The level of bio-available testosterone, along with levels of other androgens, declines as men age.

Senescence in men is associated with a decline in testosterone levels:

5. Harman SM, Metter EJ, Tobin JD, Pearson J, Blackman MR; Baltimore Longitudinal Study of Aging. Longitudinal effects of aging on serum total and free testosterone levels in healthy men. Baltimore Longitudinal Study of Aging. J Clin Endocrinol Metab. 2001 Feb;86(2):724-31 (the incidence of (overt) hypogonadal testosterone levels increased to about 20% of men over 60, 30% over 70 and 50% over 80 yr of age, and even greater percentages when free T index criteria were employed)

The speed of age-related decline of serum testosterone in men:


Senescence in men is associated with a decline in metabolic clearance of testosterone:


Senescence in men is associated with alterations of the circadian cycle of serum testosterone levels: reduced amplitude and desynchronisation of its circadian rhythm:


The age-related decline of serum testosterone starts at middle age in men:


Senescence in men is associated with a loss of the circadian rhythm of serum testosterone:

Senescence in men is associated with an increased peripheral conversion of androgens into estrogens: the increased estrogen level in aging males may inhibit the androgen production

14. Drafta D, Schindler AE, Stroe E, Neacsu E. Age-related changes of plasma steroids in normal adult males. J Steroid Biochem. 1982 Dec;17(6):683-7 (“The age related changes of plasma steroids in elderly men, were suggestive of decreased testicular function with increased peripheral conversion of androgens into estrogens. ... The negative correlation between estrone and 17-OH-P (precursor of testosterone) found in elderly men, suggested that increased estrogen level in aging males may be considered able to inhibit the testicular androgen production”)

II) The decline of androgens such as testosterone is associated with physical signs and psychic symptoms generally attributed to aging

1) Low testosterone levels may be associated with lower psychic well-being in men

Low equality of life and fatigue in men: the association with lower testosterone


Depression in men: the association with lower testosterone levels


28. Werner AA. The male climacteric JAMA. 1946; 132 (4):188-94


Anxiety in men: the association with lower testosterone levels

33. Werner AA. The male climacteric JAMA. 1946;132(4):188-94

Memory loss and Alzheimer's disease levels in men: the association with lower testosterone

36. Tan RS, Pu SJ. The andropause and memory loss: is there a link between androgen decline and dementia in the aging male? Asian J Androl. 2001 Sep;3(3):169-74

Insomnia in men: a symptom of testosterone deficiency

45. Werner AA. The male climacteric JAMA. 1946;132(4):188-94

Loss of sexual drive, sensitivity and/or potency in men: the association with lower testosterone levels


2) Low testosterone levels may be associated with poorer physical appearance, body composition and strength in men

Sarcopenia in men: the association with low testosterone levels

levels in hypogonadal men with acquired immunodeficiency syndrome and wasting. J Clin Endocrinol Metab. 1996 Nov;81(11):4051-8

**Reduced muscle strength development with exercise in men: the association with low testosterone levels**


**Lower lean body mass and higher fat mass in men: the association with lower testosterone levels**


**3) Persistent androgen deficiency may increase the risk of age-related conditions in men**

**Hypercholesterolemia in men: the association with lower testosterone levels**


**Atherosclerosis in men: the association with lower testosterone levels**


**Arterial hypertension in men: the association with lower testosterone levels**


**Coronary heart disease in men: the association with lower testosterone levels**


Stroke in men: the association with lower testosterone levels


Obesity in men: the association with lower testosterone levels


Diabetes in men: the association with lower testosterone levels


Rheumatism in men: the association with lower testosterone levels


91. Masi AT. Incidence of rheumatoid arthritis: do the observed age–sex interaction patterns support a role of androgen-anabolic steroid deficiency in its pathogenesis? Br J Rheumatol. 1994;33:697–70


Osteoporosis in men: the association with lower sex hormone levels

**Lower estrogens and androgen levels**


**Lower testosterone levels**


**Hip fractures in men: the association with lower testosterone levels**


**Cancer in men: the association with lower testosterone levels**


Cancer mortality in men: increased risk of low testosterone levels


Diagnosis of Partial Testosterone Deficiency in men

Vermeulen A, Kaufman JM. Diagnosis of hypogonadism in the aging male. Aging Male. 2002 Sep;5(3):170-6 ("The diagnosis of hypoandrogenism in elderly males requires both the presence of clinical symptoms and reduced (free) testosterone levels.")

