

INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

AUGUST 18-22, 2019 | NASHVILLE, TN



Redmond Health and Safety Symposium | Barbera EMS Conference

EMERGING

THREATS

EVOLVING

OPPORTUNITIES

INNOVATIVE

SOLUTIONS

Low Testosterone: Should it be replaced?

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Outline

- Scope of problem
- Concerns at the firehouse
- Causes
- Diagnosis
- Treatment
- Management
- Mitigation strategies
- Q & A



Part 1

- Scope of problem
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Testosterone Deficiency in Fire Fighters

DID YOU KNOW THAT TRT CAN BE COVERED BY INSURANCE?

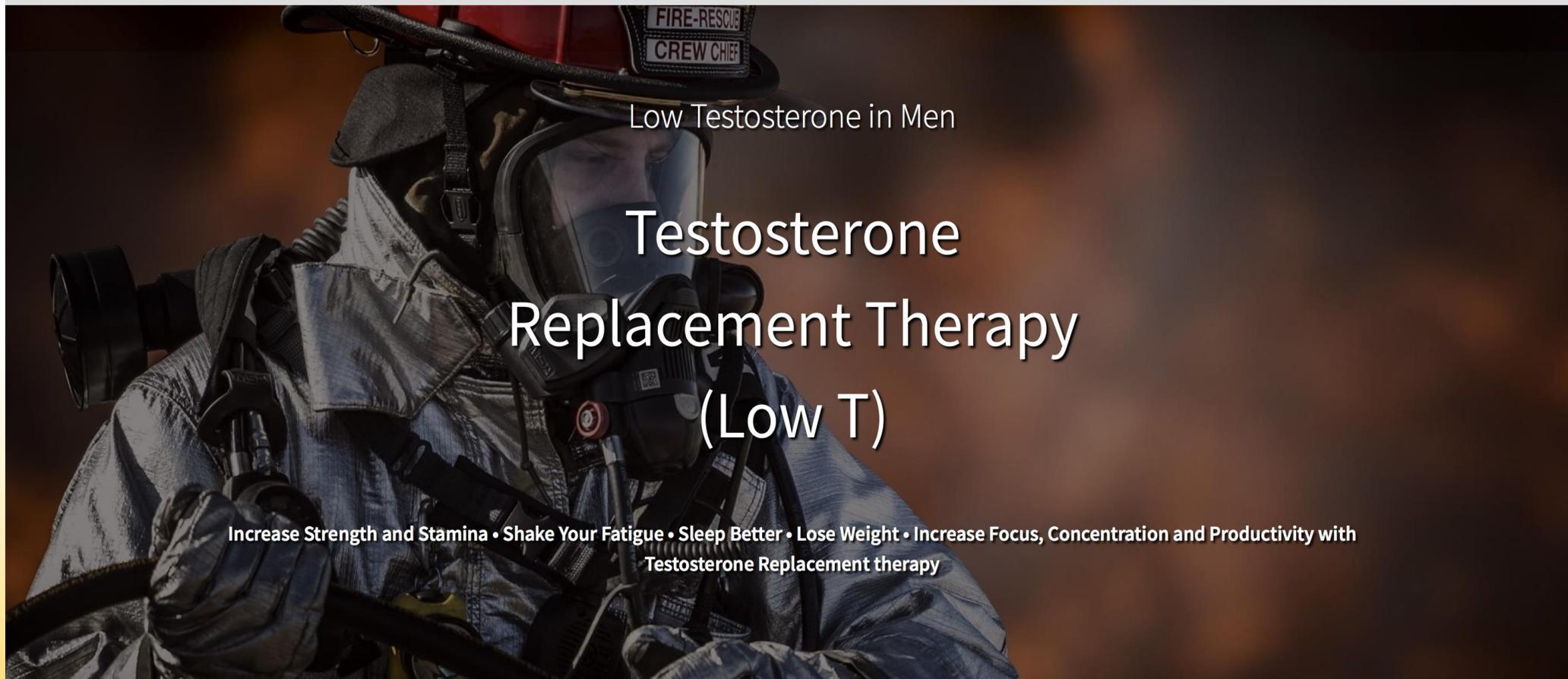
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Low Testosterone in Men

Testosterone Replacement Therapy (Low T)

Increase Strength and Stamina • Shake Your Fatigue • Sleep Better • Lose Weight • Increase Focus, Concentration and Productivity with Testosterone Replacement therapy



What is Testosterone Deficiency?

