

Clinical Uses of FDA-Approved Anabolic-Androgenic Steroids (AAS)

Nelson Vergel



This information is not a recommendation nor is it intended to provide direction regarding diagnoses, treatments, or potential outcomes. Any interpretation of this information is the opinion of Clinic Optimizers and should be used by the prescriber at his/her discretion.

FDA Approved AAS- Human Use

Injectable:

- Testosterone Cypionate and Enanthate, 100 mg/ml, 200 mg/ml (compounded and branded)
- Testosterone Undecanoate (Aveed), 750 mg/3ml
- Nandrolone Undecanoate (compounded), 200 mg/ml

Oral:

- Oxandrolone (compounded and generic), 20 mg (brand), 12.5 & 25 mg (compounded)
- Stanozolol (Winstrol), 5 mg
- Oxymetholone (Anadrol-50), 50 mg

FDA
Approved
AAS-
Veterinary

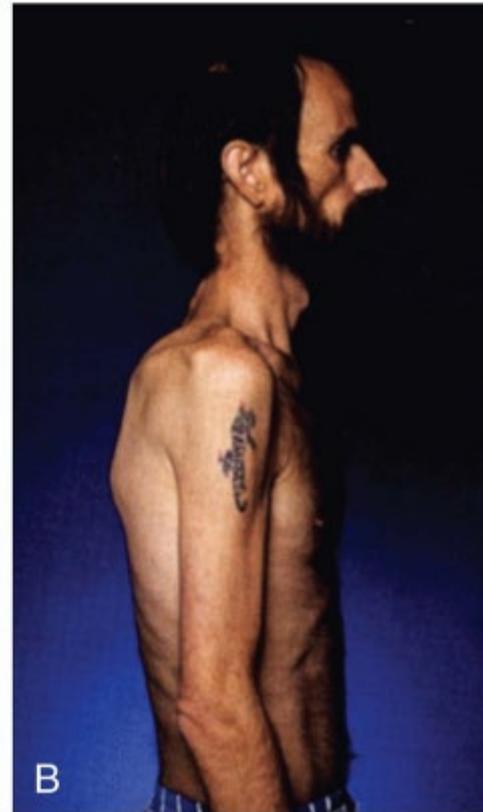
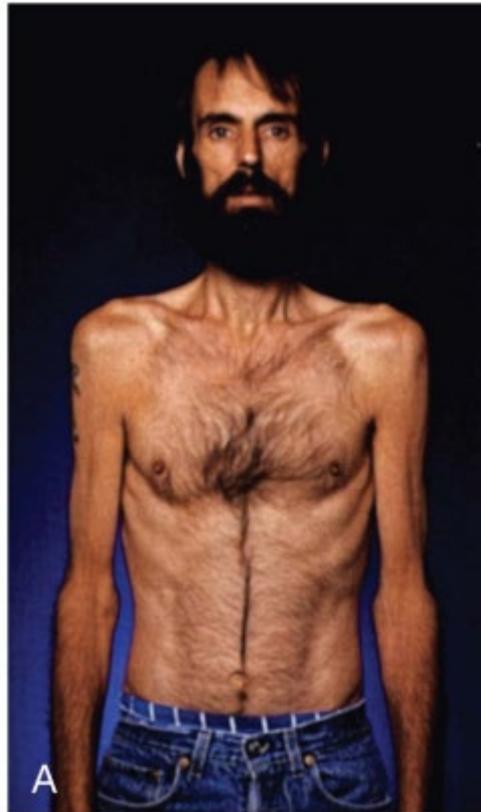
Horses

- Boldenone (Equipoise)
- Stanozolol injectable (Winstrol V)

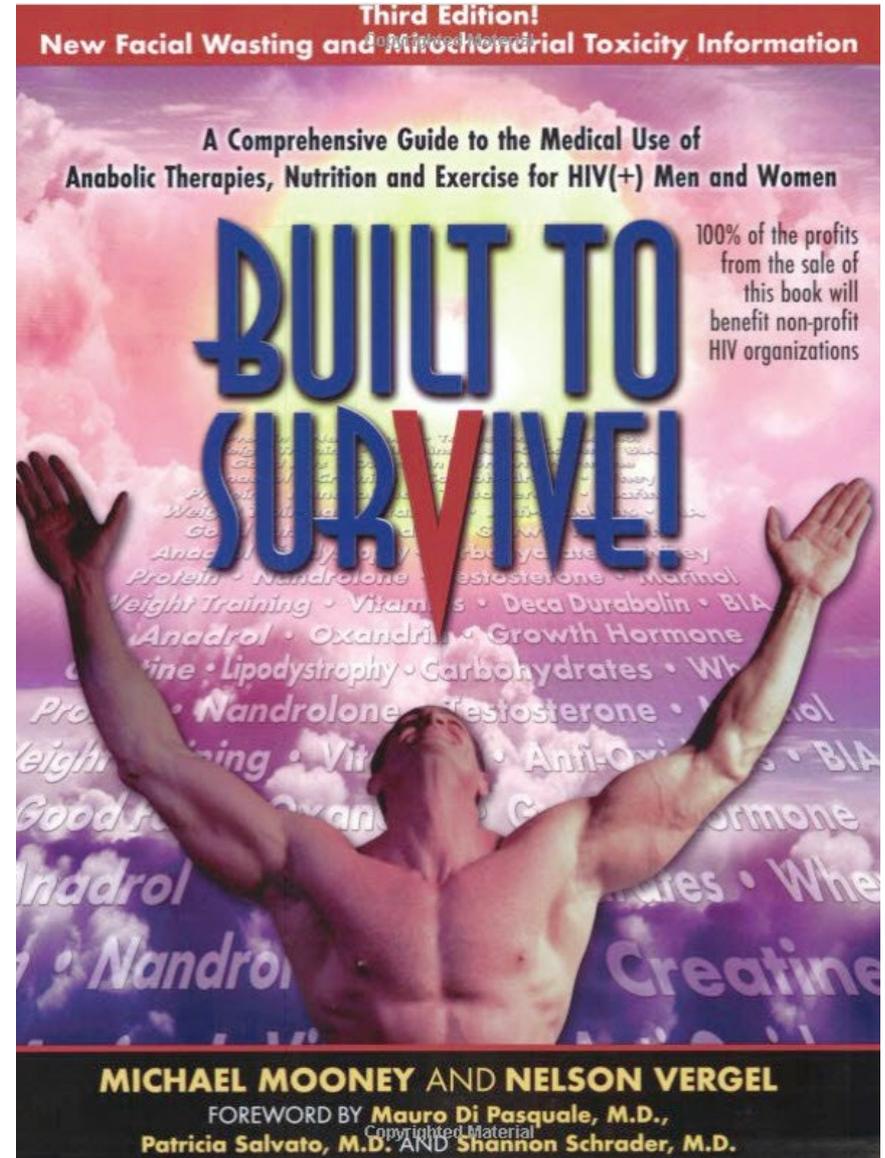
Steers

- Trenbolone (implants with estradiol benzoate)

HIV Related Wasting Syndrome



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mailchi.mp/excelmale.com/testosterone-book

BEYOND TESTOSTERONE

The Best from ExcelMale.com



NELSON VERGEL

(AUTHOR OF TESTOSTERONE: A MAN'S GUIDE
AND COAUTHOR OF BUILT TO SURVIVE)