The importance of clinical testosterone evaluation in men


Werner AA. The male climacteric. JAMA. 1946;132(4):188-94


Black AM, Day AG, Morales A. The reliability of clinical and biochemical assessment in symptomatic late-onset hypogonadism: can a case be made for a 3-month therapeutic trial? BJU Int. 2004 Nov;94(7):1066-70


Serum androgen tests in men


Serum FSH in men

**Serum testosterone in men**


139. Murray MAF, Corker CS. Levels of testosterone and luteinizing hormone in plasma samples taken at 10 minute intervals in normal men. J Clin Endocrinol Metab. 1973; 56: 157


**Serum dihydrotestosterone and androstanediol glucuronide in men**


**Serum PSA in men**


147. Carter HB, Epstein JI, Chan DW, Fozard JL, Pearson JD. Recommended prostate-specific antigen testing intervals for the detection of curable prostate cancer. JAMA. 1997 May 14;277(18):1456-60


**Frequency of overt hypogonadism in men**

152. Harman SM, Metter EJ, Tobin JD, Pearson J, Blackman MR; Baltimore Longitudinal Study of Aging. Longitudinal effects of aging on serum total and free testosterone levels in healthy men. Baltimore Longitudinal Study of Aging. J Clin Endocrinol Metab. 2001 Feb;86(2):724-31 (*"the incidence of (overt) hypogonadal testosterone levels increased to about 20% of men over 60, 30% over 70 and 50% over 80 yr of age, and even greater percentages when free T index criteria were employed"")

**Use of youthful (young adult) male reference values in the interpretation of laboratory tests**

153. Vermeulen A, Kaufman JM. Diagnosis of hypogonadism in the aging male. Aging Male. 2002 Sep;5(3):170-6 (*"In the absence of convincing arguments for altered requirements with age, we consider that the normal range of (free) testosterone levels in young adults is also valid for elderly"*)
Borderline androgen deficiencies in men should be treated


IV) Testosterone replacement therapy may offer significant beneficial effects

1) Testosterone may improve psychic well-being in men
Testosterone treatment improves lower quality of life and fatigue in men


O'Connor DB, Archer J, Hair WM, Wu FC. Exogenous testosterone, aggression, and mood in eugonadal and hypogonadal men. Physiol Behav. 2002 Apr 1;75(4):557-66


Okun MS, McDonald WM, DeLong MR. Refractory nonmotor symptoms in male patients with Parkinson disease due to testosterone deficiency: a common unrecognized comorbidity. Arch Neurol. 2002 May;59(5):807-11

Crawford BA, Liu PY, Kean MT, Bleasel JF, Handelsman DJ. Randomized placebo-controlled trial of androgen effects on muscle and bone in men requiring long-term systemic glucocorticoid treatment. J Clin Endocrinol Metab. 2003 Jul;88(7):3167-76


Testosterone treatment relieves depression in men


Testosterone treatment relieves anxiety in men


Testosterone treatment improves memory in men


Testosterone treatment improves sleep disorder in men


Testosterone treatment loss of sexual drive, sensitivity and/or potency in men


2) Testosterone may improve the physical appearance and body composition

Testosterone treatment improves sarcopenia in men
Testosterone treatment improves lean body mass in men


3) Testosterone treatment may help to prevent or slow down age-related diseases in men


Atherosclerosis in men: the improvement with testosterone treatment


Arterial hypertension in men: the improvement with testosterone treatment


Coronary heart disease in men: the improvement with testosterone treatment


221. Lesser MA. Testosterone propionate therapy in one hundred cases of angina pectoris. J Clin Endocrinol. 1946;6:549-57

Peripheral vascular disease (including intermittent claudication) in men: the improvement with testosterone treatment


Stroke in men: the improvement with testosterone treatment


Obesity in men: the improvement with testosterone treatment


Diabetes in men: the improvement with testosterone treatment


Rheumatism in men: the improvement with testosterone treatment


Osteoporosis in men: the improvement with testosterone treatment


Cancer in men: the protection with testosterone or dihydrotestosterone treatment?