- **Symptoms:** Reduced libido; Difficulty obtaining or maintaining an erection; Difficulty concentrating or making decisions; Poor results from exercise programs; Increase in body fat; Loss of lean body (muscle) mass; Loss of bone density; Depression; Poor work performance; Unfavorable changes in cholesterol profile.



What is Testosterone Deficiency?

- **Health Effects of Low-T** – Beyond the symptoms that many men experience, testosterone deficiency syndrome can also contribute to the onset or worsening of various diseases: Increased risk of cardiovascular disease; Increased risk of death from a cardiovascular event; Increased risk of metabolic syndrome: high blood pressure, elevated insulin levels, excess belly fat and abnormal cholesterol levels; Strong association with diabetes; Strong association with atherosclerotic disease of the aorta; Higher incidence of prostate cancer; Association with more aggressive variants of cancer.



What are normal Testosterone ranges?

- In general, the normal range in males is about 270-1070 ng/dL with an average level of 679 ng/dL.
- A normal male's testosterone level peaks at about age 20, and then it slowly declines about 1% per year thereafter.
- Some researchers suggest that the healthiest men have testosterone levels between 400-600 ng/dL.
- The American Urological Association suggests that clinicians should use a total testosterone level below 300 ng/dL as a reasonable cut-off in support of the diagnosis of low testosterone.
- The Endocrine Society has published that the harmonized normal range for testosterone in a non-obese population of European and American Men, 19-39 years, is 264-916 ng/dL.



Significant Increase in TRT in Fire Fighters

- Over the last decade prescribed testosterone use, or TRT, has increased markedly amongst Fire Fighters, with some major metropolitan fire departments reporting 25% of employees on TRT.
- In **population-based studies**, the prevalence of testosterone deficiency in men aged 47-60 years ranges from **2.1% to 12.8%**. The operational definition of testosterone deficiency used across studies varies considerably.
- The prevalence of testosterone deficiency in **obese** patients was found to be **57.7%** and **35.6%**, using the cut-offs TT <317 ng/dL and FT <78 pg/ml, respectively. Another study using the cut-offs TT < 300 ng/dl or FT < 65 pg/ml found the prevalence in obese patients to be **78.8%** and **51.5%**, respectively.
- The prevalence of testosterone deficiency in patients with the **metabolic syndrome** ranges from 30 to 35%.

Systematic Literature Review of the Epidemiology of Non-Genetic Forms of Hypogonadism in Adult Males. Victoria Zarotsky, Ming-Yi Huang, Wendy Carman, Abraham Morgentaler, Puneet Singhal, Donna Coffin, and T. H. Jones, Journal of Hormones 2014



Fire Fighter Career Progression



Is obesity why so many Fire Fighters have Low-T?

While obesity and metabolic syndrome are significant problems in the fire service, and it is clear that obesity is a primary cause of Low-T, there are numerous other primary and secondary causes of Low-T effecting Fire Fighters:

- Sleep disturbance
- Normal Aging
- Opioid Use
- Alcohol Use
- Lack of Exercise



Causal vs Correlation

Does Fire Fighting Cause Low-T?

- A **correlation** is a measure or degree of relationship between two variables. A set of data can be positively correlated, negatively correlated or not correlated at all. As one set of values increases the other set tends to increase then it is called a positive correlation.
- A **causal relation** between two events exists if the occurrence of the first causes the other. The first event is called the cause and the second event is called the effect.
- A correlation between two variables does not imply causation. On the other hand, if there is a causal relationship between two variables, they must be correlated.
- At this time there is not evidence to support the argument that there is a causal relationship between fire fighting and Low-T.



