

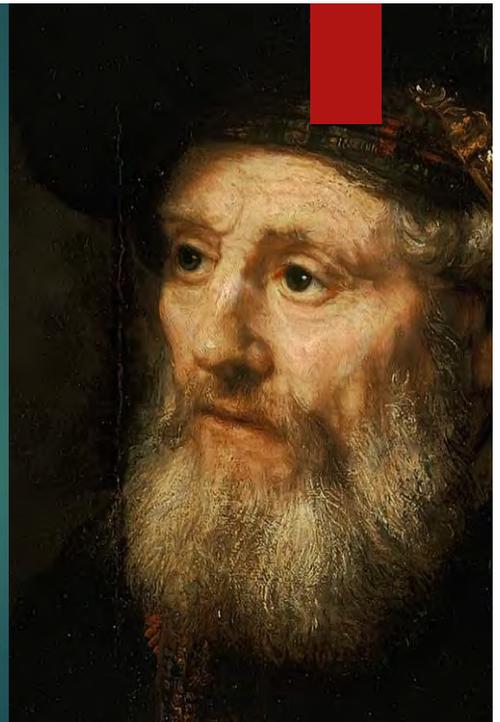
Endocrine System and Aging

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UND SCHOOL OF MEDICINE
AND HEALTH SCIENCES

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Goals

- ▶ Report how hormone levels change with age
- ▶ Understand endocrine disorders of older adults.



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Case Report

- ▶ 76F with type II Diabetes complains of weakness and lack of motivation. Her spouse reports that she sits around the house most of the day and has lost touch with her social activities at church. ROS: sleeps more than usual, takes naps and constipation. Her PHQ-2 screen is negative for depression. She does not drink alcohol. Her medications are MVI, an ACE inhibitor for hypertension and metformin for diabetes. Vital signs are normal. Physical exam shows psychomotor slowing, 3/5 mini – cog score, slow gait speed (0.8 m/s), 4/5 UE and LE motor strength, reduced reflexes, absent vibratory sense in feet and inability to hold a tandem stance for 10 seconds (+ Sharpen Romberg test).

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What do you think is causing this patient's symptoms ?

- A. Hypercalcemia from a Pituitary tumor
- B. Hypothyroidism from Hashimoto's thyroiditis
- C. Hyperthyroidism from Graves disease
- D. Hypercortisolism from an adrenal mass
- E. Rapidly progressive Alzheimer's Disease

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Hormonal theory of aging

- ▶ Death or Senescence Hormone
- ▶ Cortisol and cell death

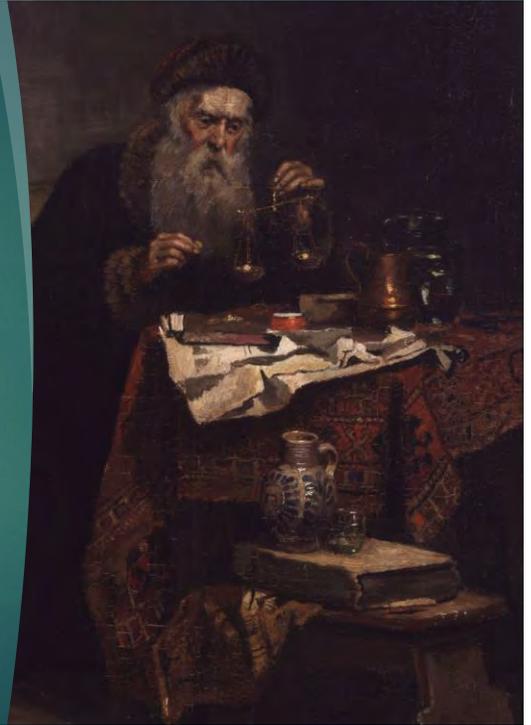


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Hormones help maintain homeostasis or balance

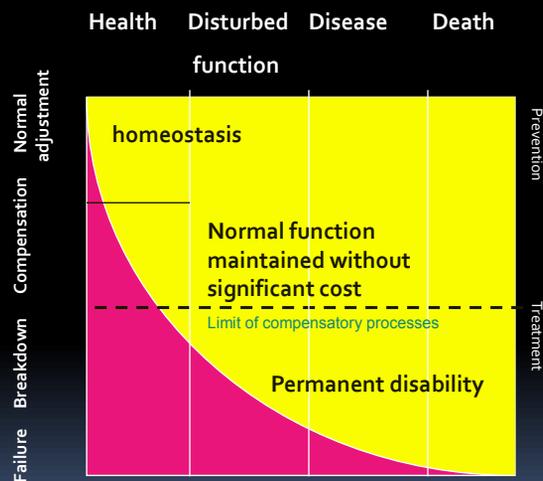
- ▶ Examples
 - ▶ Stress activates the adrenal system (fight or flight)
 - ▶ Caloric restriction reduces the thyroid axis