Compounded AAS Formulations in the United States by Prescription

Oxandrolone capsules: 7mg; 12.5mg; 25mg; 50mg

Stanozolol capsules: 5mg; 10mg; 25mg

Oxymetholone capsules: 5mg; 10mg; 25mg

Stanozolol topical cream (for DHT vaginal/scrotal application):
50mg/mL and 100mg/ML

Nandrolone: 200mg/mL 5mL in grapeseed oil

FDA Approved Testosterone and AAS Compounds

Drug class	Generic name	Trade name@	Route	FDA Approved Indications*	Dosage
A	T propionate	Testex	im	T replacement	25-50 mg 2-3 ×/wk men 10 mg 2-3 wk women
	T enanthate	Delatestryl, Everone, Durathate	im	T replacement	100-200 mg/wk men 25-50 mg/wk women
	T cypionate	Virilon im, Depotest, Andro-Cyp	im	T replacement	100-200 mg/ wk men 25-50 mg/wk women
AC	Nandrolone decanoate	Deca- Durabolin	im	Renal insufficiency-associated anemia	100-200 mg/wk men 25-50 mg/wk women
BC	Oxandrolone	Anavar, Oxandrin	PO	Involuntary weight loss	20-50 mg/d men 5-20 mg/d women
	Oxymetholone	Anadrol	PO	Anemia	5-25 mg/d safe dose men
	Stanozolol	Winstrol	PO	HAE attack prevention	10-25 mg/d men 5-10 mg/d women

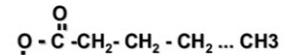
HAE, Hereditary angioedema; PO, taken orally. im: Intramuscular injection

*Clinically justified off-label uses discussed in this presentation

@ These are only a few of the available brand names

Tweaking the Testosterone Molecule to Avoid Rapid Liver Metabolism:

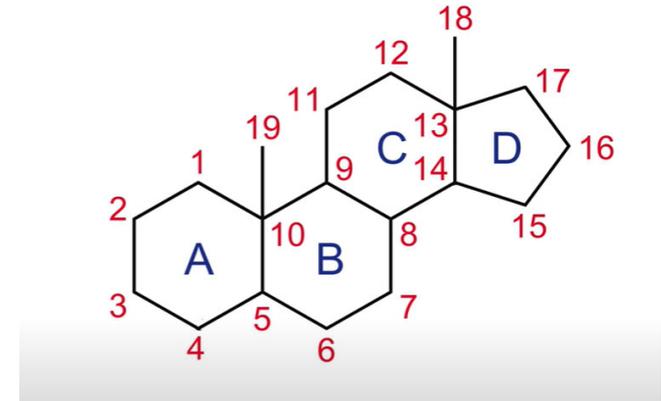
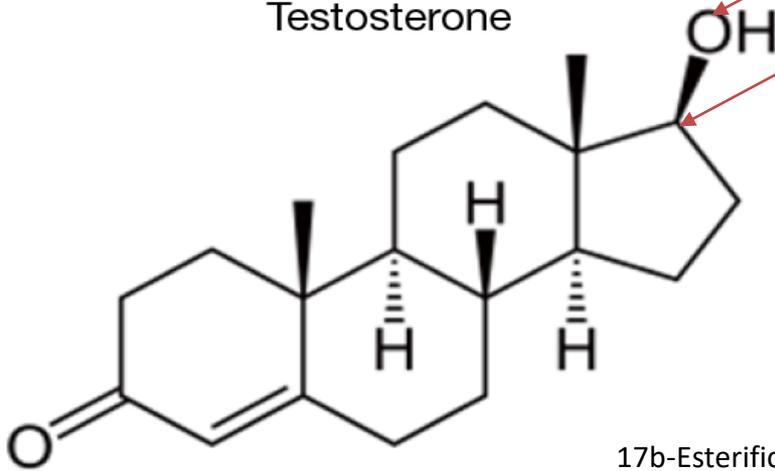
IM Esters and Orals



17b-Esterification (i.m. T esters & Nandrolone)

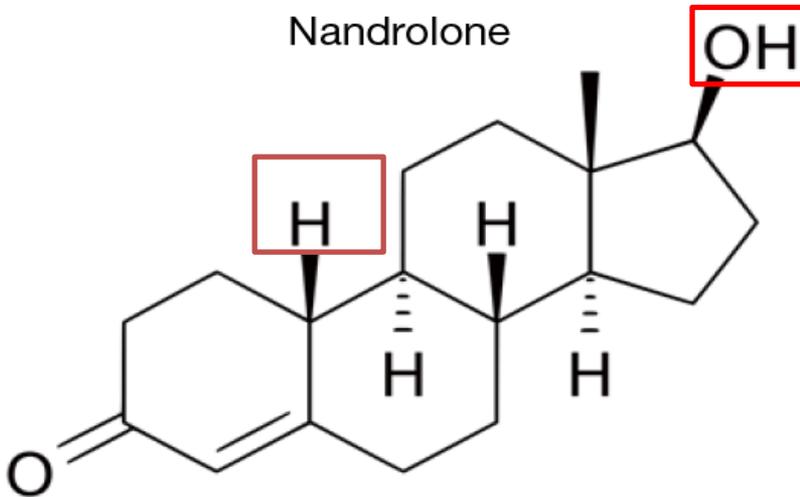
17a-Alkylation (oral AAS)

Testosterone

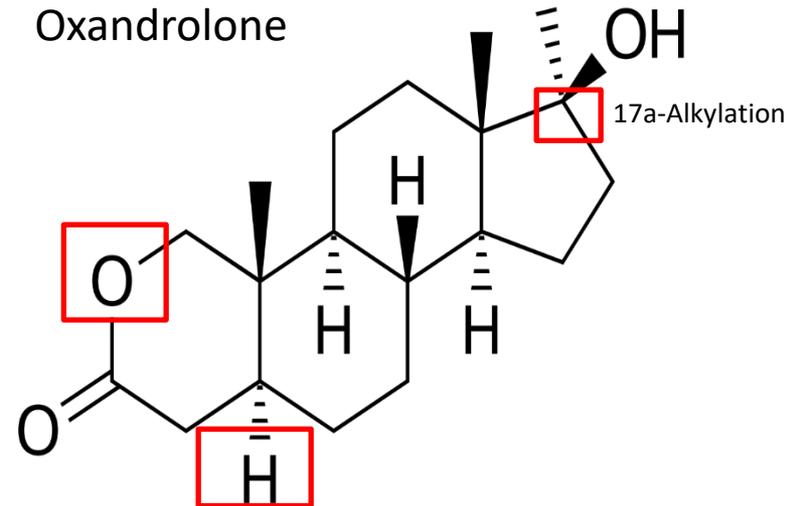


17b-Esterification

Nandrolone



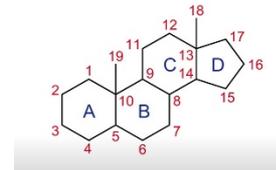
Oxandrolone



Avoiding Rapid T Metabolism: AAS Classification

Since testosterone in its native form is rapidly absorbed and degraded regardless of the route used, the use of modified analogs has become a favored method of androgen administration.