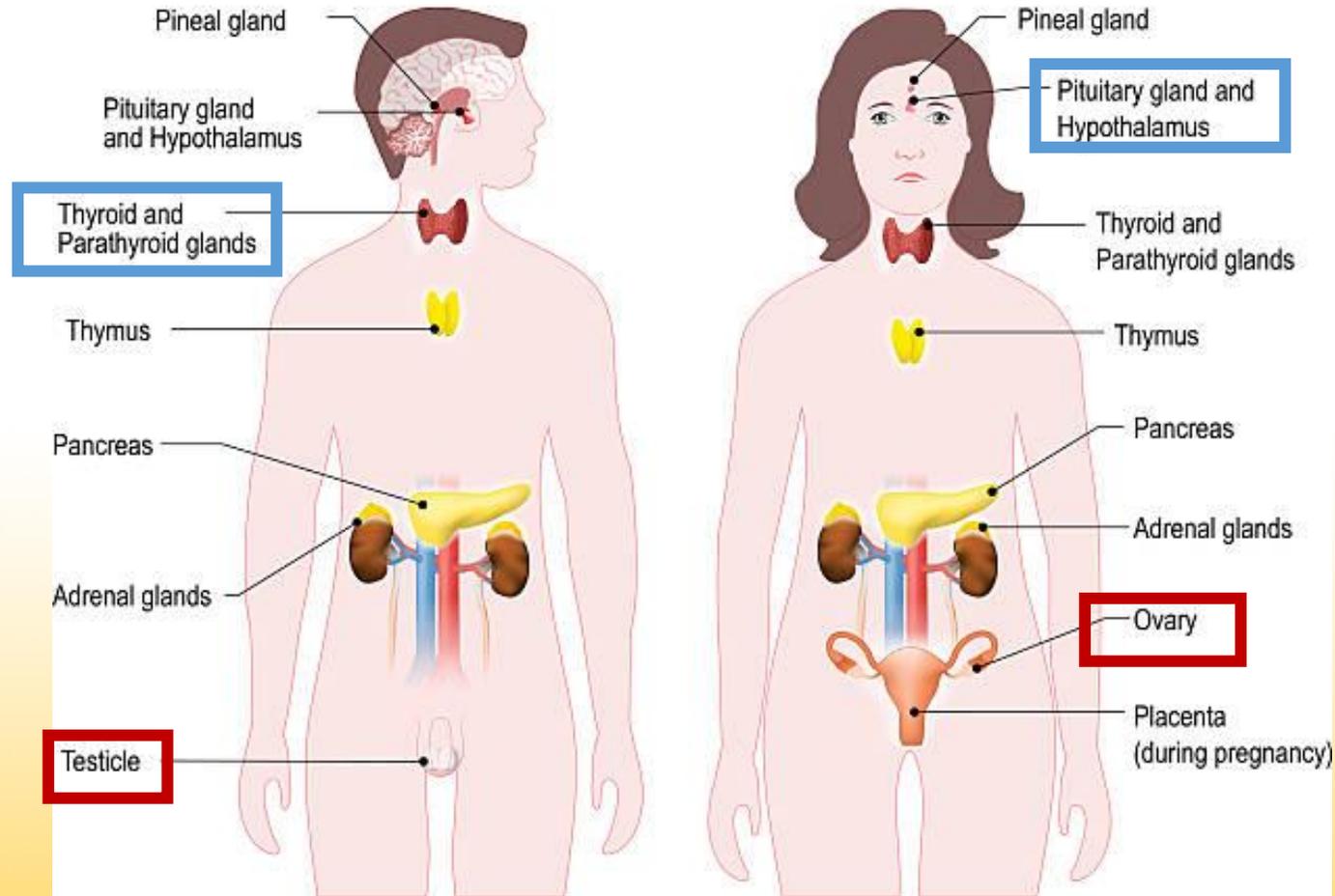
Part 2

- Scope of problem
- Concerns at the firehouse
- **Causes**
- **Diagnosis**
- Treatment
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- Mitigation strategies
- Q & A

