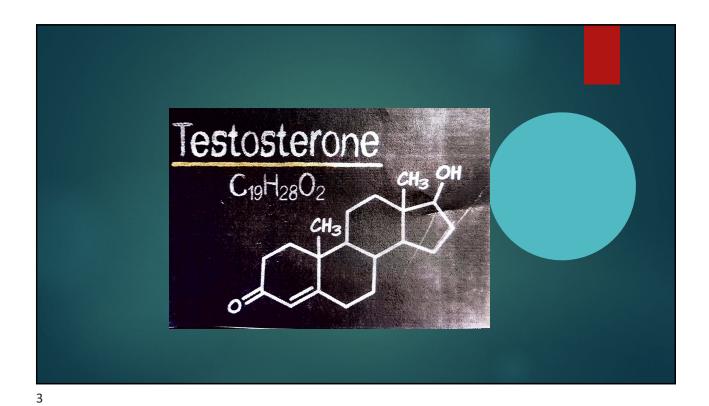
Testosterone Replacement Therapy Update 2023

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Disclosures

I will be discussing the off-label use of Clomid for men



Primary Male Hormone

- Male development
- Systems Affected
 - Cardiovascular
 - Metabolic
 - Skeletal structure
 - Brain
 - Genitourinary

Patient Care

- 1. Primary care physicians
- 2. Hormone replacement specialists
- 3. Endocrinologists
- 4. Urologists
- 5. Other

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Hypogonadism

- 40% of men over 45
- 60% of men over 65

ICD-10 E29 CPT 48723006

- 4.5 Million men in U.S. suffer from hypogonadism
- 12.2% of men are being treated

Testosterone Market

1988 - \$18 Million in RX 2013 - \$2 Billion in RX

- Increased awareness of
- Growth in senior population
- ↑↑ Levels of T Deficiency



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In 2023 the average ♂ has the average testosterone level of a 67-year-old ♂ in 2000

Level average ↓ 25-45% in the last 25 years

Age Years	Free Testosterone Average Range	Total Testosterone Average Range	Normal Total Testosterone
30 - 40	8.7 – 25.1 pg/mL	219 – 1009 ng/dL	600 – 675 ng/dL
40 - 50	6.8 – 21.5 pg/mL	201 – 993 ng/dL	500 – 550 ng/dL
50 - 60	7.2 – 24.0 pg/mL	170 – 918 ng/dL	400 – 450 mg/dL
Over 60	6.6 – 18.1 pg/mL	156 – 700 ng/dL	300 – 350 ng/dL

Medical Use

- Hypogonadism
- Gender Dysphoria
- Types of Breast Cancer

Diagnosis (Lab & Symptoms)

Lab:

• (M) Total Testosterone 300 – 1100 NG/DL

• (F) Total Testosterone 8 – 60 NG/DL

Free testosterone

Age 20-29 9.3 – 26.5 NG/DL

50-59 7.2 - 24 NG/DL

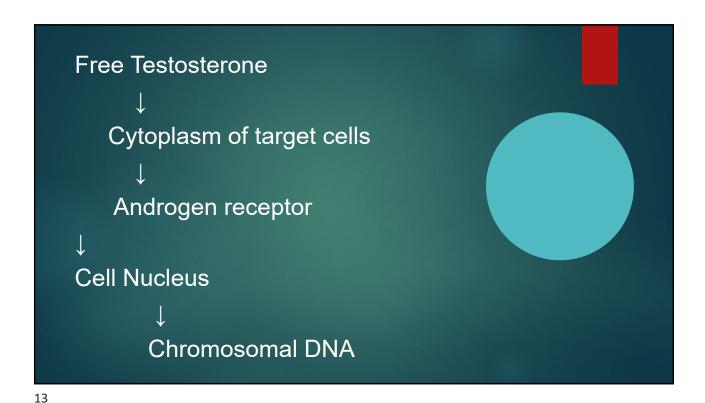
Diagnosis Lab

- •2 morning draws
- Peak levels Evening 9 p.m.