Johannes Weiland



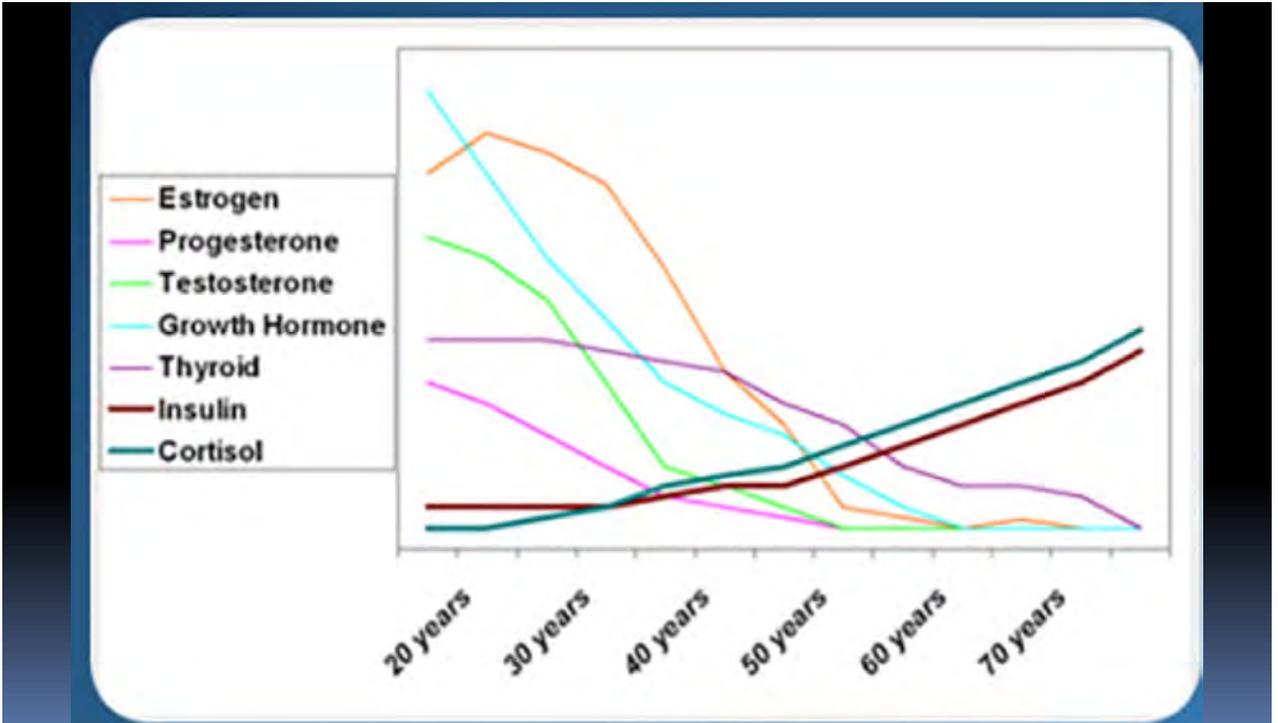
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Age alters Homeostasis



Adapted from *Physiological Basis of Aging and Geriatrics* Paola Timiras

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Diego Rivera

Age changes in one hormone level may be compensated by another

TESTOSTERONE DECLINE OFFSET BY AN INCREASE IN LUTEINIZING HORMONE (LH)

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Disorders of the endocrine system with age

- ▶ Subtle
- ▶ Non – specific
- ▶ Atypical
 - ▶ Apathetic hypothyroidism



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Non – specific symptoms of endocrine disorders in older adults

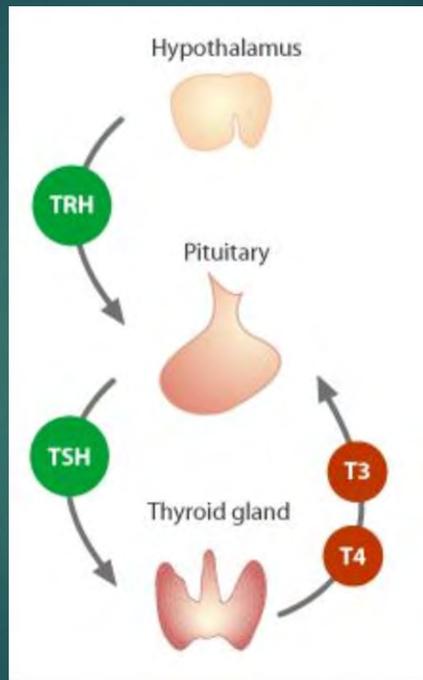
- ▶ Reduced functional status
- ▶ Cognitive impairment
- ▶ Psychomotor slowing



Anthony Hopkins

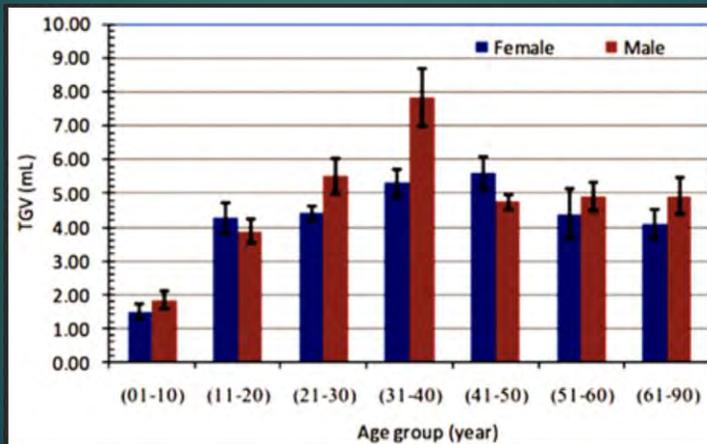
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Thyroid