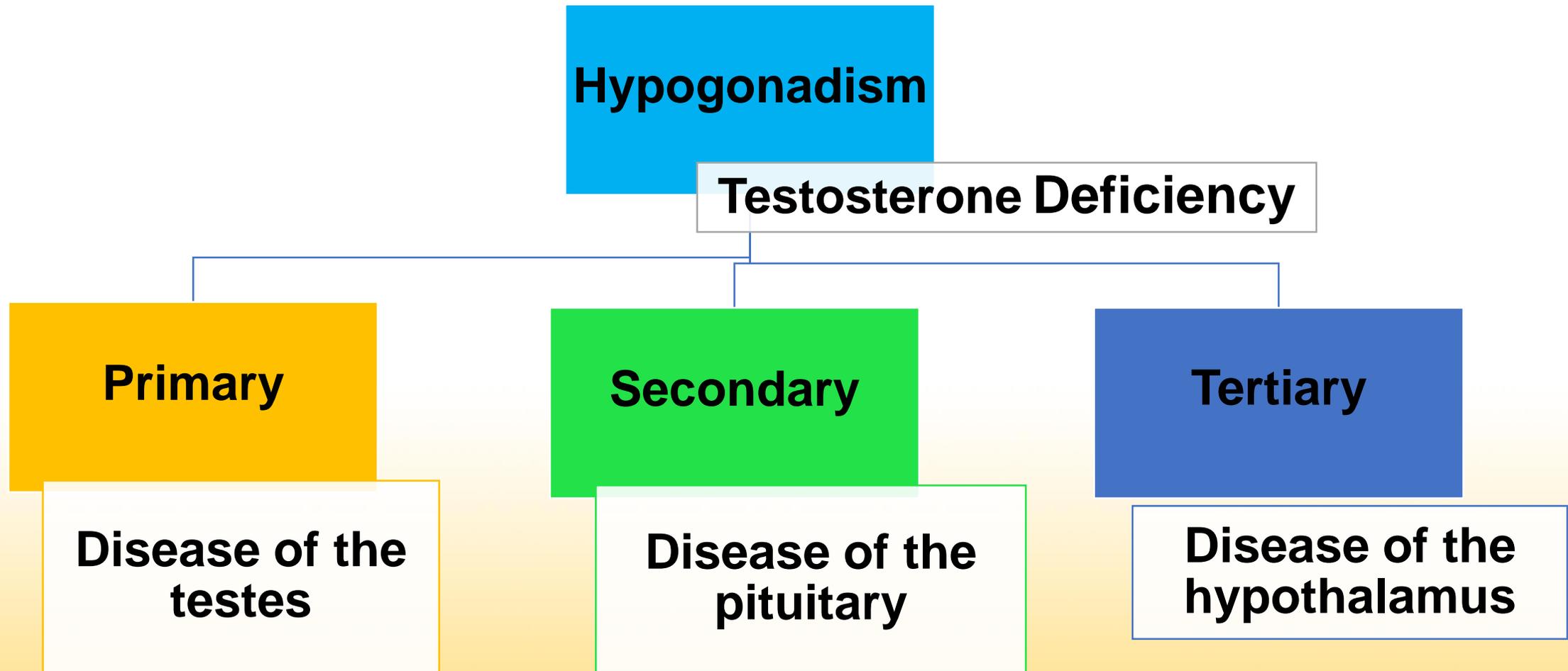


Causes of Testosterone Deficiency

ENDOCRINE SYSTEM

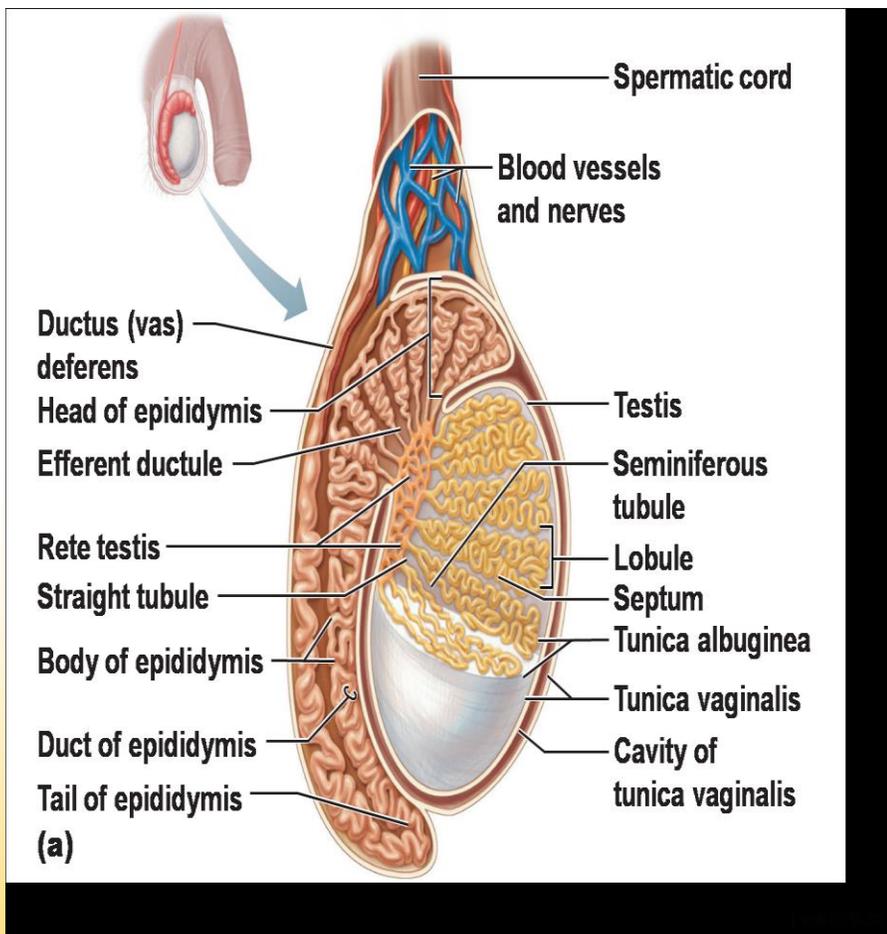


Causes of Testosterone Deficiency



Causes of Testosterone Deficiency

Primary Hypogonadism



Trauma



Infections, especially Mumps