V) Caution with testosterone treatment

Testosterone/androgen treatment in men: safety, adverse effects, complications


Importance of reducing excessive levels of estradiol in men


254. Cengiz K, Alvur M, Dindar U. Serum creatine phosphokinase, lactic dehydrogenase, estradiol, progesterone and testosterone levels in male patients with acute myocardial infarction and unstable angina pectoris. Mater Med Pol. 1991 Jul-Sep;23(3):195-8. (**Serum estradiol levels in the patient groups were significantly higher than the control group (p < 0.001). There was a positively good correlation between the serum CPK and LDH levels in acute myocardial infarction and the serum estradiol levels. These results suggest that hyper estrogrenemia may be a risk factor for myocardial infarct in middle-aged men.**)


VI) Is prostate cancer an evidence-based contra-indication for testosterone treatment? It cannot be totally excluded that prostate cancer might constitute a contra-indication. However, there appears to be very little solid supporting evidence, despite the body of research on this issue.

**Prostate cancer epidemiology**

On the important annual incidence of (detected) prostate cancer in men who are alive in the United States


On the very high incidence of prostate cancer when biopsies are made in men aged 62 or over, even with low serum PSA

2. Meikle AW, Stanish WM. Familial prostatic cancer risk and low testosterone. J Clin Endocrinol Metab. 1982 Jun;54(6):1104-8. (Among the 2950 men (age range, 62 to 91 years), prostate cancer was diagnosed in 15.2 %, 14.9 % of the prostate cancers had a Gleason score of 7 or higher. The prevalence of prostate cancer was 6.6 % among men with a PSA level of up to 0.5 ng/ml, 10.1 % among those with values of 0.6 to 1.0 ng/ml, 17.0 % among those with values of 1.1 to 2.0 ng/ml, 23.9 % among those with values of 2.1 to 3.0 ng/ml, and 26.9 % among those with values of 3.1 to 4.0 ng/ml. The prevalence of high-grade cancers increased from 12.5 % of cancers associated with a PSA level of 0.5 ng/ml, or less to 25.0 % of cancers associated with a PSA level of 3.1 to 4.0 ng/ml. Conclusions: biopsy-detected prostate cancer, including high-grade cancers, is not rare among men with PSA levels of 4.0 ng per milliliter or less — levels generally thought to be in the normal range.)

On the real incidence of prostate cancer: much higher prevalence rate of prostate cancer is found at post-mortem

3. Stemmermann GN, Nomura AM, Chyou PH, Yatani R. A prospective comparison of prostate cancer at autopsy and as a clinical event: the Hawaii Japanese experience. Cancer Epidemiol Biomarkers Prev. 1992 Mar-Apr;1(3):189-93. (**3.6% of men in life were diagnosed with prostate cancer, whereas 27% of autopsied Hawaii Japanese men who died after 50 years of age had prostate cancer, reaching a frequency of 63% among men over 80 years of age. The volume of 46(60%) of these cancers was less than 150 mm3. These small tumors would probablynot have been discovered in a screening program. Tumors larger than 1000 mm3 would probably be discovered using modern diagnostic procedures but were found in only 13 (4.4%) of the autopsied men)**

4. Oishi K, Yoshida O, Schroeder FH. The geography of prostate cancer and its treatment in Japan. Cancer Surv. 1995;23:267-80. (**The vast majority of cases of prostate cancer remain undetected during life, the prevalence of prostate cancer detected at autopsy being 2800 times that of lethal cancer in Japanese in Japan, 570 times in whites in the USA and 470 times in blacks in the USA. A case-control study of prostate cancer carried out in Japan and the Netherlands revealed a number of...**)
statistically significant risk factors, including ... no morning erections, , episodes of sexually transmitted disease, lower plasma testosterone and dihydrotestosterone concentrations.