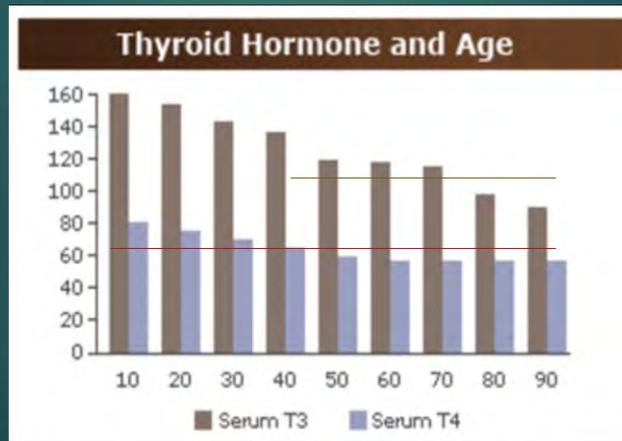
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Thyroid size and age



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Thyroid hormone levels are relatively stable with age



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Thyroid

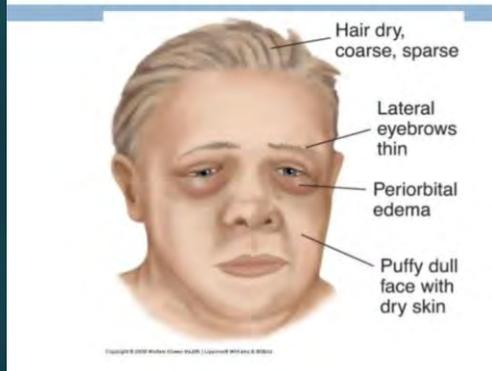
- ▶ T4 secretion declines with age but its clearance also decreases, thus leading to relatively normal T4 serum levels throughout the lifespan

P. Picasso

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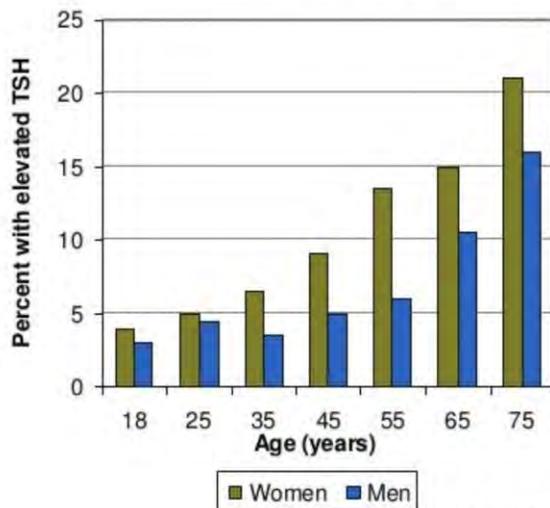
TSH is the main test to determine under or over active thyroid

Hypothyroidism



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Prevalence of Thyroid failure by age