Radiation



Medications



Congenital Abnormalities



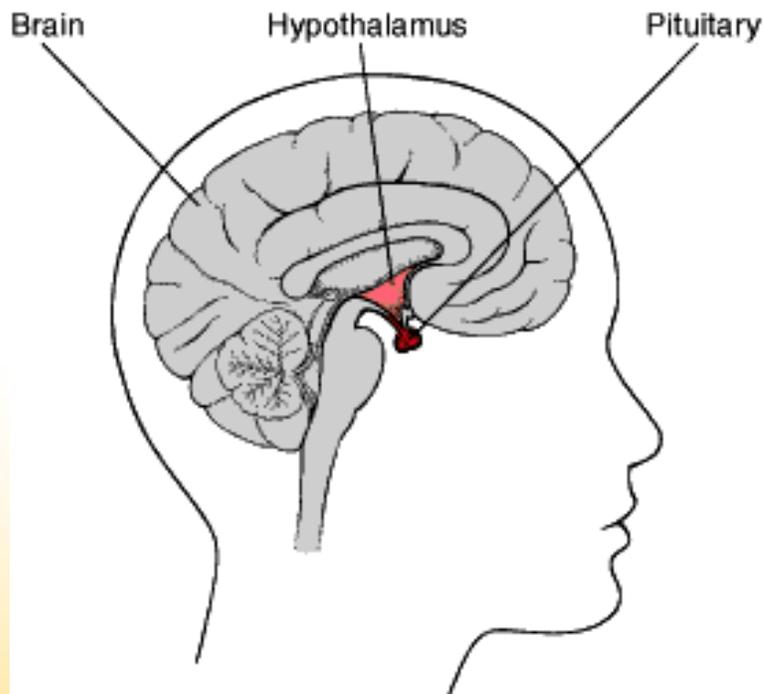
Idiopathic

Clinical Features and Diagnosis of Male Hypogonadism." UpToDate, www.uptodate.com
Image source: <https://ui-ex.com/explore/gonads-clipart-anatomy/>



