2017

	Heather	*Median*
Testosterone Free	2.8 pg/ml	2-4 pg/ml*
Testosterone Total	32.1 ng/ml	<44 ng/ml*
DHEA-S	152 ug/dl	195 ug/dl*
Estrone (E1)	78 pg/ml	< 200 pg/ml*
Estradiol (E2)	<0.5 pg/ml	90 pg/ml*
Progesterone	2.1 ng/ml	5-7 ng/ml*
Pregnenolone	103 ng/dl	100 ng/dl*
EP Ratio	38	< 250
Other:		
25 OH D 12	41	(50-80)
cRP	1.26	<1
FBS 92, Insulin 9, (<5) IR 2.04, (<1.9) HBA1c 5.8 (<5.7)		
Homocysteine	9.62	<10
HCT	44	42

Fixing Heather-Reevaluate After 90 Days

- Testosterone Control
  - Spironolactone 50 mg 1/d
  - Progesterone Micronized 100 mg 1 @ bedtime
- Estrogen
  - DIM 150 mg bid
  - Berberine (400 mg) 1/d
  - Quercetin (can mix w Nettle 400 mg each, Bromelain)
- Blood Sugar
  - Cinnamon (150 mg)/Vanadium (50 mg)/Chromium (800 mcg)/Biotin 3000 mcg BID
  - Metformin 500 mg bid
- Vitamin D3
  - 6000 IU @ bedtime
- C Reactive Protein
  - Fish Oil (1000 mg) bid
  - Curcumin 500 mg 1-2 am, 1-2 pm
- Homocysteine
  - Methylated B6 (10 mg), B12 (600 mg), Folic Acid (1200 mg), TMG 550 mg

Acupuncture for Libido Enhancement





From the "North American Menopause Society"

BHRT-NAMS Endorses Endocrine Society Statement Little or no scientific or medical evidence supports claims that bioidentical hormones are safer or more effective than more traditional FDA-approved therapies. In addition, many custom-compounded "bioidentical hormone" formulations are not subject to FDA oversight and can be inconsistent in dose and purity. (2006, re-released in 2009)

Saliva Testing- Compounders often rely on salivary and blood tests to "assess" your hormone levels to mix their recipes, but these tests are meaningless for midlife women because hormone levels vary from day to day and even from hour to hour. (http://www.menopause.org/publications/clinical-practice-materials/bioidentical-hormone-therapy)

Androgens-*There is evidence to support the use of testosterone therapy* in carefully selected postmenopausal women with female sexual interest/arousal disorder (previously known as hypoactive sexual desire disorder) and no other identified etiology for their sexual problem.

There is no evidence to support the use of dehydroepiandrosterone (DHEA) for the management of female sexual interest/arousal disorder.

There are currently no androgen-containing prescription products government-approved for the treatment of female sexual interest/arousal disorder in the United States or Canada.

http://www.menopause.org/publications/clinical-care-recommendations/chapter-8-prescription-therapies

Do I Have Low T?

The definitive answer of course, is maybe.

Testosterone Quiz [15]

	Never				Always
1. My face has gotten slack and more wrinkled.	0	1	2	3	4
2. I've lost muscle tone.	0	1	2	3	4
3. My belly tends to get fat.	0	1	2	3	4
4. I'm constantly tired.	0	1	2	3	4
5. I feel like making love less often than I used to.	0	1	2	3	4
6. I am forgetting things and less mentally sharp	0	1	2	3	4
7. I feel less self-confident and more hesitant.	0	1	2	3	4
8. My sexual performance is poorer than it used to be.	0	1	2	3	4
9. My muscle tone is poor	0	1	2	3	4
10. I tire easily with physical activity.	0	1	2	3	4

Add up your Overall Score _____: **Women:** 5 or less: Satisfactory level. Between 6 and 10: Possible Testosterone deficiency. 11 or more: Probable Testosterone deficiency. **Men:** 10 or less: Satisfactory level. Between 11 and 20: Possible Testosterone deficiency. 21 or more: Probable Testosterone deficiency.

Testosterone Self Assessment

T Deficient

Weak, flabby muscles
Low Self Esteem
Loss of Muscle Mass
Lack of Energy/Stamina
Loss of Coordination and Balance
Loss of Confidence
Fatigue inc. Mental Fatigue
Decreased Libido
Lack of Sex Drive/Orgasm
Weight Gain
Depression
Thinned Hair

T Excess

Aggressiveness
Agitated/Irritable
Oily Skin/Oily Hair
Overconfidence
Acne
Increased Facial Hair
Decreased HDL

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