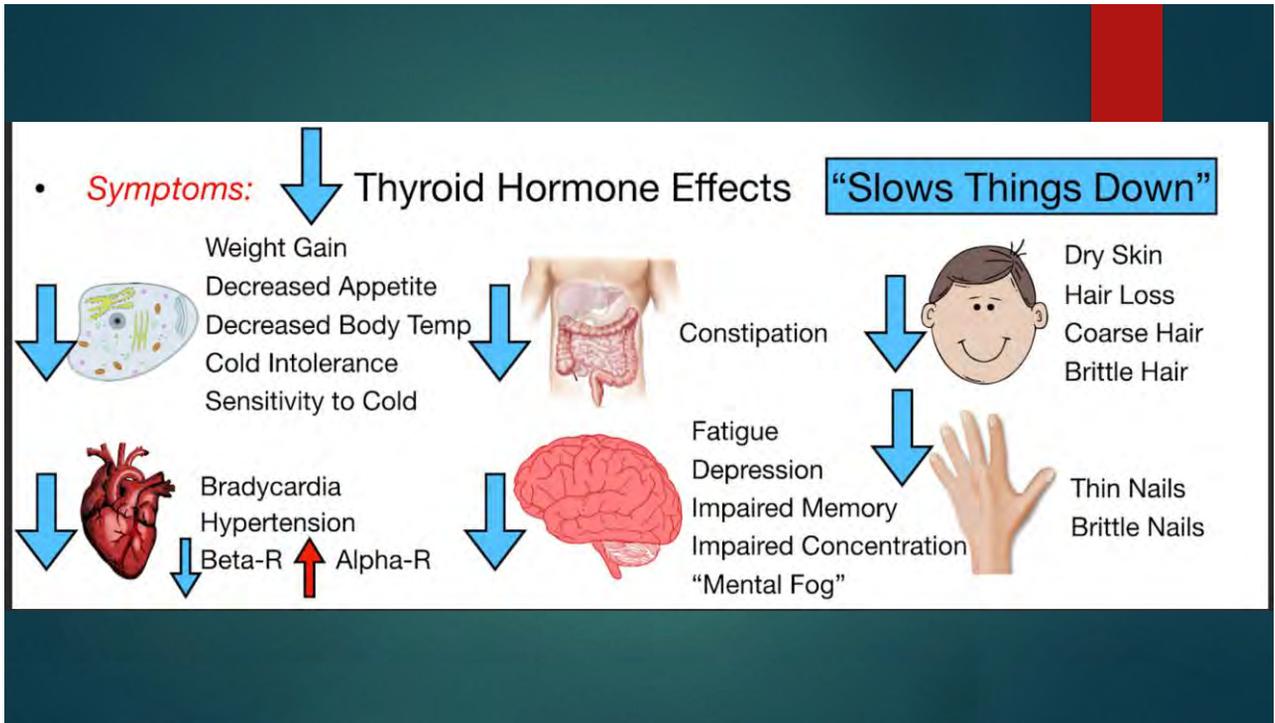


- The incidence of Thyroid disease increases with age.
- For all age groups, thyroid disease is more common in women than men.

1. GJ Canaris, et al. Arch Intern Med. 2000;160:526-534.

drjoazer@gmail.com

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Hypothyroidism

- ▶ Chronic autoimmune thyroiditis (Hashimoto disease)
- ▶ Dementia associated with hypothyroidism rarely resolves with thyroid treatment
- ▶ Cases of mild hypothyroidism can rapidly progress to severe hypothyroidism when seriously ill

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Subclinical hypothyroidism

- ▶ Serum TSH > 4.5 mIU/L
- ▶ Normal T4 level
- ▶ Significance unclear as exceptionally long lived people have elevated TSH levels
- ▶ Young old may have CV benefit from thyroxine supplement but not 70+

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Elevated TSH

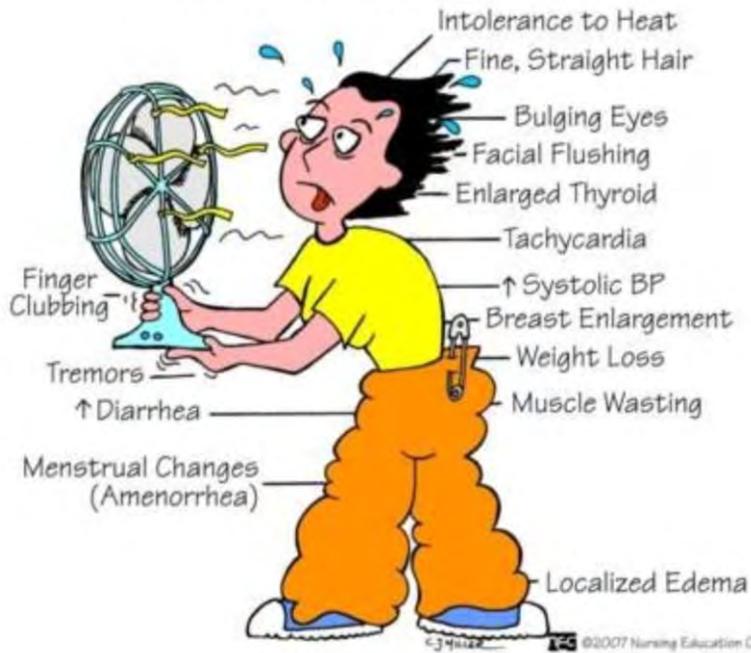
- ▶ 50% of older adults with elevated TSH (> 5.5) normalize within a year
- ▶ Therefore, diagnosis requires two consecutively elevated TSH levels

Chuck Close



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HYPERTHYROIDISM



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Apathetic
Hyperthyroidism

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David Hockney

Hyperthyroidism

- ▶ Most cases under age 65 (75%)
- ▶ Classic symptoms are less common
- ▶ A – fib, heart failure, weakness, weight loss, muscle atrophy
- ▶ Apathetic variant: depression, sedentary, withdrawn, lethargic
- ▶ Consider hyperthyroidism with osteoporosis

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Causes of hyperthyroidism

- ▶ Toxic adenoma
- ▶ Multi nodular goiter
- ▶ Thyroiditis (Graves)



Els Van Dorst

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Subclinical hyperthyroidism

- ▶ Low TSH
- ▶ Normal T4 and T3
- ▶ Linked to a – fib, osteopenia, and all cause mortality
- ▶ Treat with RAI usually with thiourea and beta blockade

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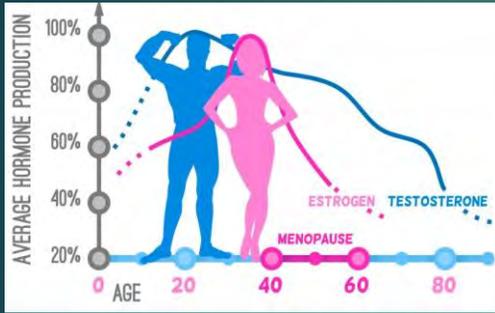
Nodular thyroid and cancer



- ▶ Multinodular thyroid increases with age
- ▶ 90% older women with thyroid nodules
- ▶ Amiodarone or iodine (contrast dye) may precipitate hyperthyroidism
- ▶ ~ 5 % nodules are cancerous