Causes of Testosterone Deficiency

Secondary Hypogonadism



-  Congenital Abnormalities
-  Deficiency of Pituitary hormones
-  Opiates
-  Infections
-  Damage to Gonadotroph Cells

Clinical Features and Diagnosis of Male Hypogonadism.” UpToDate, www.uptodate.com
Image source: <https://ui-ex.com/explore/gonads-clipart-anatomy/>



Causes of Testosterone Deficiency

Miscellaneous Contributors

Diabetes
mellitus

Age

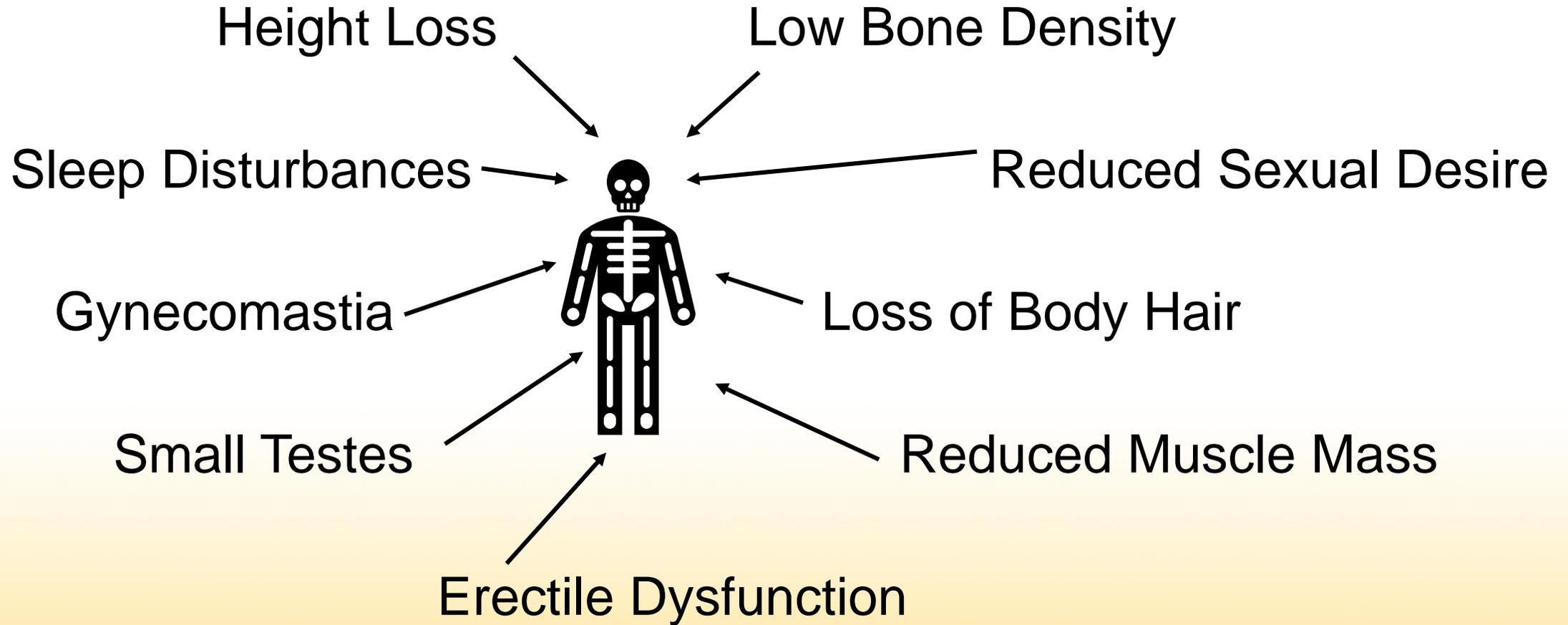
Hypertension

COPD

Kidney
Disease



Signs and Symptoms



Case Scenario

A 65 year-old man is evaluated for fatigue, weakness, and erectile dysfunction, which have been progressing over the last few years. He describes disrupted sleep, waking up approximately two to three times per night.