There are three main classes of androgen analogs:



- **Class A** is made up of those analogs produced via esterification of the 17β -hydroxyl group with any of the several carboxylic acid groups. Longer carbon chains in these groups yield androgen derivatives that are more soluble in lipid vehicles, such as those used for i.m. injection. When injected as a solution in oil, they are rapidly absorbed, metabolized, and excreted. Esters are less polar and are absorbed slowly when injected i.m. in oil. Different esters have variable durations of action, and therefore the frequency of administration depends on the type of ester being used.
- **Class B** analogs are those that have been *alkylated at the 17α position*.
- **Class C** analogs are those that are produced via modification of the A, B, or C rings. These analogs often exist in conjunction with those of class A as AC analogs .
- As alkylated analogs and those with a modified ring structure are not metabolized by the liver as quickly as T and its 17β -esterified derivatives, therefore, **class B and C analogs are available for oral use.**

Background: How Anabolic-Androgenic Steroids (AAS) Work

Depending on the specific characteristics of AAS and the type of target cell, various effects are initiated:

- Increase synthesis of proteins
- Increase of rate and speed of transport of amino acids
- Block the effects of glucocorticoids
- Block development of fat-storage cells
- Increase BMR

Effects of AAS

Anabolic Effects of AAS

- Increase protein synthesis
- Increase amino acid transport through cell walls
- Increase appetite
- Increase bone, tendon, ligament structural integrity
- Anti-catabolic: reduce cortisol secretion, and sensitivity
- Promote IGF and HGH secretion
- Increase erythropoietin synthesis
- Retention of Nitrogen
- Promote lean body mass development and fat loss

Androgenic Effects of AAS

- Change in primary and secondary sexual characteristics at puberty in males. Lifelong risk for females (AAS dependent)
- Increase CNS efficiency: alertness, motivation, and mood
- Increase assertiveness
- Increase libido

Side Effects of AAS

Increased red blood cell volume/hematocrit (blood viscosity)

Serum cholesterol changes (increase LDL, decrease HDL)

HPT Axis Shut Down. Shut down of endogenous testosterone production (They should always be used in combination with testosterone replacement therapy TRT)

Hypertension

Hair loss (head)

Virilization in women and clitoral enlargement

Liver enzyme increases (orals)

Heart's left ventricle structural changes with long term use

Gynecomastia (In the presence of low testosterone)

Testicular atrophy

Acne

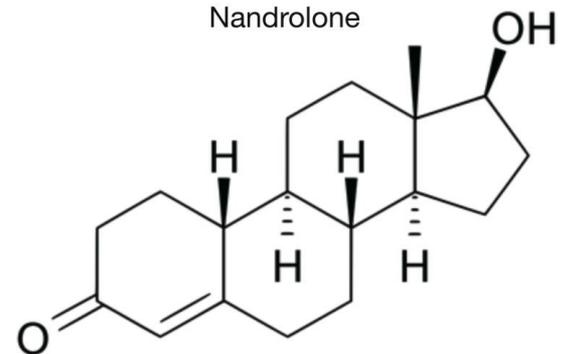
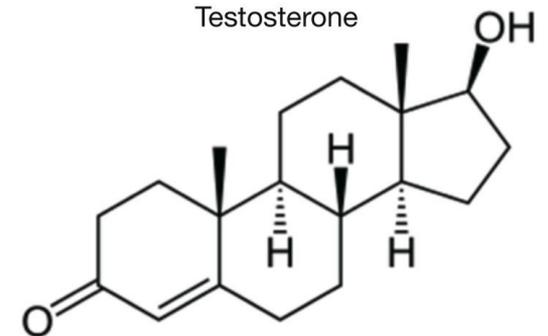
Impaired sperm production

Nandrolone and Oxandrolone: Widely Researched Compounds in Humans

- Nandrolone: 2,250 Studies/Reports
- Oxandrolone: 890 Studies/Reports

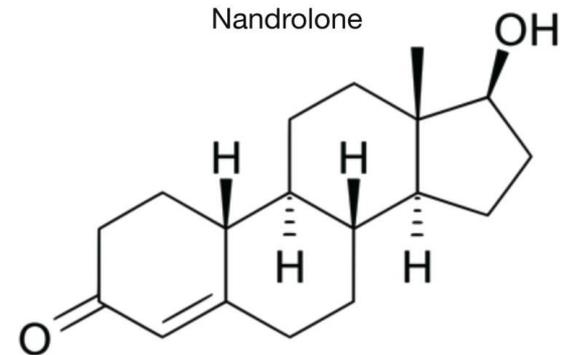
Nandrolone Decanoate- Background

- Nandrolone has a similar chemical structure to testosterone.
- Lacks a methyl group at the 19th position.
- Has an ~10:1 myogenic/androgenic ratio.
- Developed in 1962 by Organon to treat anemia from renal disease.



Nandrolone Basics

- 19-Nortestosterone (or nandrolone) is an anabolic steroid that was first synthesized in 1950.
- One of the main biochemical differences between nandrolone and testosterone is the substitution of a hydrogen atom in the C19 methyl group of testosterone, a change that imparts a favorable anabolic effects .
- It is administered via an intramuscular injection and is metabolized in a similar manner to testosterone, with conversion into 3-norandrosterone by 5α -reductase .



Nandrolone Undecanoate (Old Brand Name: Deca Durabolin)

- Presentation: Injectable (IM-Depot) 200mg/mL x 5 mL
- Common dose range: 100-200 mg per week along with TRT
- Active-life: 7-10 days post injection
- Treatment and Indication:
 - FDA approved in 1983 for treatment of osteoporosis; anemia; and to treat some forms of neoplasia including breast cancer.
 - Indicated for the treatment of anemia associated with chronic and acute renal failure.

Nandrolone Undecanoate

Clinical Off-Label Uses

- Nandrolone has strong evidence in the treatment of cachexia, most commonly in the form of HIV/AIDS wasting syndrome; wasting caused by Tuberculosis; cancer cachexia, etc.
- To induce an increase in nitrogen retention and feed-efficiency for patients suffering metabolic acidosis.
- To treat musculoskeletal injuries and soft tissue trauma. Nandrolone is also prescribed to improve joint pain/injury.
- To treat muscle loss due to M.S and other neurological disease.

Nandrolone- Background

Has been shown to be effective in treating muscle wasting, osteoporosis, and increasing lean mass in eugonadal men.

Animal studies have shown decreased fatty infiltration and improved healing in rotator cuff injury and repair models.

Popular performance enhancing drug amongst athletes because of its reported ability to aid in musculoskeletal recovery.

Anecdotally linked to decreased joint pain without frank injury.