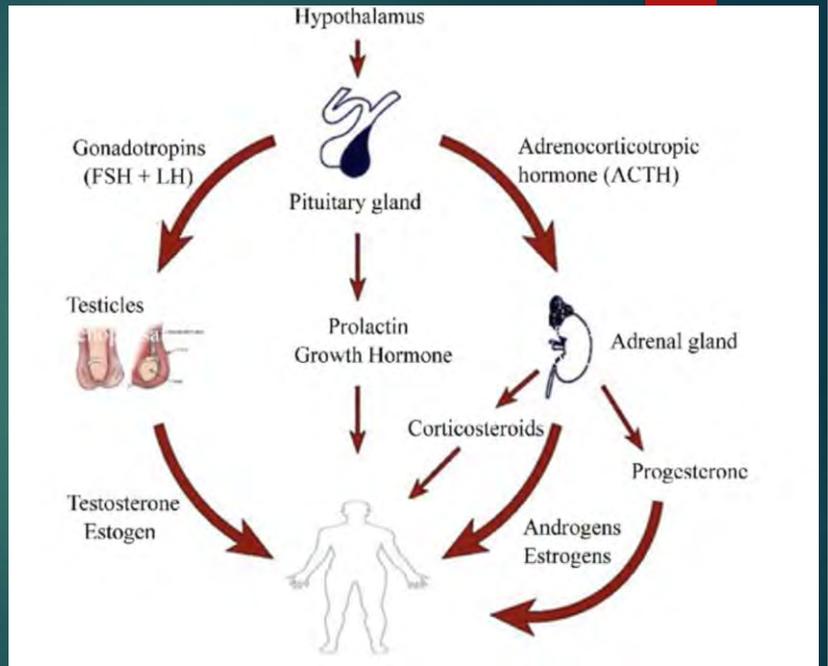
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Sex hormones



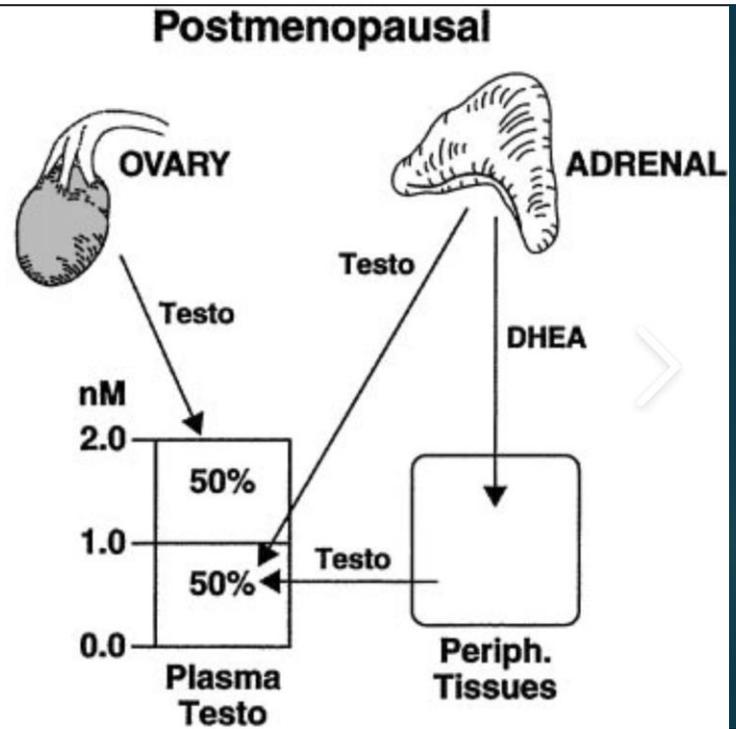
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Male Testosterone mostly from testicles