5. Sanchez-Chapado M, Olmedilla G, Cabeza M, Donat E, Ruiz A. Prevalence of prostate cancer and prostatic intraepithelial neoplasia in Caucasian Mediterranean males: an autopsy study. Prostate. 2003 Feb 15;54(3):238-47 (“The prevalence of prostate cancer (CaP) is 3.58, 8.82, 14.28, 23.80, 31.7, and 33.3% in the 3rd, 4th, 5th, 6th, 7th, and 8th decades, respectively. The rates of high-grade prostatic intraepithelial neoplasia (HGPIN) were 7.14, 11.75, 35.71, 38.06, 45.40, and 48.15% at the 3rd, 4th, 5th, and 8th decades of life... In 21/27 cases (77.7%), an association between CaP and HGPIN was found. The prevalence of both lesions in Caucasian Mediterranean males is significantly lower than in Caucasian American and Afro-American males in all the age groups evaluated.”)

7. Baron E et al. Arch Path. 1941,32:787-93

Prostate cancer patients have a low risk of dying from cancer

9. Stemmermann GN, Nomura AM, Chyou PH, Yatani R. A prospective comparison of prostate cancer at autopsy and as a clinical event: the Hawaiian Japanese experience. Cancer Epidemiol Biomarkers Prev. 1992 Mar-Apr;1(3):189-93. (“Prostate cancer was diagnosed in life among 274 of 8006 (3.6%) members of a cohort of Japanese men in Hawaii between 1965 and 1990. Only 55 (20%) of the 274 diagnosed cases died with prostate cancer, and they accounted for only 2% of the 2893 deaths that occurred among the men during this period.”)

Prostate cancer, esp. non-metasized, is rarely a cause of death in men


Side effects of testosterone/androgen deprivation therapy of prostate cancer

Androgen deprivation therapy may severely impair the quality of life

13. Dacal K, Sereika SM, Greenspan SL. Quality of life in prostate cancer patients taking androgen deprivation therapy. J Am Geriatr Soc. 2006 Jan;54(1):85-90 (“Participants receiving androgen deprivation therapy (ADT) reported significantly poorer quality of life in the areas of physical function (P<.001), general health (P<.001), and physical health component summary (P<.001) than men not receiving ADT; After controlling for comorbidity, total testosterone level rather than ADT accounted for a small yet statistically significant percentage of the total variance of the physical health.”)
14. Chen AC, Petrylak DP. Complications of androgen-deprivation therapy in men with prostate cancer. Curr Urol Rep. 2005 May;6(3):210-6 (“Androgen-deprivation therapy (ADT) is indicated for the treatment of metastatic prostate cancer and locally advanced disease. In addition to sexual side effects, long-term ADT results in several other changes, including hot flashes; gynecomastia; changes in body composition, metabolism, and the cardiovascular system; osteoporosis; anemia; psychiatric and cognitive problems; and fatigue and diminished quality of life.”)

Androgen deprivation causes anaemia


Androgen deprivation causes impotence


Androgen deprivation therapy may cause urinary incontinence

Androgen deprivation therapy generates a greater rate of bone loss in men with prostate cancer

Testosterone deprivation therapy increases arterial stiffness in men with prostate cancer

Dihydrotestosterone deprivation therapy increases the risk of aggressive prostate cancer

Arguments against population-based PSA screening for prostate cancer and against treatment of prostate cancer:

1. High prevalence rates of prostate cancer at postmortem
2. Increasing biopsy rates leads to overdiagnosis and overtreatment
3. Despite widespread use of such tests in the USA, and apparent incidence rates of detected prostate cancer almost 3 times higher than in the U.K., the mortality in the USA has for many years been almost the same as in the U.K. and other European countries
4. 1/3 of screen-detected cases are incurable
5. No clear benefit of treatment
6. Side effects of prostatectomy include impotence in a large proportion of cases and incontinence in a smaller proportion
7. Screening and follow-up of treatment (much of which may be unnecessary) is expensive (high costs)
8. Few years of life to gain in many elderly patients
9. No consequent reduction in mortality has yet been demonstrated in a randomized controlled trial


ARGUMENTS FOR TESTOSTERONE THERAPIES in prevention of prostate cancer

HUMAN STUDIES:

Studies where low testosterone apparently increases the risk of prostate cancer

The urinary free testosterone decreases with aging, while the incidence of prostate cancer increases

Low serum testosterone is associated with an increased prostate cancer risk


**Low serum testosterone levels have been found in prostate cancer patients**


**Close to statistical significance lower testosterone levels in prostate cancer patients**


**Low testosterone levels are found in prostate cancer patients and in their (not yet affected) relatives with familial predisposition to prostate cancer**


A **high serum SHBG** (and thus less bioavailable testosterone) **is found in men with family history of prostate cancer**


**A high incidence of prostate cancer is found in patients with low testosterone and normal digital rectal examination and normal PSA (≤ 4 ng/ml)**

Low serum levels of total and bio-available testosterone are found in populations with a higher risk of prostate cancer (such as African-Americans and whites)


Studies where a low serum dihydrotestosterone (DHT) was found in prostate cancer patients


A study where DHT is inversely, significantly, and strongly associated with the risk of prostate cancer


Studies where close to statistical significance lower DHT levels were found in prostate cancer patients


High grade prostate cancers are associated with low testosterone levels


Gene polymorphisms with increased risk of high grade prostate cancer are associated with low testosterone levels


Metastatic prostate cancer (PC) is associated with a low serum testosterone compared to localized PC


A low serum testosterone level in patients with metastatic prostate cancer predicts a worse response to androgen withdrawal therapy (progression to androgen-independent prostate cancer)


Lower prostate tissue levels of DHT (but similar levels of testosterone) are found in men with recurrent prostate cancer compared to men with benign prostate hypertrophy


Low testosterone levels are associated with an increased prostate cancer mortality in prostate cancer patients


A study where low testosterone levels are found in men with benign prostate hypertrophy


A study where a low androstanediol glucuronide level was found in patients with benign prostate hypertrophy


Men with chronic prostatitis have often low testosterone

Yundia IF, Imshinetskaya LP. Testosterone excretion in chronic prostatitis. Andrologia. 1977 Jan-Mar;9(1):89-94 (“In 73.1% of patients considerable reduction of testosterone excretion was revealed. Reduction of testicular endocrine function is in direct correlative dependence on severity of clinical symptoms, duration of disease and form of chronic prostatitis.”)

A history of prostatitis is positively associated with a history of benign prostatic hyperplasia and cancer

Daniels NA, Ewing SK, Zmuda JM, Wilt TJ, Bauer DC; Osteoporotic Fractures in Men (MrOS) Research Group. Correlates and prevalence of prostatitis in a large community-based cohort of older men. Urology. 2005 Nov;66(5):964-70 (“We found positive associations for a history of prostatitis with a history of benign prostatic hyperplasia (odds ratio 8.0, 95% confidence interval 6.8 to 9.5) and a history of prostate cancer (odds ratio 5.4, 95% CI: 4.4 to 6.6)”)

A study where testosterone treatment at high doses prevented the prostate stromal proliferation that estradiol may induce in the presence of physiological concentrations of testosterone


Studies where testosterone treatment appears to protect against prostate cancer

Studies where testosterone/androgen treatment of patients with advanced prostate cancer increased their survival time and quality of life
Studies where testosterone/androgen treatment inhibits the proliferation of human prostate cancer cells or induces their apoptosis in vitro


Studies where testosterone treatment reduces prostate dysfunction complaints (dysuria, nocturia)

74. Flamm J, Kiesswetter H, Englisch M. An urodynamic study of patients with benign prostatic hypertrophy treated conservatively with thyrotherapy or testosterone. Wien Klin Wochenschr 1979 Sep 28;91(18):622-7

75. Kearns WM. Testosterone in the treatment of testicular deficiency and prostatic enlargement. Wisconsin Med J. 1941; 40:927 (testosterone propionate therapy did not reduce the size of the prostate, but reduced the dysuria)

76. Meltzer M. Male hormone therapy of prostatic hypertrophy. Lancet. 1939; 59: 279


78. Markham MJ. The clinical use of peroral methyltestosterone in benign prostatic hypertrophy. Urol Cutan Rev. 1942; 46: 225

