

The role of testosterone and hypogonadism

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History

- 8th century AD
 - Chinese used testicular extracts to treat impotence

- 1889
 - Brown-Sequard used injections of dog and guinea pig testicular extracts

Androgens in Men

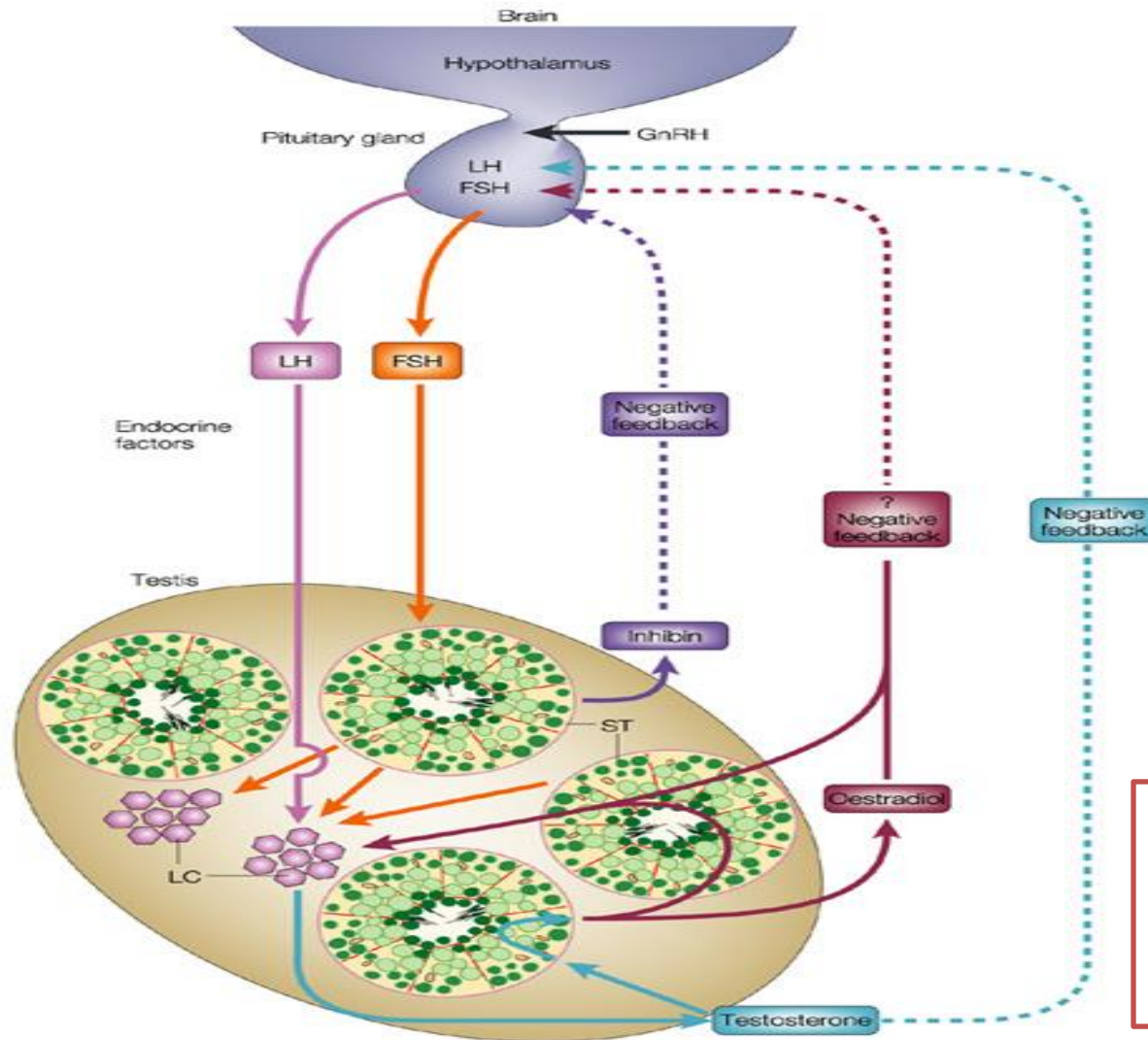
- Testosterone
- Dihydrotestosterone (DHT)
- Androstenedione