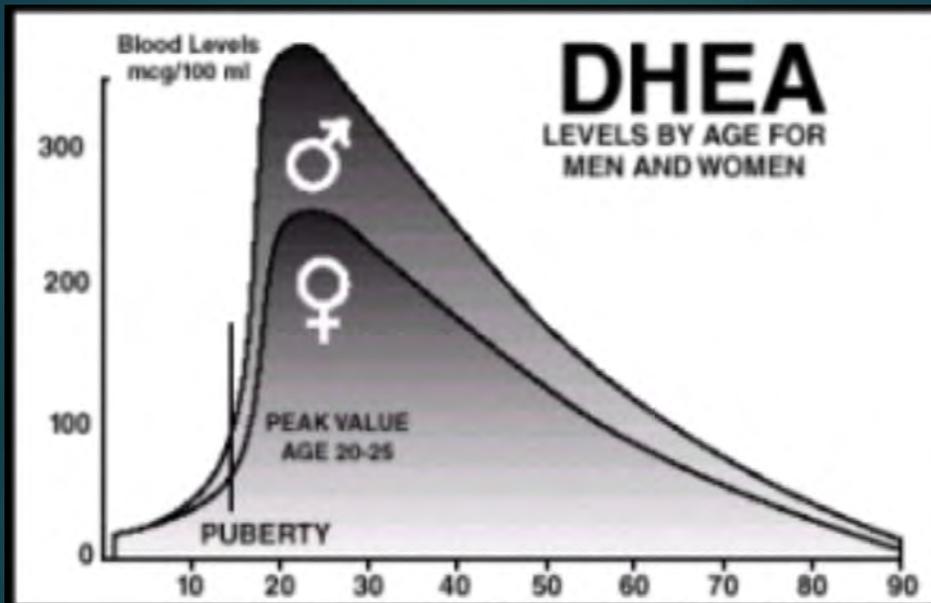


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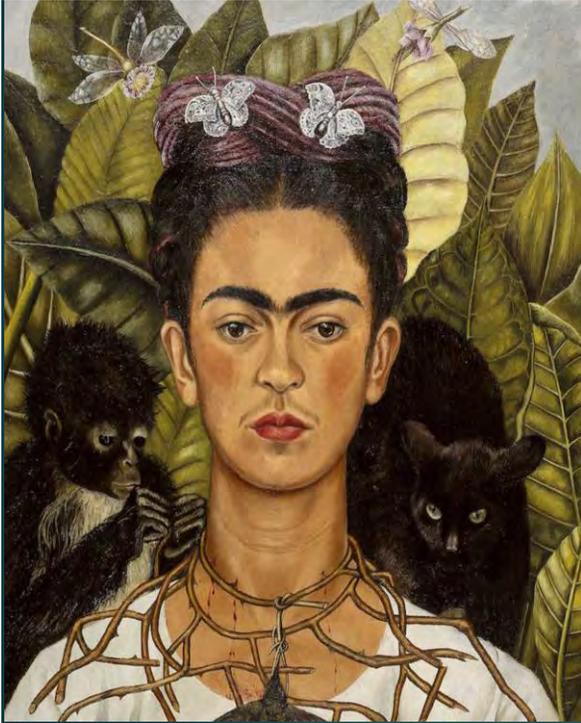
Female testosterone
50/50 from ovaries and
adrenal gland



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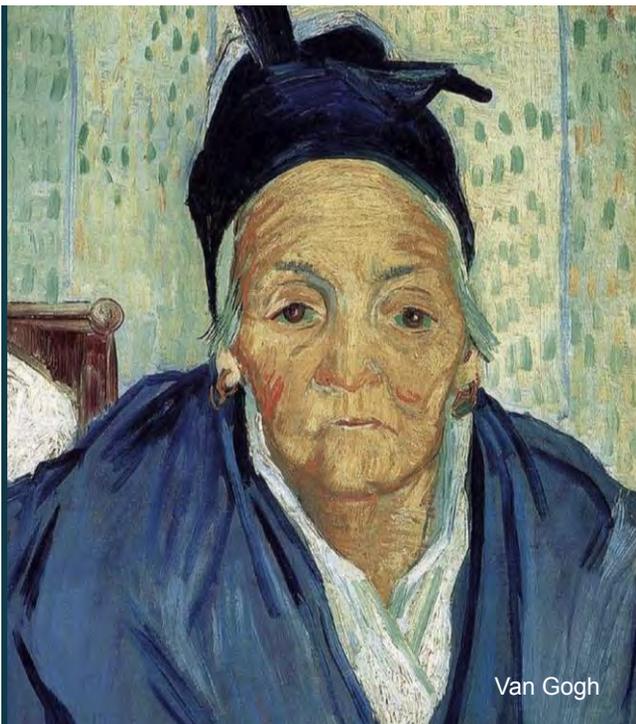


Frida Kahlo

DHEA

- ▶ Adrenal gland source in women only
- ▶ Source of testosterone and estrogen
- ▶ Oral use not effective
- ▶ Vaginal use (6.5 mg) reduces atrophic changes

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Van Gogh

Menopause

- ▶ Permanent cessation of menstruation
- ▶ Median age 51
- ▶ 33% of female lifespan in post menopausal state

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Climacteric

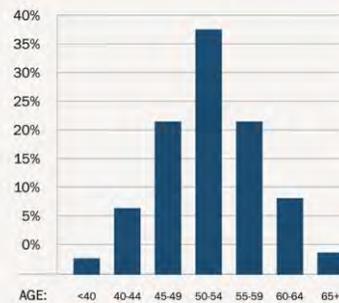
Mood changes

Sleep disorders

Vasomotor symptoms (hot flash)

- 8 – 10 year duration
- daily symptoms
- most associated with race (AA), obesity and smoking

Percentage of Women Experiencing Menopause Symptoms by Age



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HRT

- ▶ Effectively treats climacteric symptoms
- ▶ Dangers (Womens' Health Initiative)
 - ▶ Thromboembolic events
 - ▶ Stroke
 - ▶ Heart attack
 - ▶ Breast cancer
- ▶ Estrogen alone is less dangerous
 - ▶ Possible cardioprotective effects
 - ▶ Transdermal estrogen has less risk
 - ▶ Caution with obesity, CAD, CVD



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HRT summary

- ▶ Individualization
- ▶ Do not use for primary prevention
- ▶ Use for vasomotor symptoms
- ▶ Use lowest dose for least amount of time
- ▶ Avoid in groups with high risk of adverse events

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Ed Paschke

Alternatives to HRT for post menopausal hot flashes

- ▶ SSRI (Paroxetine)
- ▶ Gabapentin
- ▶ Clonidine

- ▶ Phytoestrogens
- ▶ Methyldopa
- ▶ Yams
- ▶ Lifestyle modifications

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Avoid

- ▶ Testosterone
- ▶ Progesterone only
- ▶ Compounded bioidentical hormones



Menopause Relief™

- Hot Flashes & Night Sweats
- Mood Changes & Irritability
- Weight Gain & Fatigue