Nandrolone: The Most Studied Anabolic Agent

1. Therapeutic effects of nandrolone and testosterone in adult male HIV patients with **AIDS wasting syndrome** (AWS): a randomized, double-blind, placebo-controlled trial. [2010.07]
2. Beneficial effects of nandrolone decanoate in wasting associated with HIV. [2009.05]
3. Effects of testosterone and nandrolone on **cardiac function**: a randomized, placebo-controlled study. [2007.02]
4. Effects of resistance exercise training and nandrolone decanoate on body composition and muscle function among patients who receive **hemodialysis**: A randomized, controlled trial.[2006.08]
5. Effects of nandrolone decanoate compared with placebo or testosterone on HIV-associated wasting. [2006.04]

More Nandrolone Studies

- A randomized, placebo-controlled trial of nandrolone decanoate in human immunodeficiency virus-infected men with mild to moderate weight loss with recombinant human growth hormone as active reference treatment. [2005.08]
- The effect of nandrolone decanoate on bone mineral density, muscle mass, and hemoglobin levels in **elderly women with osteoporosis**: a double-blind, randomized, placebo-controlled clinical trial. [2005.05]
- Effect of nandrolone decanoate therapy on weight and lean body mass in **HIV-infected women** with weight loss: a randomized, double-blind, placebo-controlled, multicenter trial.[2005.03.14]
- Effects of protein-rich supplementation and nandrolone in lean **elderly women with femoral neck fractures**. [2004.08]
- Body mass reduction markedly improves muscle performance and body composition in **obese females aged 61-75 years**: comparison between the effects exerted by energy-restricted diet plus moderate aerobic-strength training alone or associated with hGH or nandrolone undecanoate. [2004.04]

Nandrolone Studies (III)

- The use of an anabolic steroid (nandrolone decanoate) to improve nutritional status after **esophageal resection for carcinoma**. [1999]
- Nandrolone decanoate is a good alternative for the treatment of **anemia in elderly male patients on hemodialysis**. [1999]
- Nandrolone decanoate for **men with osteoporosis**. [1998.03]



RESEARCH ARTICLE

Open Access

Anabolic steroids after total knee arthroplasty. A double blinded prospective pilot study

Erik Hohmann^{1*}, Kevin Tetsworth², Stefanie Hohmann¹, Adam L Bryant³

The results of this research strongly suggest that nandrolone results in an improved clinical outcome as assessed by the knee society score and significantly increases quadriceps muscle strength after knee replacement surgery. A larger study is needed to confirm findings of this pilot project in order to recommend the general use of low dose anabolic steroids after joint replacement surgery.

Nandrolone Decanoate Improves Joint Pain in Men Within 8 Weeks: A Novel Prospective Pilot Study

Alexander J. Tatem¹, Jonathan A. Beilan¹, Jason R. Kovac², Jabez Gondokusumo¹, Nannan Thirumavalavan¹, Larry I. Lipshultz¹

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 Androgen Society

March 21-22, 2019 / New Orleans, LA

March 21, 2019

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Nandrolone Decanoate Improves Joint Pain in Men Within 8 Weeks: A Novel Prospective Pilot Study

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Tatem et al. Nandrolone decanoate relieves joint pain in hypogonadal men

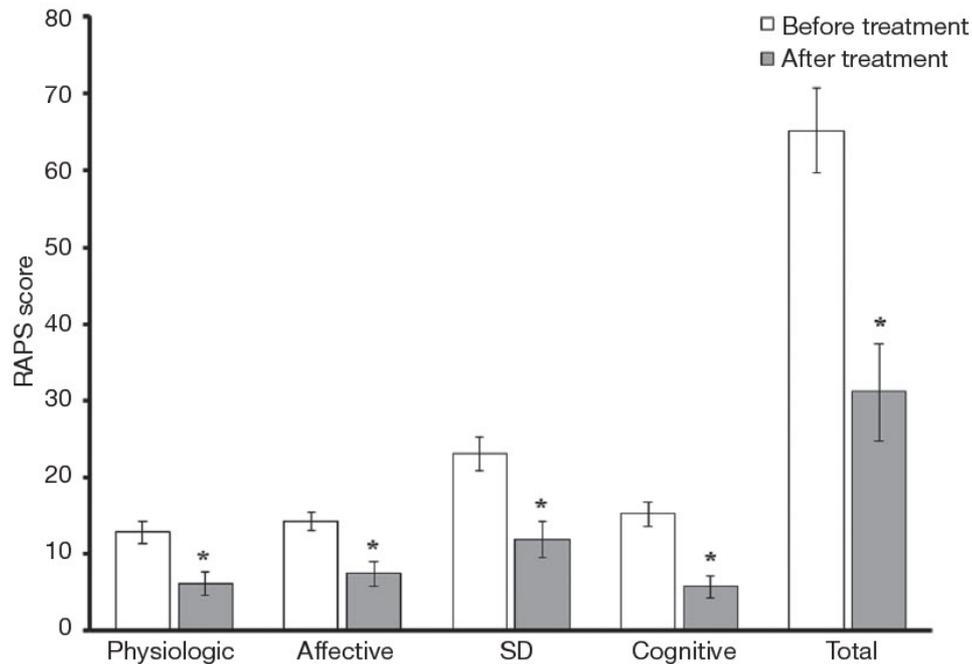


Figure 2 Mean RAPS scores before and after ND treatment. *, $P < 0.05$. RAPS, Rheumatoid Arthritis Pain Scale; ND, nandrolone decanoate;