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Biologic Activity

- Lipophilic Hormone
 - Transported in water-based plasma
 - SHBG Sex hormone binding globulin binds testosterone
 - Unbound Free Testosterone is active hormone

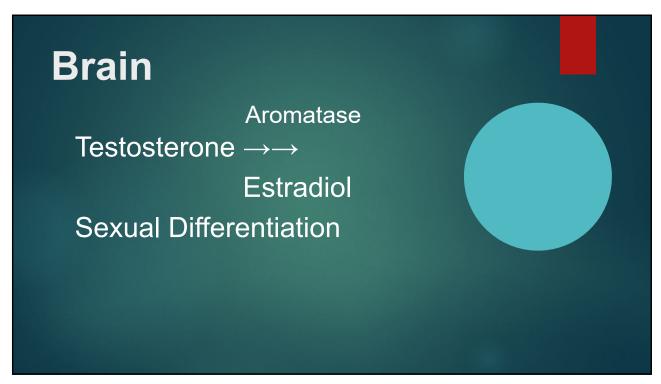


Hormone Activity
Two Important Human Tissues
Bones – Conversion to Estradiol
Brain → Estradiol Feedback to hypothalamus → LH

Non-Steroidal Activity

- Testosterone Modulates GABA receptor
- Affects on Neurotrophin nerve growth factor

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- Memory Spatial ability
- Importance in cognitive decline
- Alzheimer Dementia relationship

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Immune System

- T-Deficiency associated with metabolic syndrome
- Cardiovascular disease
- ↑ Mortality

Testosterone Plasma concentration correlates inversely with multiple biomarkers of inflammation

- CRP
- Interleukin 1 beta
- Interleukin 6
- TNF ALPH
- Endotoxin concentration
- Leukocyte count

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In Androgen-deficient men with autoimmune thyroiditis substitution therapy with testosterone leads to decrease in thyroid auto antibody titers

Testosterone is included in WHO List of Essential Medications

- It is available for men in topical gel, injection, intramuscular pellets
- Women have transdermal patches and sublingual tablets

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Clinical application of testosterone replacement therapy in men

Men Under 40

- Do not start with testosterone
- Check LH Level most have low testosterone due to hypopituitary function

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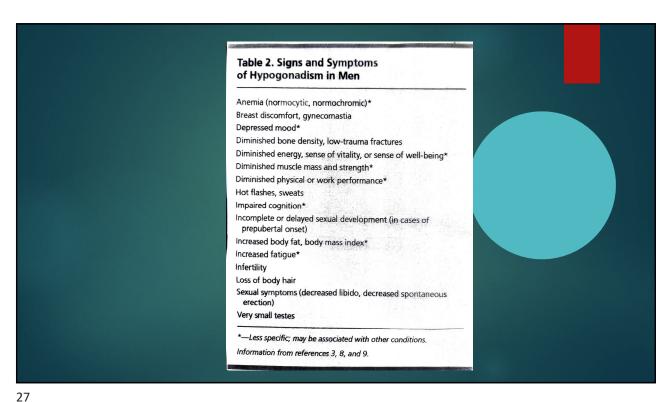
Treatment

- Clomid 25-50mg Daily
- Recheck testosterone in 8 weeks

Table 1. Causes of Hypogonadism in Men				
Туре	Laboratory values	Origin	Possible causes	
Primary	Decreased total serum testosterone, increased LH and FSH	Congenital	Chromosomal abnormalities, cryptorchidism, FSH/LH receptor gene mutations, Klinefelter syndrome, myotonic dystrophy	
		Acquired	Chemotherapy, hypothyroidism, orchitis/epididymo-orchitis (from mump gonorrhea, or chlamydia), radiation/trauma to testes, testicular torsion	
Secondary	Decreased total serum testosterone, normal or decreased LH and FSH	Congenital	Kallmann syndrome, Prader-Willi syndrome, other genetic abnormalities	
		Acquired	Chronic opioid use, hyperprolactinemia, pituitary tumors, sellar radiation sleep deprivation, surgery, trauma	
Mixed primary and secondary	Decreased total serum testosterone, variable LH and FSH	Acquired	Aging, cancer, chronic glucocorticoid use, chronic kidney disease, chronic obstructive pulmonary disease, cirrhosis, diabetes mellitus, hemochromatosis, human immunodeficiency virus infection, obesity	

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Table 3. Contraindications to Starting Testosterone Therapy Absolute contraindications Breast cancer Polycythemia (hematocrit > 54%) Prostate cancer Prostate-specific antigen > 4 ng per mL (4 mcg per L) or presence of nodules/induration on digital rectal examination (referral to a urologist is required before considering testosterone therapy) Relative contraindications Baseline hematocrit > 50%* Desire for fertility (testosterone therapy suppresses spermatogenesis) Severe lower urinary tract symptoms Uncontrolled congestive heart failure Untreated obstructive sleep apnea *—The criterion for discontinuing or decreasing testosterone therapy is a rise to a hematocrit of > 54%. A baseline hematocrit of > 50% predicts a likely rise to > 54% on therapy and is therefore a relative contraindication to starting therapy. Information from references 9 and 11.



Goal is to raise testosterone to 750-1000 and monitor symptoms compared to start of symptoms