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Genitourinary syndrome of menopause

- ▶ Decreased vascularity
- ▶ Vaginal dryness
- ▶ Pallor
- ▶ Reduced rugae
- ▶ Thinning
- ▶ Change in pH
- ▶ 10 – 40 %
- ▶ Burning
- ▶ Discharge
- ▶ Bleeding
- ▶ Irritation
- ▶ Dyspareunia
- ▶ UTI
- ▶ Urgency / frequency



David Kassan

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Treatment options for dyspareunia and vulvovaginal atrophy

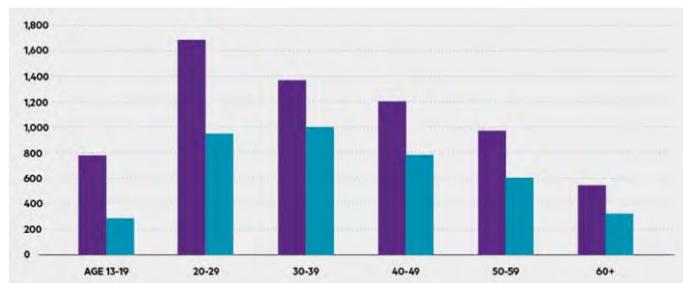
- ▶ Intravaginal estrogen
 - ▶ Cream or tablets
 - ▶ Twice weekly
 - ▶ Minimal systemic absorption
 - ▶ No risk if breast cancer history
- ▶ Ospemifine (estrogen receptor agonist)
- ▶ Prasterone vaginal insert
- ▶ Fractional carbon dioxide laser therapy



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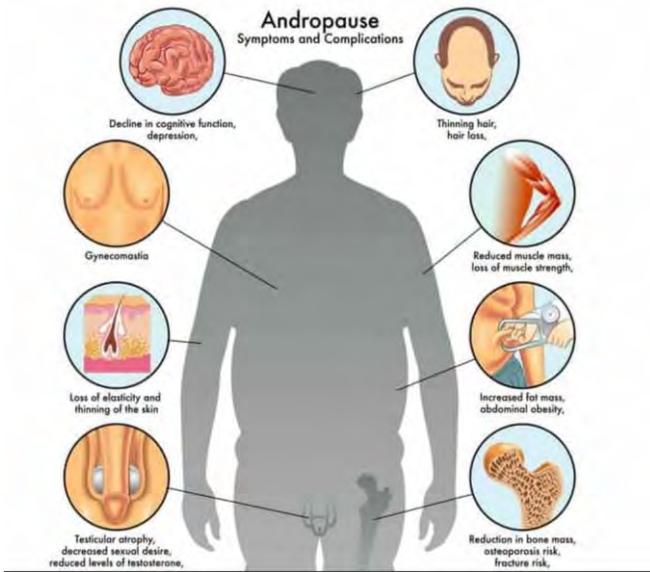
Vulvovaginal infection and inflammation

- ▶ Change in vaginal pH and microbiome (less lactobacillus)
- ▶ Increase risk of yeast infection
- ▶ Diabetes and obesity as risk factors
- ▶ Trichomonas and Gardenella vaginosis more rare in older women



STD per age group

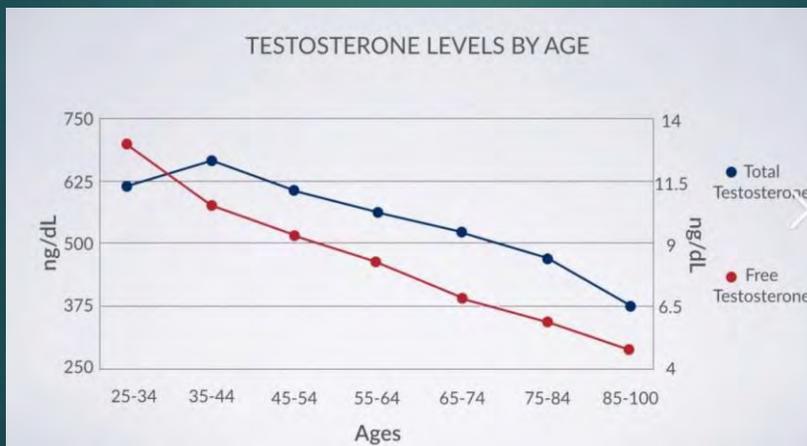
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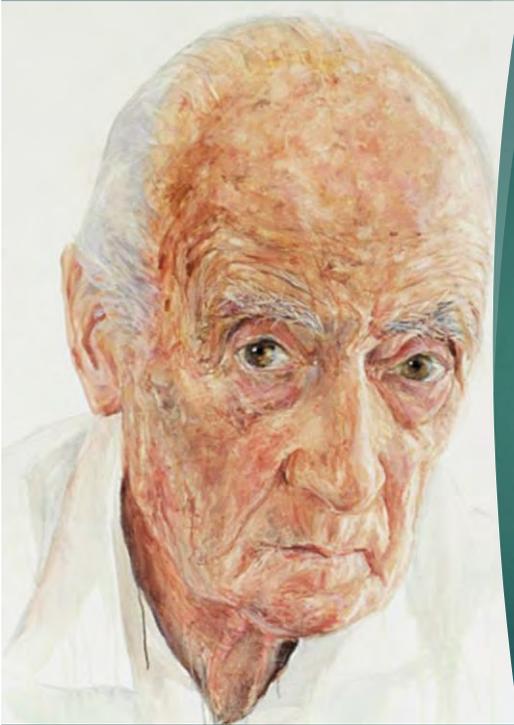
Is there a male andropause or late-onset hypogonadism ?