79. Markham MJ. The clinical use of testosterone propionate in benign prostatic hypertrophy. Urol Cutan Rev. 1941; 45: 35

80. Laqueur E. Behandlung der Prostathypertropie mit männlichen Hormone (Hombreol) une experimentell Begründung dieser Therapie. Schweiz Med Wochenschr. 1934; 64: 1116


Study where testosterone treatment reduces prostate stromal hyperplasia and prostatic complaints (prostatism)

82. South Med J, 1939, 32: 154

Studies where dihydrotestosterone treatment reduced the prostate volume (-15 to -20% after 1 year treatment)


85. Stiruk-Ware R. Contraception, 1989, 39: 1-191

ANIMAL STUDIES:

Studies where androgen deprivation stimulates the progression of hormone-sensitive mouse prostate cancer cells to hormone insensitive in vitro


Studies where antiandrogens (which cause androgen deficiency) may promote DMAB-induced prostate cancer incidence or increase its malignancy

A study where significantly lower testosterone (and androstenedione) levels are found in mice with prostate inflammation. This means that testosterone (and androstenedione) may be necessary to counter prostate inflammation.

A study where testosterone treatment may prevent benign prostate hypertrophy by inhibiting stromal proliferation-induced by estradiol and by keeping prostate glandular cells health, preventing their atrophy in vitro

A study where testosterone treatment reduces the proliferation of mouse prostate cancer cells in vitro

A study where testosterone treatment reduces the proliferation of guinea pig prostate stroma cells in vitro

A study where testosterone treatment at high doses does not increase the incidence of prostate cancer cells in mice

A study where testosterone treatment of certain species of mice can inhibit prostate cancer growth

Studies where dihydrotestosterone treatment of certain species of rats can inhibit prostate cancer growth

A study where dihydrotestosterone treatment stimulates apoptosis of prostate cancer cells

Breast Cancer in women: protection with testosterone or dihydrotestosterone treatment?

Neutral effects of testosterone therapies
REVIEW STUDIES where the authors did not find an adverse effect of testosterone levels or treatment on the prostate cancer risk

Review studies with conclusions that there is no data to support the view that testosterone treatment could increase the risk of prostate cancer, making e.g. a prostate cancer progress from a preclinical to a clinical stage

103. Rhoden NEJM 2004 (“No compelling evidence at present to suggest that men with higher testosterone levels are at greater risk of prostate cancer or that treating men who have hypogonadism with exogenous androgens increases this risk. In fact, it should be recognized that prostate cancer becomes more prevalent exactly at the time of a man's life when testosterone levels decline.”
104. Basaria S, Wahlstrom JT, Dobs AS. Anabolic-Androgenic Steroid Therapy in the Treatment of Chronic Diseases. J Clin Endocrinol Metab. 2001 Nov;86(11):5108-17 (“...recent reviews suggest that the incidence of prostate cancer is not increased by testosterone administration”)
105. Morales A. Androgen replacement therapy and prostate safety. Eur Urol 2002 Feb;41(2):113-20 (“To date there is no evidence that exogenous androgens promote development of prostate cancer”)
106. Prehn RT. On the prevention and therapy of prostate cancer by androgen administration. Cancer Res. 1999 Sep 1;59(17):4161-4 (“... contrary to prevalent opinion, declining rather than high levels of androgens probably contribute more to human prostate carcinogenesis and ... androgen supplementation would probably lower the incidence of the disease. ... consider the possibility that the growth of androgen-independent prostate cancers might be reduced by the administration of androgens”)

STUDIES with no association between serum androgen levels and prostate disease, including cancer

Studies with no significant difference in plasma testosterone and/or DHT and/or androstanediol glucuronide between prostate cancer patients and controls


Studies with no correlation between serum testosterone and serum PSA

114. Monda JM, Myers RP, Bostwick DG, Oesterling JE. The correlation between serum prostate-specific antigen and prostate cancer is not influenced by the serum testosterone concentration. Urology 1995 Jul;46(1):62-4
A study with no correlation between serum testosterone and prostate tumour volume, weight or Gleason score

117. Monda JM, Myers RP, Bostwick DG, Oesterling JE. The correlation between serum prostate-specific antigen and prostate cancer is not influenced by the serum testosterone concentration. Urology. 1995 Jul;46(1):62-4