Testis OR
peripheral conversion

- Dehydroepiandrosterone (DHEA)
- DHEAS

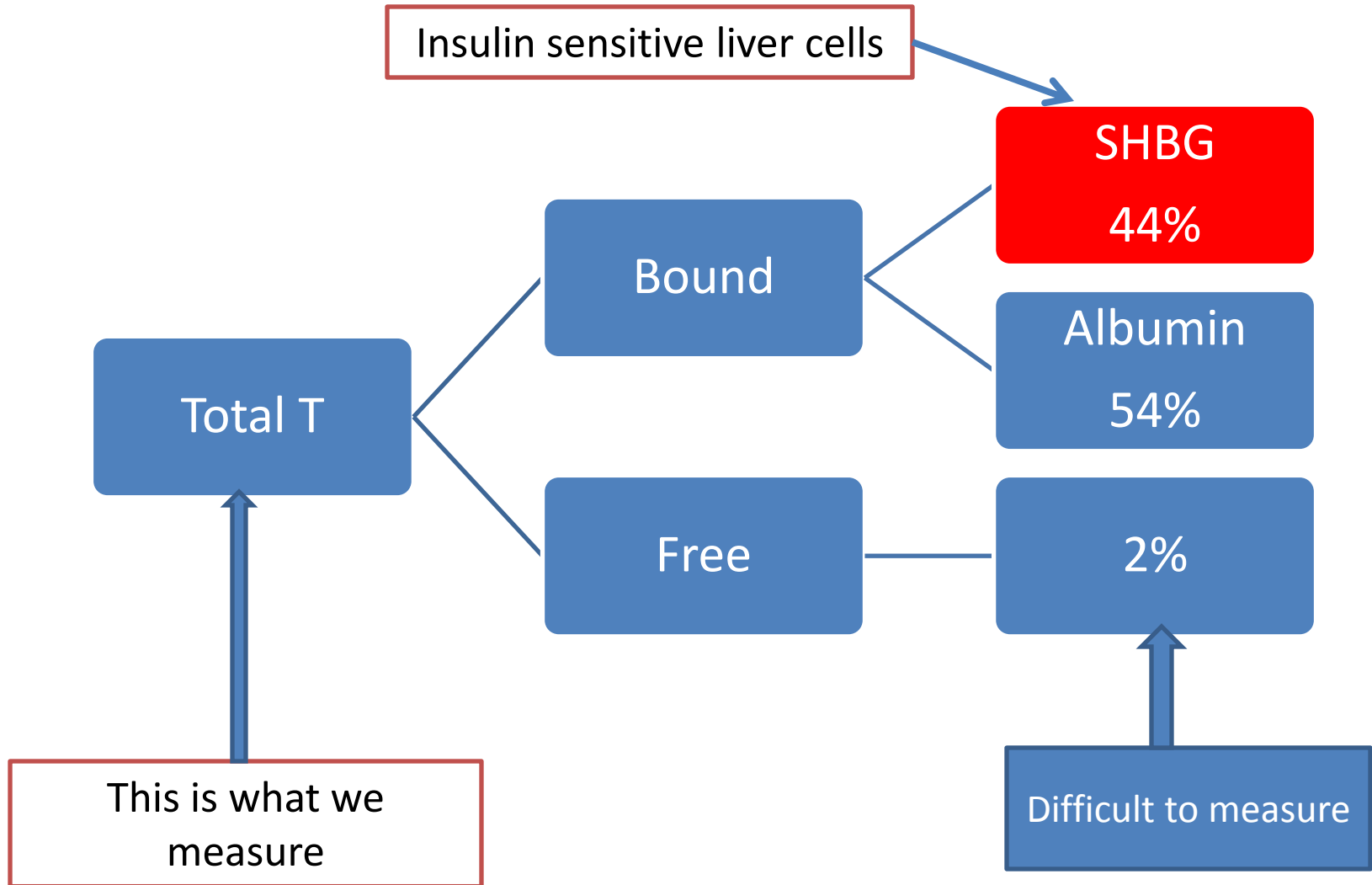
Adrenal gland

Regulation of Testosterone Production



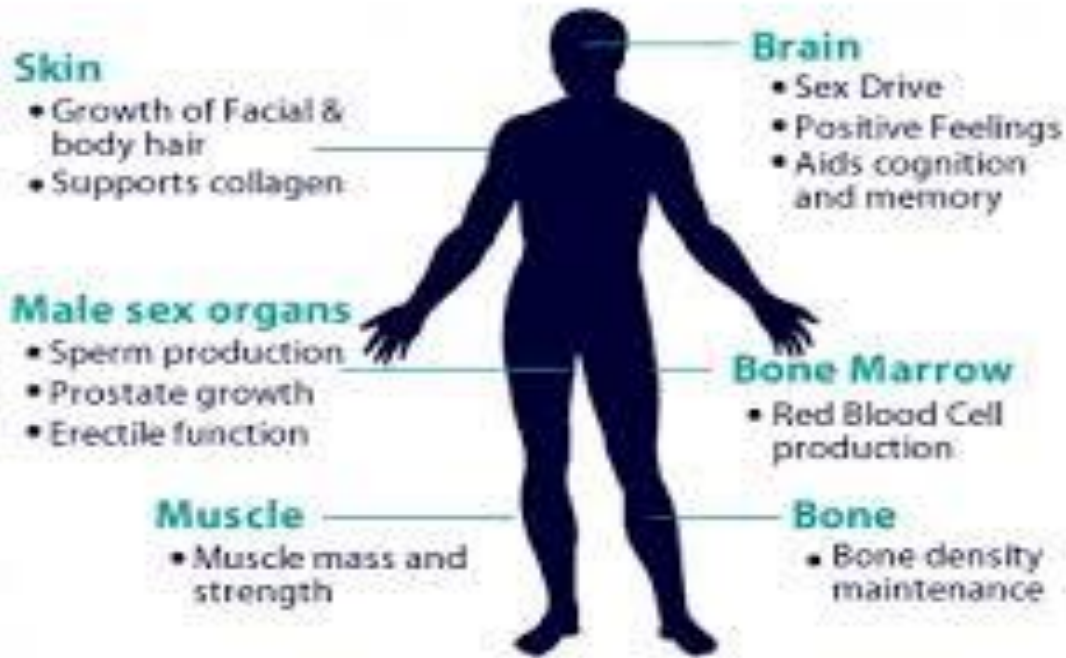
Peak in the morning with nadir in the afternoon [35%]

Circulating Testosterone



Effects of Androgens in Men

The Influence of Testosterone



Androgen deficient man [late onset hypogonadism]

- Hot flushes
- Loss of body hair
- Fatigue
- Depression
- Reduced bone mass
- Reduced muscle mass
- Erectile dysfunction
- Reduced libido

Conditions associated with low T

- Acute illness
- Heart failure