On physical examination blood pressure and vital signs are normal. Visual fields are full to confrontation. Testes are normal size and without masses.

What is the Possible Diagnosis?



Alternative Diagnoses

Depression

Hypothyroidism

Pituitary Lesions

Adrenal Tumor

Drugs

Malnutrition

Prolactinoma



Evaluation and Diagnosis

As suggested by the Endocrine Society Guidelines, physicians should check testosterone levels when the prevalence is high and symptoms are present.

Situations in which the prevalence is high

- **Medications that affect testosterone production**
- **Infertility**
- **Type 2 Diabetes**
- **End Stage Renal Disease**
- **Osteoporosis**



Additional Diagnostic Considerations

- Measurement of the serum testosterone concentration is usually the most important single test
- The **normal range** in adult men in most laboratories is approximately 300 to 800 ng/dL
- Measurement of the serum **free** testosterone concentration is worthwhile in certain situations
- Two common situations of abnormal testosterone binding may occur 1) obesity and 2) aging



Additional Diagnostic Considerations

Fire Fighters seeking testosterone screenings should:

- Contact an Endocrinologist or a Urologist specializing in the diagnosis and treatment of Low-T
- DO NOT go to a “men’s clinic”
- Labs must be drawn first thing in the morning, after fasting for 12 hours, and after a full night of sleep
- If low levels are found, a repeat test should be done under the same conditions 2-3 weeks later
- 2 separate tests are required for an accurate diagnosis



Part 3

- Scope of problem
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Case

41 y/o male firefighter (12 year career) works at busy station (24-48 shift) complains of one year of increased fatigue, weight gain, poor sleep. PMH includes HTN, prediabetes (HA1C 5.9), OSA, Low HDL Chol, BMI (31). NFPA 1582 EKG stress test normal. VO2Max = 38 ml/kg/min. Drinks 2 beers per night off shift at home.

- Other labs normal including thyroid, but Total Testosterone Level of 265 ng/dl
- Diagnosis: Metabolic Syndrome with Low Testosterone
- Doctor wants to place patient on Androgel

What are options and what is best next step?



Lifestyle Factors Published References

- Kumagai et al (2015) 12-wk lifestyle modification program involving aerobic exercise and diet modification significantly increased testosterone levels.
- Heufelder et al (2009) 52-wk program of diet and exercise significantly increased mean serum testosterone levels.
- Camacho et al (2013) Individuals who lost 10% of weight between visits showed a significant increase in testosterone levels.
- Corona et al (2013) Weight loss through low-calorie diets or bariatric surgery was associated with significant increases in total testosterone levels.
- Santamaria et al (1998) Significant improvement in sleep among men with OSA who were treated had significant increases in testosterone level at 3 months.
- Leproult and Van Cauter (2011) Restriction of sleep to 5 h/night decreased testosterone levels by 15%.

Sexual Medicine Reviews 2018



Lifestyle Factors Published References

- Singer and Zumoff (1992) Men with high stress levels had significantly lower serum testosterone levels compared to control subjects (men with low or normal stress)
- Guay et al (2010) Men with higher work stress had higher than expected incidence of hypogonadism
- Su et al (1995) Varicocele surgery significantly increased mean testosterone levels
- Tanrikut et al (2011) Varicocele repair significantly increased testosterone levels
- Sathya Srini and Belur, Veerachari (2011). Significantly increased total testosterone levels were found at 12-mo follow-up after varicocelectomy
- Li et al 2012 Mean serum total testosterone significantly increased after varicocelectomy
- Hiroshi Kumagai et al (2016) Increased physical activity has a greater effect than reduced energy intake on lifestyle modification-induced increases in testosterone

Sexual Medicine Reviews 2018



Lifestyle Factors

What are preventable reasons for low T?

