

## Goals of Testosterone Replacement Therapy in Adult Men (50 yrs or older)

- ▶ Improvement in psychological well-being and mood
- ▶ Improvement in erectile dysfunction
- ▶ Improvement in libido
- ▶ Increased muscle mass
- ▶ Increased strength and stature
- ▶ Preservation of bone mass
- ▶ Decrease in cardiovascular risk

*Testosterone replacement can improve:*

**Osteoporosis** - Gradual loss of testosterone is one of the major causes of osteoporosis in elderly men. In one study, 59% of men with hip fracture had low testosterone, compared with 18% of controls. Fracture occurs at a later age in men than women because men's bones are denser at baseline. Several studies have reported beneficial effects of testosterone therapy on bone in older men, showing an increase in bone mineral density (BMD) and slowing of bone degeneration.

**Cardiovascular disease** - Risk is decreased with higher serum total testosterone levels, according to most reports. A number of studies have demonstrated that testosterone minimizes several important risk factors for heart attack by:

- ▶ reducing cholesterol and triglycerides
- ▶ reducing blood glucose levels
- ▶ decreasing visceral fat mass
- ▶ normalizing blood clotting

The degree of atherosclerotic disease increases significantly with declining levels of free testosterone. Visceral fat accumulation is connected with increased vascular risk, and studies have shown that androgen administration can decrease this fat accumulation.

**Depression** - Depression is more common when levels of bioavailable testosterone are low; perhaps because an associated decrease in sexual function results in depression, irritability, and mood swings. In a study which examined the association between levels of sex hormones and depressed mood in 856 men ages 50-89, bioavailable testosterone levels were 17% lower for depressed men. The results suggest that testosterone treatment may elevate depressed mood in older men who have lower levels of bioavailable testosterone.



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Knowledge and attitudes regarding the existence of and treatments for andropause — the “male menopause” — have recently undergone a revolutionary change. Andropause may consist of a variety of signs and symptoms, including:

- ▶ weakness
- ▶ erectile dysfunction
- ▶ fatigue
- ▶ slow wound healing
- ▶ prostate problems
- ▶ disturbed sleep
- ▶ reduced libido
- ▶ osteoporosis
- ▶ depression, anxiety
- ▶ heart disease
- ▶ reduced muscle mass
- ▶ memory impairment
- ▶ atherosclerosis
- ▶ irritability
- ▶ impaired blood cell formation
- ▶ insomnia
- ▶ reduced cognitive function

Numerous changes are associated with an age-related decline in the hormone testosterone, which is classified as an androgen. Some men may go through a rather sudden change in testosterone levels that might correlate with the hormonal changes that women experience at menopause. However, most men have a slower and more subtle hormonal decline, and develop symptoms over a period of time. Symptoms of testosterone deficiency are often attributed to other problems, denied by the patient, and unrecognized health care professionals.

## Natural Testosterone Replacement is Central to the Treatment of Andropause.

When hormones are replaced or restored back to physiologic levels considered normal for younger males, men may experience a dramatic reversal of many of these changes.

On the average, a man's testosterone levels begin to decline at a rate of 1% per year after age 40. It is estimated that 20% of men aged 60-80 years have levels below the lower limit of normal. The diagnosis of low testosterone levels (medically termed “hypogonadism”) is based on the presence of signs or symptoms and must be confirmed by laboratory testing, which should include Total Testosterone, Bioavailable Testosterone (Free plus Albumin Bound), Estradiol, Cholesterol, Prostate Specific Antigen (PSA), Complete Blood Count (CBC), Hemoglobin, and Hematocrit. Screening for potential risks of androgen therapy should be performed prior to the initiation of treatment.

Evaluation should include a history of or potential for sleep apnea, arrhythmias, significant symptoms of benign prostatic hypertrophy (BPH), personal or family history of prostate carcinoma, and a physical exam. Proper monitoring of laboratory values and clinical response are essential when prescribing testosterone replacement therapy.