- Type 2 DM/obesity
- Chronic diseases: COPD, RA, epilepsy
- Cirrhosis
- CKD
- Advancing age
- Pituitary tumours
- Haemochromatosis
- Primary hypogonadism

Effect of age on testosterone levels

- Total testosterone ↓ from 40 years onwards [2% fall per year]
- SHBG levels ↑ from 40 years onwards
 - Greater fall in free testosterone
- Reliable marker of androgen activity at the level of the tissues is lacking
- Age-specific 'normal' ranges lacking

Medications associated with low T

- Decreased LC testosterone production

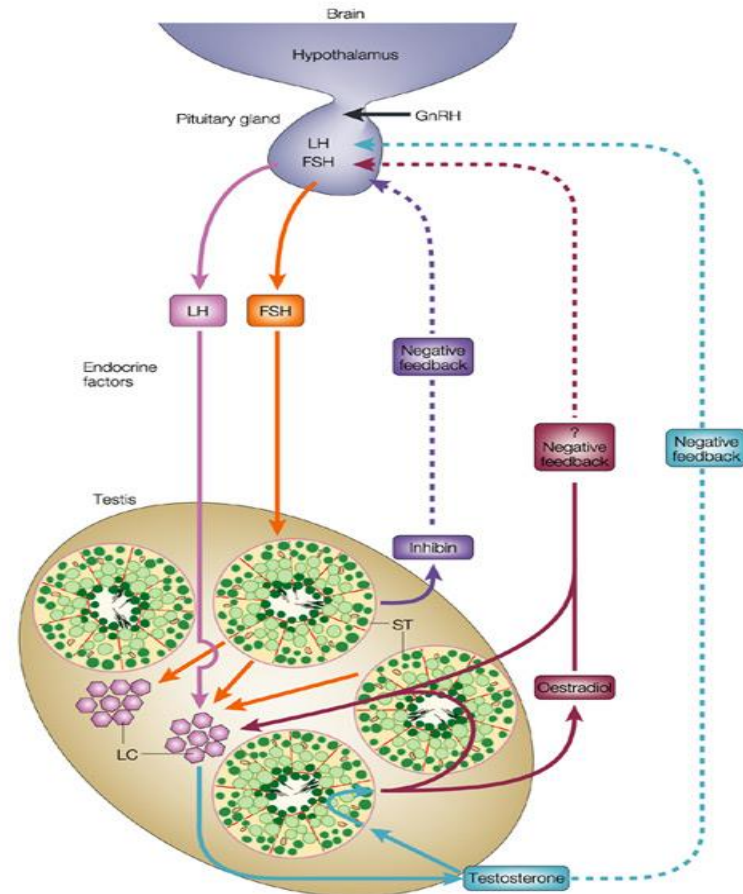
- Corticosteroids
- Alcohol
- Ketoconazole