A study where therapeutic androgen deprivation (blockade) has no beneficial effect on the evolution of the prostate cancer


A study with no significant association of serum testosterone with benign prostate hyperplasia


STUDIES where testosterone/androgen treatments had no adverse effect on the risk of prostate disease, including the risk of prostate cancer

Small clinical studies, performed before the days of PSA, where androgen treatment, usually with small dosages of androgen, did not stimulate the growth of many prostatic tumors and in some cases the tumours were even inhibited by the treatment; the responses were extremely variable

121. Trunnell JD, Duffy BJ Jr. The influence of certain steroids on the behavior of human prostate cancer. Trans. NY Acad Sci. 1950;II:12:238-41

Studies where testosterone treatment had no significant effect on PSA and/or prostate volume

131. Rhoden EL, Morgentaler A. Influence of demographic factors and biochemical characteristics on the prostate-specific antigen (PSA) response to testosterone replacement therapy. Int J Impot Res. 2005 Sep 22 (No statistical increase: average = 0.31 ng/ml after 1 year of treatment of hypogonadal men)

A study where dihydrotestosterone treatment had no significant effect on serum PSA

Studies where testosterone treatment increases the serum PSA but normalizes it in patients with initial atrophic prostate bringing it up to normal levels without any excessive increase


Testosterone treatment does not increase the incidence of prostate disease

140. Hartnell J, 72nd Endocrine Soc. Meeting, 1990, A 428

A study where previous testosterone propionate treatment (terminated 1 to 7 years before the study) did not increase the risk of prostate hypertrophy or palpable prostate irregularities in men over 45 years, whatever the treatment length or dose


Studies where DHT treatment had no effect on the prostate volume


ARGUMENTS AGAINST TESTOSTERONE THERAPIES in prevention of prostate cancer

Studies that suggest that testosterone may increase the prostate cancer risk

Prostate cancer: the association with high free testosterone levels

144. Parsons JK, Carter HB, Platz EA, Wright EJ, Landis P, Metter EJ. Serum testosterone and the risk of prostate cancer: potential implications for testosterone therapy. Cancer Epidemiol Biomarkers Prev. 2005 Sep;14(9):2257-60; critics: a potential bias may come from nutritional factors: individuals who eat a lot of food related to a higher cancer risk such as meat, particularly if cooked well-done, and/or milk, have also higher levels of testosterone as well as of other hormones associated with a higher cancer risk. Moreover, there is no information in this study on estradiol levels. This is important as the simultaneous presence of high levels of testosterone and estradiol may, following certain reports, increase the prostate cancer (PC) risk, not testosterone levels alone; heavy alcohol drinking, another risk factor for PC, that is in some countries of the world frequent can considerably increase both the estradiol levels and the PC risk in consumers. Other possible bias: data were not adjusted for other PC risk factors such as smoking, nutritional deficiencies, etc.)

145. Mydlö JH, Tieng NL, Volpe MA, Chaiken R, Kral JG. A pilot study analyzing PSA, serum testosterone, lipid profile, body mass index and race in a small sample of patients with and without carcinoma of the
critical: no dietary factors were taken into account, only high BMI as a risk factor, nore was serum SHBG analysed: dehydrated persons have usually high SHBG, and thus higher total testosterone, which is bound to it, but generally low active, bioavailable and free testosterone levels)


Note: on the importance to check dietary factors:

Studies where the consumption of high amounts of protein and saturated fat such as milk products and meat increased testosterone levels


Milk or meat intake may increase the risk of prostate (in fact the increased risk may disappear if the vegetable intake which is lower in meat eaters is taken into account)

Link between meat, milk and/or protein intake, and prostate cancer


A study where higher levels of testosterone were found in patients who are in the advanced D-stage of PC, compared to the levels found in patients in the more moderate B and C-stages of prostate cancer


A study where a higher rate of metastasis (-relapse) is found in prostate cancer patients with testosterone > 500 ng/dl that have been locally irradiated (critic: the irradiation may change the risk)


A study where testosterone treatment increases the growth of prostate cancer: in vitro