## What is the Optimal Form of Testosterone for Replacement Therapy?

Testosterone USP is natural testosterone that has been approved by the United States Pharmacopoeia and is available as a bulk chemical. Upon a prescription order, compounding pharmacists can use Testosterone USP to compound numerous dosage forms. The information that follows should be considered as prescriber, patient, and pharmacist work together to meet the specific needs of each patient.



A healthy adult male secretes 8-15mg/day of testosterone. This “physiologic dose” should be considered when prescribing replacement therapy. Excessive doses leading to high serum levels of testosterone can result in a greater conversion to estradiol (and side-effects resulting from abnormally high estradiol levels), because the body can not effectively store excess testosterone. This may be a reason to administer testosterone on a daily basis, rather than using long-lasting injections.

Testosterone is well-absorbed from transdermal (topical) creams and gels. Dosage forms also include sublingual drops, buccal or sublingual troches, or tablet triturates. These offer excellent alternatives to oral Testosterone USP tablets, because testosterone that is absorbed through the gastrointestinal tract passes directly into the blood vessels supplying the liver, where the drug is significantly inactivated.

Compounded preparations can be very advantageous. For example, there is no need to shave the area to apply transdermal testosterone preparations. The medication can be administered as a single dose (rather than multiple patches), and there is no skin irritation from patch adhesive. The cream or gel can be applied two or three times daily to simulate the normal circadian rhythm.

In the form known as Testosterone Cypionate, testosterone can be administered by intramuscular injection every 1-3 weeks. However, release may vary widely from patient to patient, resulting in significant fluctuations in serum testosterone levels. Polycythemia, a serious blood disorder, is more common with 10-14 day regimens.

The only absolute contraindications to androgen replacement therapy are the presence of prostate or breast cancer. Although it is known that the clinical course of prostate cancer is accelerated by testosterone, its incidence is not known to be increased by testosterone administration. There is no clear evidence that testosterone replacement accelerates the development of BPH.

Natural testosterone must not be confused with synthetic derivatives or “anabolic steroids,” which when used by athletes and body builders have caused disastrous effects, including heart problems and cancer. The term “testosterone” is often used generically when referring to numerous synthetic derivatives, as well as natural testosterone.

The confusion surrounding testosterone transcends the lay person; it is responsible for conflicting data in the medical literature about the benefits and risks of testosterone therapy. Studies must be reviewed carefully to determine the form of testosterone that was used. For example, administration of synthetic non-aromatizable androgens, like stanozolol or methyltestosterone, causes profound decreases in HDL-C (“good cholesterol”) and significant increases in LDL-C (“bad cholesterol”), and has been associated with serious heart disease. Yet, hormone replacement with testosterone, an aromatizable androgen, results in lower total cholesterol and LDL cholesterol levels while having little to no impact on serum HDL cholesterol levels. In the doses needed for male hormone replacement, methyltestosterone causes a rise in liver enzymes and cholesterol, peliosis of the liver, and liver toxicity, and is not recommended.



A healthy lifestyle has been shown to be associated with higher hormone levels, and higher hormone levels seem to induce a more active, healthier lifestyle. When hormone levels decline, men often become less active and gain weight. As weight increases, hormones are stored in fat and become unavailable to meet the body's demands. Lack of exercise, excessive alcohol use, and many diseases can reduce bioavailable hormone levels. For optimal results, it is vital that hormone replacement therapy be combined with adequate exercise, proper nutrition, and appropriate use of natural supplements.

## Healthy Lifestyle

Considerations in andropause treatment should include:

- ▶ the role of dihydrotestosterone (DHT) and its relationship with benign prostatic hypertrophy (BPH), levels of DHT, and even DHT supplementation.
- ▶ the use of 5-alpha reductase inhibitors and aromatase inhibitors to modify the amount of the metabolites DHT and estradiol that are produced when testosterone is broken down by the body.
- ▶ DHEA (dehydroepiandrosterone) and its role as an “anti-aging” supplement and in the treatment of symptoms of andropause.