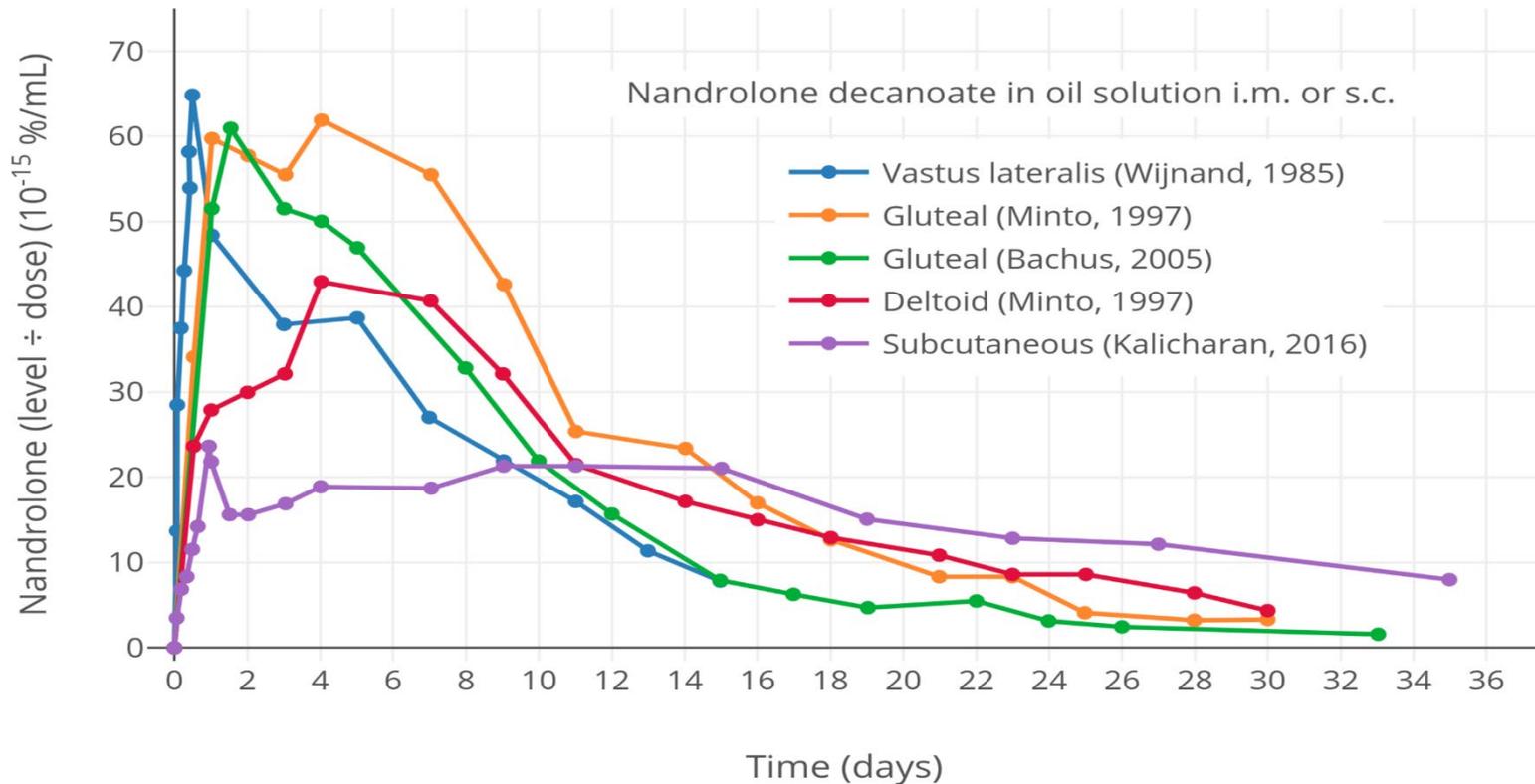
Nandrolone and Lipids

“... intramuscular administration of 200 mg/wk. of nandrolone decanoate (200 mg a week) for eight weeks did not have any effect on serum concentrations of triglycerides, total cholesterol, HDL-C, HDL2-C, and HDL3-C, although a trend to decreased Lp(a) concentration was found.

This may beneficially affect the risk of cardiovascular events.”

Effects of androgenic-anabolic steroids on apolipoproteins and lipoprotein (a)
Br J Sports Med 2004;38:253-259

Nandrolone Has a Long Half Life. Different IM Injection Sites and Subcutaneous



Effect of Nandrolone + TRT on Lab Test Values and Quality of Life

Free Testosterone goes up

HDL goes down

Sex Hormone Binding Globulin (SHBG) goes down

DHT may not go up

Hematocrit goes up

Blood pressure may go up in some men

Joint pain goes down (this effect is unique to nandrolone)

Prolactin does not change

Total T does not go up if LC/MS assay is used (Not ECLIA immunoassay)

ED: No effect if used with TRT

Muscle volumization improves

Strength improves

Water retention can get worse

Appetite may increase

Orals: Stanozolol and Oxandrolone

- The C-17 methyl group enhances oral availability.
- They are weaker androgens than DHT and exert comparatively less androgenic effect. They will not aromatize to estrogenic metabolites.
- Well known as “cutting agents” in the bodybuilder community.
- Can temporarily increase liver enzymes and decrease HDL that normalize after treatment cessation.

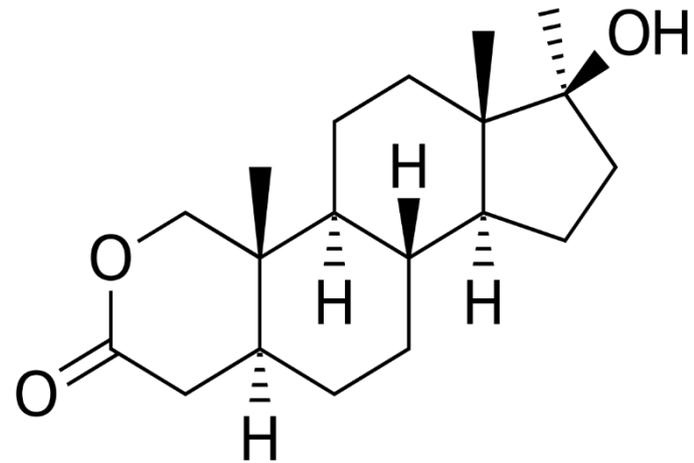
Oxandrolone Basics

- Oxandrolone was first synthesized in 1962 .
- Presentation: Capsule; Tablet; Sublingual Troche
- Oxandrolone capsules: 7mg; 12.5mg; 25mg; 50mg
- Common dose range: 2.5mg-50mg daily
- Active life: 9h-12h
- Treatment and Indication:

Oxandrolone is indicated as an adjunctive therapy to promote weight-gain after weight loss following extensive surgery, chronic infections; or severe trauma, and in some patients who without definite pathophysiologic reasons fail to gain or maintain normal weight.

Oxandrolone Basics

- Characterized by a modification in the basic structure of testosterone to include a substitution of an oxygen atom in place of the methylene group at the C2 position in the steroid ring, this molecule has a 17α -alkylated group at the C17 position that prevents deactivation of this steroid by hepatic first-pass metabolism - allowing for oral administration.
- Given these alterations, oxandrolone also shows resistance to hepatic metabolism further enhancing action



Oxandrolone

- Alpha-alkylated compound mild on the liver
- Non-aromatizing: no estrogen as byproduct
- Non-virilizing: safe for women
- Effective fat loss agent
- Moderate anabolic agent
- Detection time ~ 3 weeks

Oxandrolone Studies

238 papers published in the last 28 years (1992-2020)

- 55 results for Burn/Trauma Patient Care
- 45 results for Turner Syndrome
- 24 results for Halting Weight Loss
- 22 results for AIDS Related Wasting
- 10 results for Cancer
- 9 results for Wound Healing
- 6 results for Hepatitis
- 4 results for Angioedema
- 4 results for Muscular Dystrophy
- 3 results for COPD

Stanozolol (Winstrol)

- Stanozolol capsules: 5mg; 10mg; 25mg
- Common dose range: 5 mg-25mg PO daily
- Stanozolol topical cream (for DHT vaginal/scrotal application): 50mg/mL and 100mg/ML
- Active life: ~8h
- Treatment and Indications:

Stanozolol is indicated prophylactically to decrease the frequency and severity of attacks of hereditary angioedema. Given the serious potential adverse reactions, patients should be placed on the lowest possible effective dose.

Off label used in patients with HIV-related unintentional weight loss and cancer cachexia.

Oxymetholone (Anadrol)

This quite potent AAS is a unique agent. Oxymetholone is C-17 methylated and, thus, is an oral agent. The action of this agent in androgen-sensitive tissues is much like that of DHT and is quite androgenic.

Oxymetholone capsules: 5mg; 10mg; 25mg

Oxymetholone is the only AAS to date considered liver toxic if used long term at doses of 50 mg/day or higher.

Like this entire class, oxymetholone does not aromatize. It is thought to activate estrogen receptors via the 2-hydroxymethylene group, and it can exert many estrogenic side effects.

Oxymetholone is marketed in the United States as Anadrol-50 and has been abused the world over by weight-lifters and strength athletes for its strong anabolic and pronounced androgenic effects.

Management of AAS Adverse Effects

Erythrocytosis

Rx: Phlebotomy

Decreased HDL (Increased hepatic lipase activity)

Rx: Exercise & Supplementation ? Orals > Injectable.

Acne

Acne washes (Benzoyl peroxide, salicylic acid, alpha hydroxy acids)

2 % ketoconazole (Nizoral) shampoo (1% is OTC)

UV light

Zinc?