- Increased T metabolism

- Anticonvulsants

- Decreased LH release

- Anabolic steroids
- Alcohol
- Corticosteroids
- Psychotropic agents



Iatrogenic hypogonadism

RESET ANDROGEN RECEPTORS,
INCREASE
DOPAMINE ACTIVITY &
TESTOSTERONE UTILIZATION



Discreet Shipping & Billing



100% PROVEN RESULTS

NO PRESCRIPTION. NO INJECTIONS.

CUTTING STACK

View Product >

MasterCard VISA American Express Discover

Those-run chase spurs interest in Androstenedione

Rich Bu...
And...

Muscle Pill

BY JOHN STODOLSKY AND LARRY WELLS
Illustration by [unreadable]

44 **Y**ou've probably heard of "muscle pills." They're the latest craze in the fitness world, and they're being sold in every health food store, gym, and fitness center. But what are they? And do they really work?

These pills are a mix of various ingredients, including herbs, vitamins, and minerals. Some of the most common ingredients are yohimbin, fenugreek, and tribulus terrestris. These ingredients are believed to increase testosterone levels, which can lead to increased muscle mass and strength.

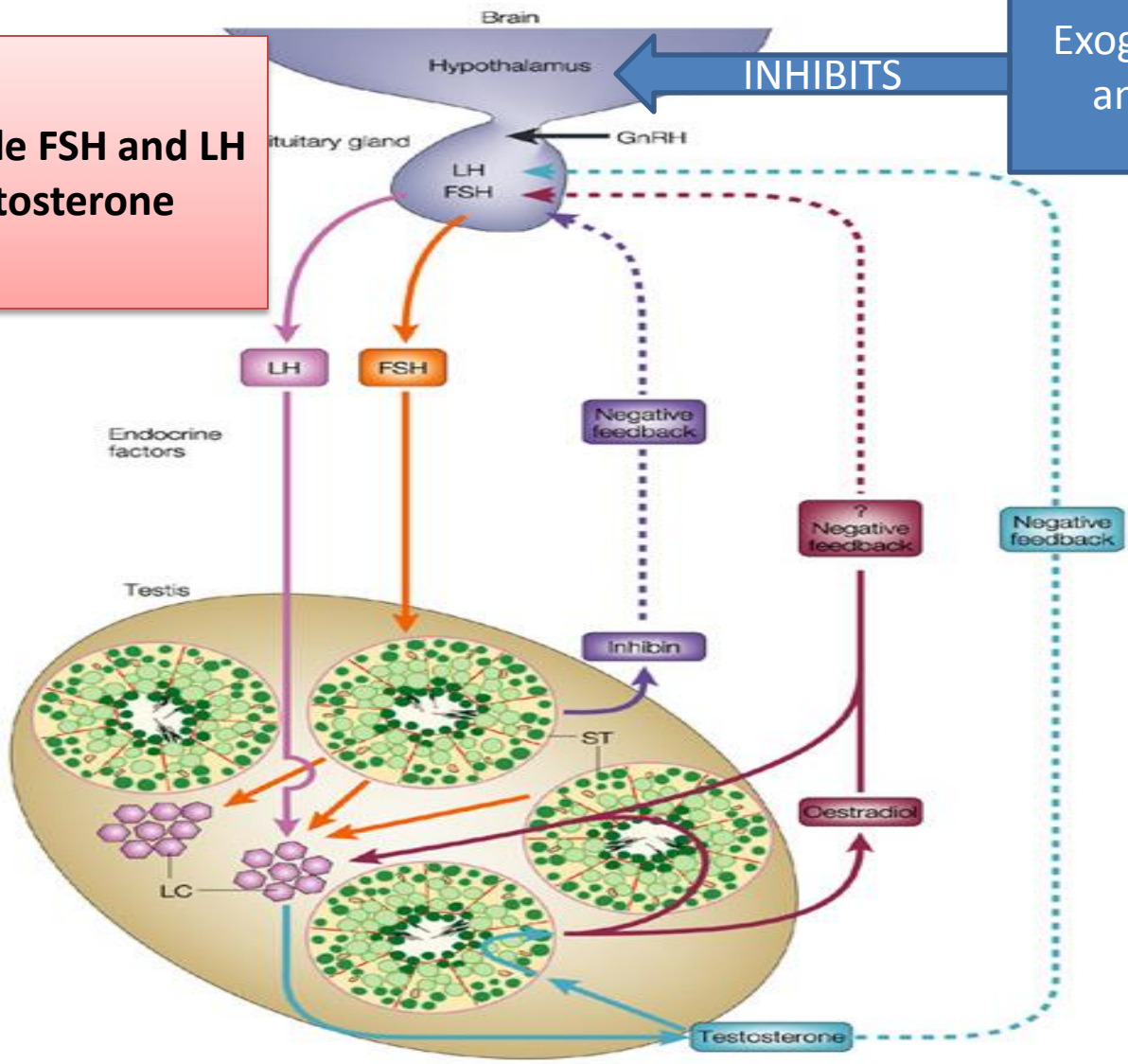
However, there is a lot of controversy surrounding these pills. Some people claim that they are effective, while others claim that they are just a waste of money. In fact, the FDA has issued warnings about several of these pills, claiming that they contain dangerous levels of yohimbin and other ingredients.

So, should you take a muscle pill? The answer is probably not. While these pills may offer some benefits, the risks are too high. It's always best to get your nutrients from a healthy diet and regular exercise.



**Undetectable FSH and LH
Low Testosterone**