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Testosterone



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Causes of low T in addition to aging

- ▶ Opioids
- ▶ Glucocorticosteroids
- ▶ Chronic conditions
- ▶ Cancer

Danelle Bergstrom

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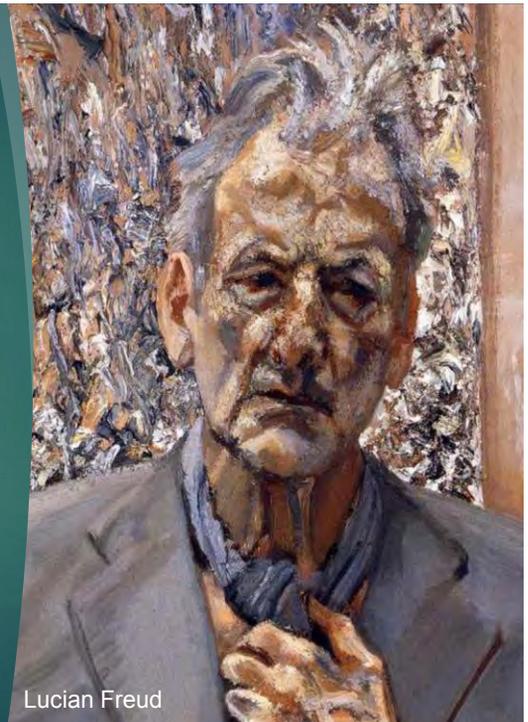
T gel or not to T gel ?

T Trial 12 months

- ▶ Increase muscle, less fat, denser bone
- ▶ Borderline changes in libido, mood, walking
- ▶ No changes in vitality or memory
- ▶ Increased non – calcium arterial plaque

TEAAM trial 3 years

- ▶ increased power



Lucian Freud

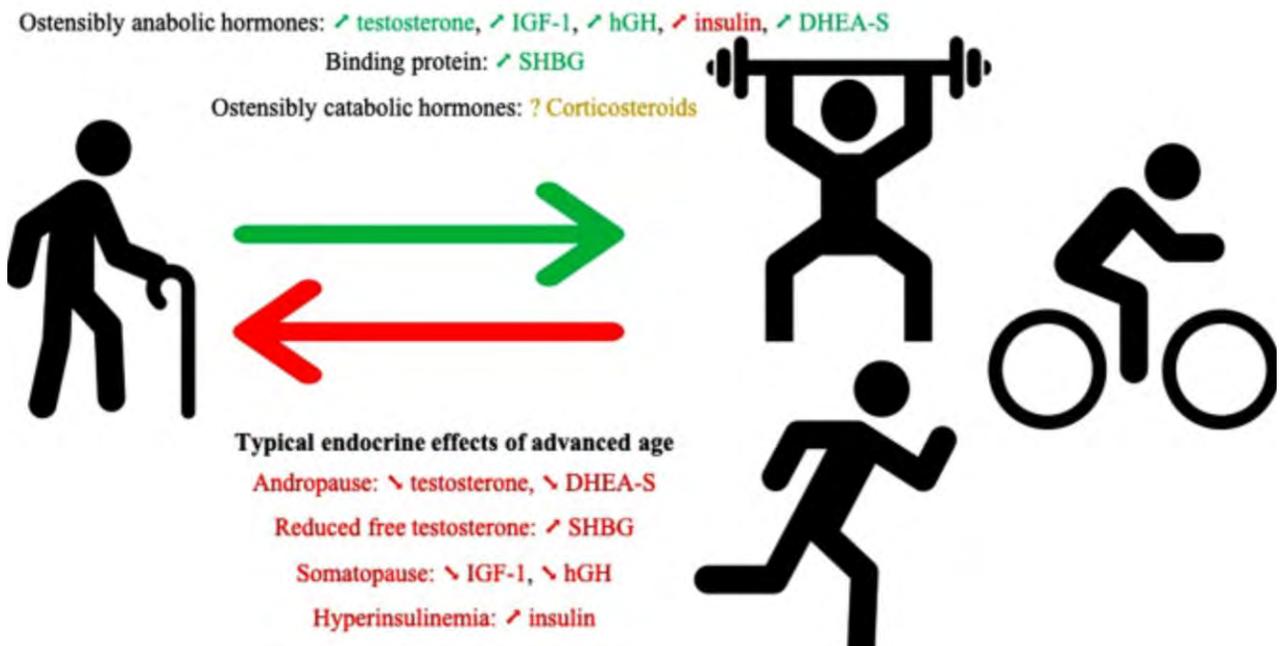
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Non pharmacological means to increase testosterone



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Effects of exercise training observed in advanced age



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All ages and genders benefit from resistance training

- Serum T unchanged
- Muscle T improved > 50 %
- Strength lost in 4 weeks