Management of Adverse Effects

Gynecomastia

Improve T/E2 ratio

Anastrozole and other AIs

Check for low DHT

Surgery (if advanced)

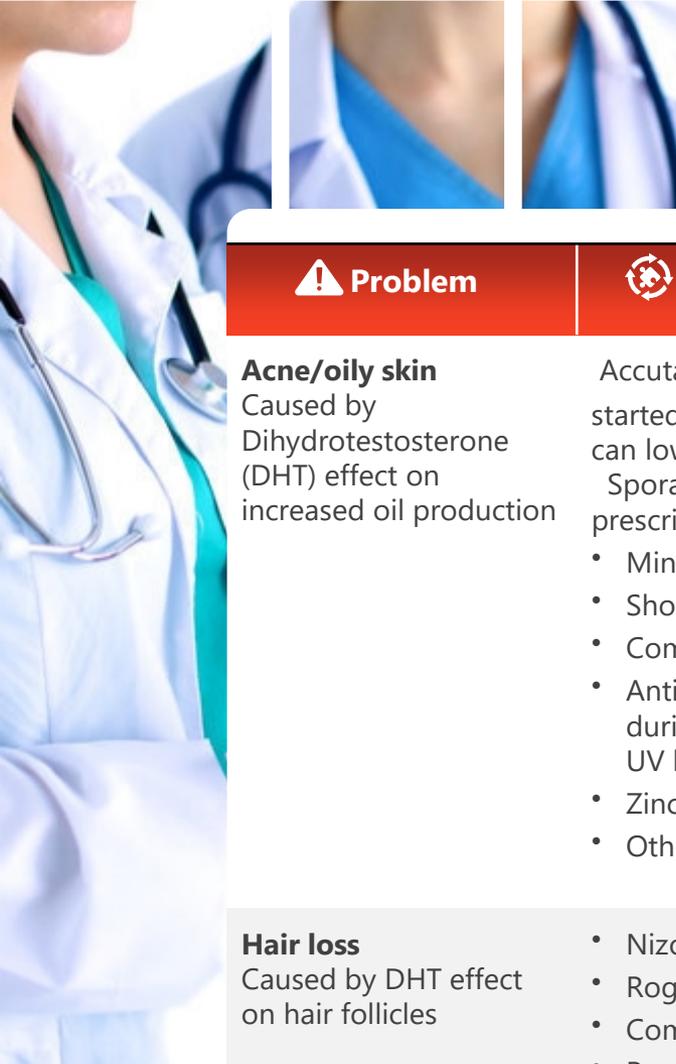
Increase in LFTs

Orals only. GTT not affected.

Peliosis hepatitis (oxymetholone)

Management of Adverse Effects

- Hair loss
 - Minoxidil foam. Nizoral Shampoo. Compounded hair gels.
 - Warning: FDA warning about finasteride (Propecia)
- Decreased libido. ED (if used without testosterone)
- Insomnia and/or sleep apnea.
 - Melatonin, Sleep Rx, CPAP, dosing adjustment?
- Testicular atrophy
 - hCG
- Aggressiveness (supraphysiologic)?
- Hypertension
 - HTN Rx



TESTOSTERONE REPLACEMENT (TRT) & AAS SIDE EFFECT MANAGEMENT

Problem

Acne/oily skin

Caused by Dihydrotestosterone (DHT) effect on increased oil production



Solution and Comments

Accutane– a powerful prescription item - 40 mg/day for one week sometimes stops acne if started at the first sign or as directed by your doctor. Accutane is potentially highly liver toxic and can lower testosterone. Do not use unless as last resort.

Sporanox – Effective for some acne-like eruptions that are caused by fungi. Some doctors also prescribe antibiotics, like tetracycline, for acne with good results.

- Minocycline
- Shower with Nizoral shampoo
- Compounded acne creams
- Anti-bacterial soaps - Use a scrubbing brush and wash twice a day, especially after sweating during a workout.
UV light or sunlight with moderation.
- Zinc/copper supplements or zinc soaps may help some men with acne.
- Other options: [How to treat and prevent acne](#)

Hair loss

Caused by DHT effect on hair follicles

- Nizoral shampoo– Available by prescription and over-the-counter as a lower dose product.
- Rogaine – Available over the counter
- Compounded foams and lotions including several products
- Propecia (finasteride) - Available by prescription. A few males experience decreased erections with finasteride. Do not use.

TRT & AAS SIDE EFFECT MANAGEMENT

Problem	Solution and Comments
Unresolved erectile function	<ul style="list-style-type: none">• <u>Viagra, Cialis, Levitra</u> – Available by prescription; enables strong erections in 60% of men. If you have sinus congestion or headaches/backaches (Caused by Cialis) take non-drowsy allergy medication and ibuprofen. ED drugs can be combined with alpha-blockers and/or nitric oxide precursor amino acids (arginine or citrulline) but be careful with low blood pressure.• Muse - Available by prescription; pellet inserted into the urethra to produce an erection. Unpopular• <u>Trimix, BiMix or Quadmix</u> – Available by prescription from compounding pharmacies. The best and cheapest formula for injection into the penis for lasting erections.• Caverject - Available by prescription. An injection into the penis that produces an erection that can last 1 to 2 hours. Be careful with injecting too much since it can produce dangerously long erections that need to be treated in emergency rooms! Follow instructions from your urologist.• Papaverine – An older injectable medication, less expensive than Caverject.• Wellbutrin – Prescription at 300 to 450 mg/day; increases dopamine.• <u>Human chorionic gonadotropin (HCG)</u> – First dose is 2,000 IU, then 250-500 IU twice or three times a week. No protocol has been proven in controlled studies yet. <p><u>When Testosterone Replacement Doesn't Lead to Better Erections</u></p>
Insomnia Usually, this is caused by dosages that are too high. Find the least amount that gives you a good result.	<ul style="list-style-type: none">• Sleeping medications – e.g. Ambien, Sonata, Lunesta, Restoril. Concerns about habituation.• Melatonin- 1 to 3 mg before bedtime. If you wake up groggy after 6 hours your dose should be lower.• Avoid working out too close to bedtime.• Limit caffeine, especially after 3 pm.• You may want to try a sleep formula with tryptophan, melatonin, and magnesium. Nutrients do not work as well as drugs, but they can help some people.• Article: <u>How to protect your circadian rhythm</u>

TRT & AAS SIDE EFFECT MANAGEMENT

Problem	Solution and Comments
<u>Sleep Apnea</u>	<ul style="list-style-type: none">• Have your doctor prescribe a sleep study if you snore and wake up tired even after 7 hours of sleep. Some people may have to wear a C-PAP machine to breathe at night. Visit Home - SleepApnea.org for more information. Note: Sleep apnea worsens hematocrit. There are also oral devices for those people who fail CPAP. Fatigue- When Testosterone Is Not Enough
Testicular atrophy	<ul style="list-style-type: none">• Human Chorionic Gonadotropin (hCG)– One 2,000 unit injection per week for 2 weeks, followed by maintenance of 350-500 IU twice a week. For men who want to remain fertile while on TRT, 500 IU every other day has been studied.
Enhanced assertiveness or reactivity.	<ul style="list-style-type: none">• Make sure you are getting enough sleep.• Count until 10 and be aware of your interaction with others.• Decrease caffeine. Be careful with pre-workout drinks.• Meditation, mindfulness, yoga, breathe from your belly for a few minutes when overreacting.• Your testosterone dosage may be too high.• Ask yourself: Do I need to always be right?• Vent extra energy at the gym, sex, and sharing with your buddies at www.excelmale.com