**Exogenous steroids
and androgens**



54 year-old man

- ED with loss of libido
- Past Mhx:
 - Type 2 DM since 2003 (BMI = 36)
 - HT
- Non-smoker, alcohol 18 units/week
- **Rx:** Metformin, pioglitazone, losartan, simvastatin
- Serum testosterone [1200] = 7.9 [9-32]

The endocrinologist's dilemma!

- Does this man have 'true' hypogonadism?
- Will he benefit from testosterone replacement?

Does he have 'true' hypogonadism?

- History is important
 - Onset of symptoms
 - Local testicular pathology
 - Markers for other pituitary hormone problems
- Examination
 - Absence of secondary sexual characteristics
- Biochemistry and imaging
 - Always measure T in the morning
 - Exclude pituitary disease
 - Ensure causes for primary hypogonadism have not been missed
 - BMD

Type 2 DM and obesity

- Total T is reduced
 - Lower SHBG levels
- Free T is also reduced
 - Direct effect from the HT [GnRH]
- Circadian rhythm is blunted

**Hypogonadotropic
hypogonadism**

Does he have 'true' hypogonadism?

- Once primary hypogonadism and pituitary disease are ruled out:
 - Case rests on finding evidence of hypogonadism clinically

Will he benefit from testosterone replacement?


- Possibly, if there is evidence of deficiency clinically
- If not
 - Literature often contradictory
 - Risks versus Benefits

Benefits versus Risks

Benefits

- Improve ED and libido
- ↑ muscle mass
- ↑ BMD
- ↓ Visceral fat
- Improved mood
- ? QOL improvement

Risks

- Fluid retention
 - Gynaecomastia
 - Acne/oily skin
 - ↑ haematocrit
 - ↓ HDL cholesterol
 - ↑ BP
 - ↑ risk of BHP and Ca Prostate
 - Behaviour change
 - ↓ endogenous T production
- 

Thank you for your attention

Questions and discussion