- Sleep deprivation
- Excessive exercise/overtraining
- Obesity
- Work demands/stress
- Alcohol
- Marijuana

Hirokawa K, Taniguchi T, Fujii Y, et al. Modification Effects of Changes in Job Demands on Associations Between Changes in Testosterone Levels and Andropause Symptoms: 2-Year Follow-up Study in Male Middle-Aged Japanese Workers. In J Beh Med. 2016;23:464–472



Lifestyle Factors

What functional reasons for low T?

- Some low T levels are considered “functional” meaning that they are due to another cause rather than the T hormonal pathway.
- Medications such as opioids, anabolic steroids and prohormones (Andro, DHEA, etc)
- Nutritional deficiency
- Obstructive sleep apnea
- Chronic illness
- Overweight: According to a Harvard Men's Health Watch article, a five-point increase in body mass index (e.g., from 30 to 35) lowers Testosterone levels as much as 10 years of aging.

Harvard Men's Health Watch. <https://www.health.harvard.edu/mens-health/a-new-look-at-testosterone-therapy>. May, 2016 (accessed 4/13/2019)



Mitigation Strategies

- Establishment of positive sleep hygiene and consideration of referral for assessment of sleep apnea signs and symptoms;
- Referral to clinicians trained to treat the specific behavioral health concerns of the warrior culture occupation community;
- Referral to endocrine or urology specialist to diagnose and treat as needed the presence of testosterone deficiency;
- Establishment of diet and exercise regime geared toward the reduction of body fat and increase in muscle mass and cardiovascular fitness.



Medication Use

- An oral form of Testosterone was approved by the US Food and Drug Administration in March 2019. (<https://www.fda.gov/news-events/press-announcements/fda-approves-new-oral-testosterone-capsule-treatment-men-certain-forms-hypogonadism>)
- After starting therapy, follow-up with your physician periodically to have T levels and other lab tests checked to make sure the therapy is not causing any problems with your prostate or blood chemistry. Monitoring hematocrit is especially important for fire fighters.



Caution on Gels

- Users of AndroGel are advised to avoid “fire, flames, or smoking” until the gel has dried since they are alcohol-based.
- Avoid showering for at least 5 hours after application (counter to some decon procedures promoted for cancer prevention).
- If taking this medication, firefighters should not apply product within 5 hours of a shift that require fire suppression activities.



Treatment

Fire Fighters diagnosed with Low-T must implement lifestyle changes before, or in addition to TRT:

- Dedicated exercise regime
- Dedicated diet and weight loss plan
- Establishment of consistent sleep hygiene
- Relationship with licensed behavioral health professional specializing in warrior culture issues and treatment
- Smoking/tobacco cessation
- Decrease alcohol consumption



Take Home Points

- If you have potentially reversible causes of low testosterone levels, should first be treated with lifestyle modification and avoid the need for T supplementation.
- Avoid clinics that market to men and focus only on non-specific symptoms. Avoid clinics that don't follow the T measurement criteria discussed. If found to have low T, get a second opinion from an endocrinologist.
- Specifically, to prevent low testosterone in light of the inherent risk factors of low testosterone associated working as a firefighter, establish positive lifestyle practices such as a regular exercise regime (including cardiovascular exercise and strength training), a healthy diet, a plan for improving sleep, achieve optimal body weight, and implement a daily stress management plan and activity.



Resources

- The Endocrine Society has published guidelines of specific conditions in which T should not be prescribed. These include men planning to procreate, men with breast or metastatic prostate cancer or PSA test results above specific levels and other reasons.
- US FDA: Androgen testing and replacement
- If need further information: kuehlk@ohsu.edu, IAFF @ rdoctor@iaff.org



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