TRT & AAS SIDE EFFECT MANAGEMENT

Problem	Solution and Comments
High blood pressure/water retention	<ul style="list-style-type: none">• Blood pressure medications - Elevated blood pressure may be transient or not. Try ACE or ARBs since they seem to have fewer sexual dysfunction related effects.• Magnesium (600 mg/day); vitamin B6 (100 to 200 mg/day); may help reduce water retention.• Water - Drink extra water every day to help flush the kidneys.• Avoid salty or extra sweet foods• Make sure you are doing cardio exercise at least 3 times a week for 30 min. Sweat and lower your salt intake since TRT increases sodium retention in some men.
<u>Gynecomastia- RARE in TRT</u> (male breast development) Caused by overproduction of estrogen in the presence of low testosterone and high IGF-1	<ul style="list-style-type: none">• Arimidex (anastrozole) Inhibits <u>estrogen production</u>. Available by prescription. 0.5 mg/week max. Ensure that your estradiol is never under 20 pg/ml (by <u>sensitive test</u>) since it is needed for bone, skin, brain, lipids, libido, good lipids and hair health. Only 0.3-0.4% of testosterone is aromatized to estradiol. Current lab ranges were derived from men not on TRT. Most men on TRT do not need anastrozole. Be careful not to <u>crash your estradiol</u>.• Nolvadex (tamoxifen)– Competes with estrogen for receptors. Available by prescription, 10 to 20 mg/day. Use of Nolvadex may reduce T's net anabolic effect, as it decreases the production of GH and IGF-1, factors also involved in gynecomastia. A <u>tamoxifen cream</u> can also be purchased by prescription from Empower Pharmacy.• Severe cases may require removal of the breast tissue by surgery.• <u>DHT cream</u>- Some people have obtained great results by rubbing a 10% DHT cream on their nipples. Not available in the US but some people order it online from Germany• Read about <u>medications/foods to avoid</u> if you have gynecomastia.• Those who do know to respond to the above, check <u>other reasons</u> Watch <u>this video about estradiol in men</u> Check your estradiol with the right sensitive test and make sure your testosterone is not low.

For More Information:

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Clinical Use of Anabolics and Hormones

Nandrolone, oxandrolone, and hormones used clinically for wasting and recovery

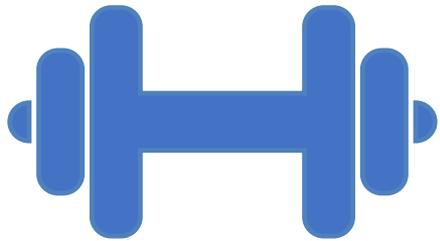
 

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Appendix:

Lean Mass, Fat and Strength.

Anabolic Steroid Comparison
Studies

Oxandrolone in HIV- Lab Test Differences vs Placebo

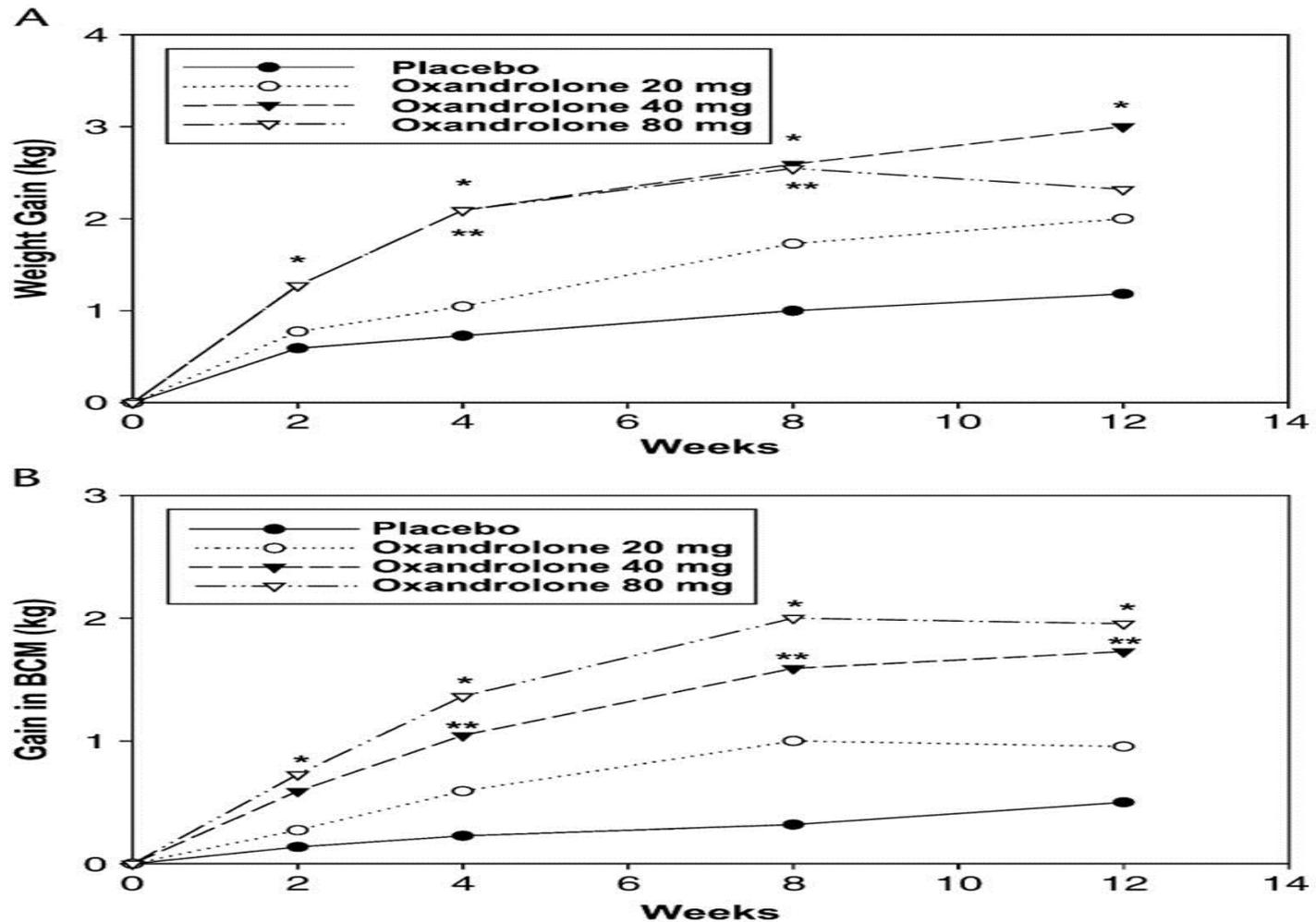
		Oxandrolone			
		Placebo	20 mg	40 mg	80 mg
HIV RNA by PCR (μL)	Baseline	204,915 ± 581,530	154,294 ± 377,496	156,563 ± 376,248	123,994 ± 391,468
	change week 12	-110,419 ± 654,209	1338 ± 734,313	-81,152 ± 297,702	-83,976 ± 346,641
CD4 ⁺ T lymphocyte count (%)	Baseline	15.5 ± 10.1	14.9 ± 11.2	16.8 ± 11.4	15.1 ± 9.9
	change week 12	0.2 ± 4.1	1.4 ± 3.9	1.1 ± 5.3	0.8 ± 3.1
Hemoglobin (g/L)	Baseline	137 ± 20	137 ± 20	134 ± 19	137 ± 16
	change week 12	5 ± 15	-4 ± 13	-2 ± 14	-3 ± 15
Platelets (10 ⁹ /L)	Baseline	221 ± 90.0	217 ± 67.2	228 ± 77.6	235 ± 70.6
	change week 12	3.1 ± 53.9	49.6 ± 86.7*	51.3 ± 103*	64.9 ± 59.1*
Creatinine (μmol/L)	Baseline	79.6 ± 17.7	79.6 ± 17.7	70.7 ± 17.7	79.6 ± 26.5
	change week 12	0.0 ± 17.7	8.8 ± 26.5*	17.7 ± 26.5*	17.7 ± 17.7*
Creatinine kinase (U/L)	Baseline	192 ± 393	138 ± 220	114 ± 81	167 ± 217
	change week 12	-61 ± 424	58 ± 94*	88 ± 127*	70 ± 234*
AST (U/L)	Baseline	42.4 ± 24.7	39.9 ± 22.0	36.6 ± 20.8	39.5 ± 22.4
	change week 12	-2.6 ± 37.0	3.6 ± 23.8	12.1 ± 56.7	20.3 ± 38.3*
ALT (U/L)	Baseline	39.4 ± 27.2	42.7 ± 33.1	37.0 ± 28.5	40.1 ± 30.4
	change week 12	-1.6 ± 39.3	4.4 ± 38.3	19.2 ± 56.3*	37.5 ± 61.0*
Glucose (mmol/L)	Baseline	5.2 ± 1.5	5.1 ± 1.1	4.9 ± 1.0	5.1 ± 0.9
	change week 12	0.1 ± 1.0	0.1 ± 1.8	0.6 ± 2.4	0.1 ± 1.3*
Uric acid (μmol/L)	Baseline	345 ± 95	339 ± 83	357 ± 107	333 ± 71
	change week 12	-12 ± 71	-54 ± 71*	-54 ± 101*	-77 ± 59*
Triglycerides (mmol/L)	Baseline	2.78 ± 2.99	3.99 ± 8.44	3.65 ± 4.90	2.28 ± 1.89
	change week 12	0.09 ± 2.01	-1.33 ± 7.10	-0.63 ± 2.96	0.12 ± 1.10
Cholesterol (mmol/L)	Baseline	4.6 ± 1.6	4.9 ± 2.9	4.6 ± 1.5	4.6 ± 1.3
	change week 12	0.01 ± 1.0	-0.3 ± 2.4	0.4 ± 1.6	0.3 ± 1.2
LDL (mmol/L)	Baseline	2.8 ± 1.3	2.7 ± 1.1	2.6 ± 0.8	2.6 ± 0.8
	change week 12	0.1 ± 1.0	0.4 ± 1.3	0.7 ± 1.3*	0.8 ± 1.1*
HDL (mmol/L)	Baseline	1.0 ± 0.4	1.0 ± 0.4	0.9 ± 0.3	1.0 ± 0.4
	change week 12	-0.03 ± 0.3	-0.3 ± 0.3*	-0.3 ± 0.3*	-0.5 ± 0.4*
Lp(a) (mmol/L)	Baseline	0.7 ± 0.7	0.9 ± 1.0	0.5 ± 0.5	0.7 ± 0.8
	change week 12	0.2 ± 0.7	-0.2 ± 0.4	-0.2 ± 0.5*	-0.6 ± 0.7*

Values are mean ± SD.

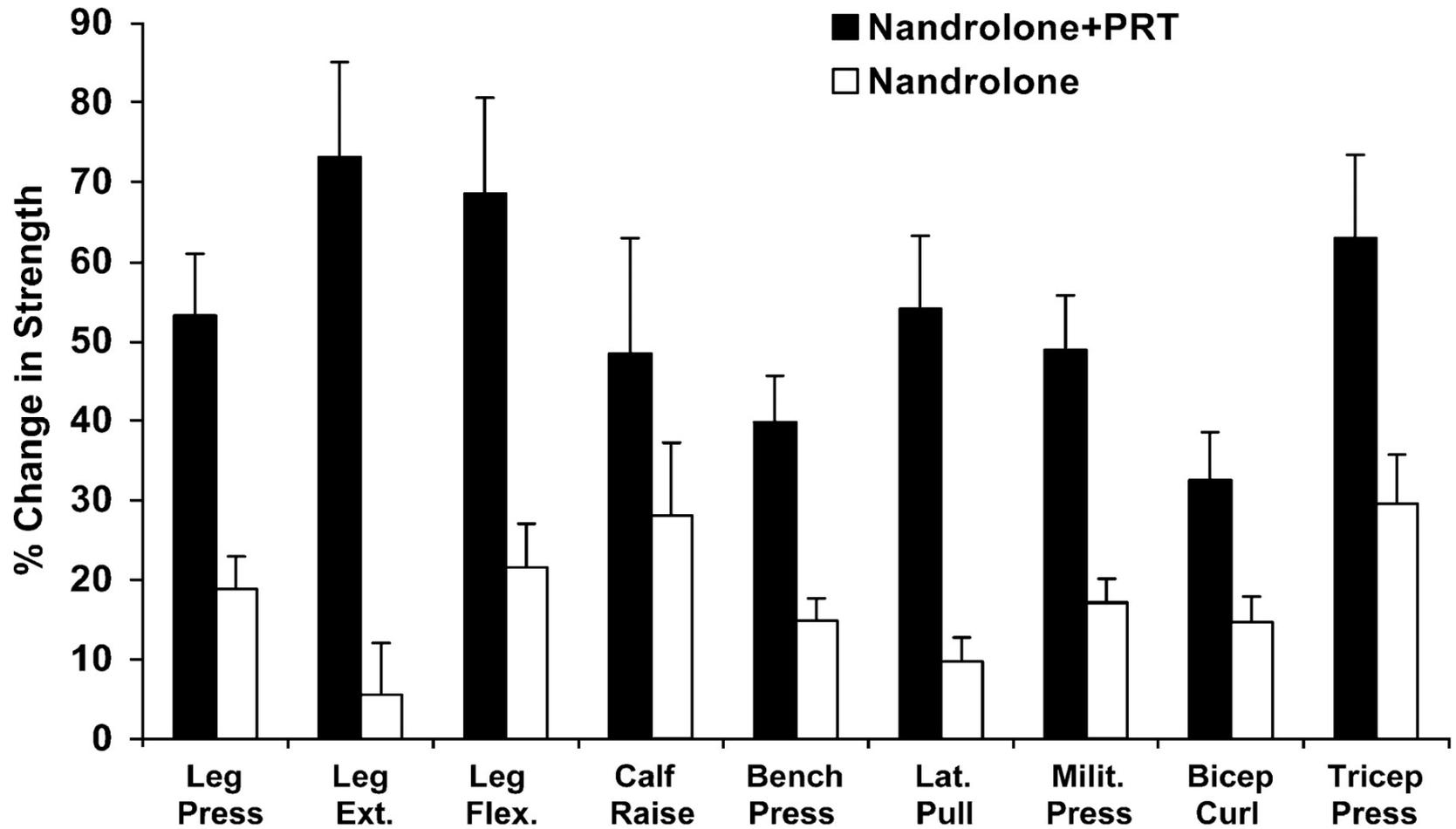
**P* < 0.017 vs. placebo.

Lp(a) indicates lipoprotein (a).

Body Weight and Body Cell Mass at Different Oxandrolone Doses

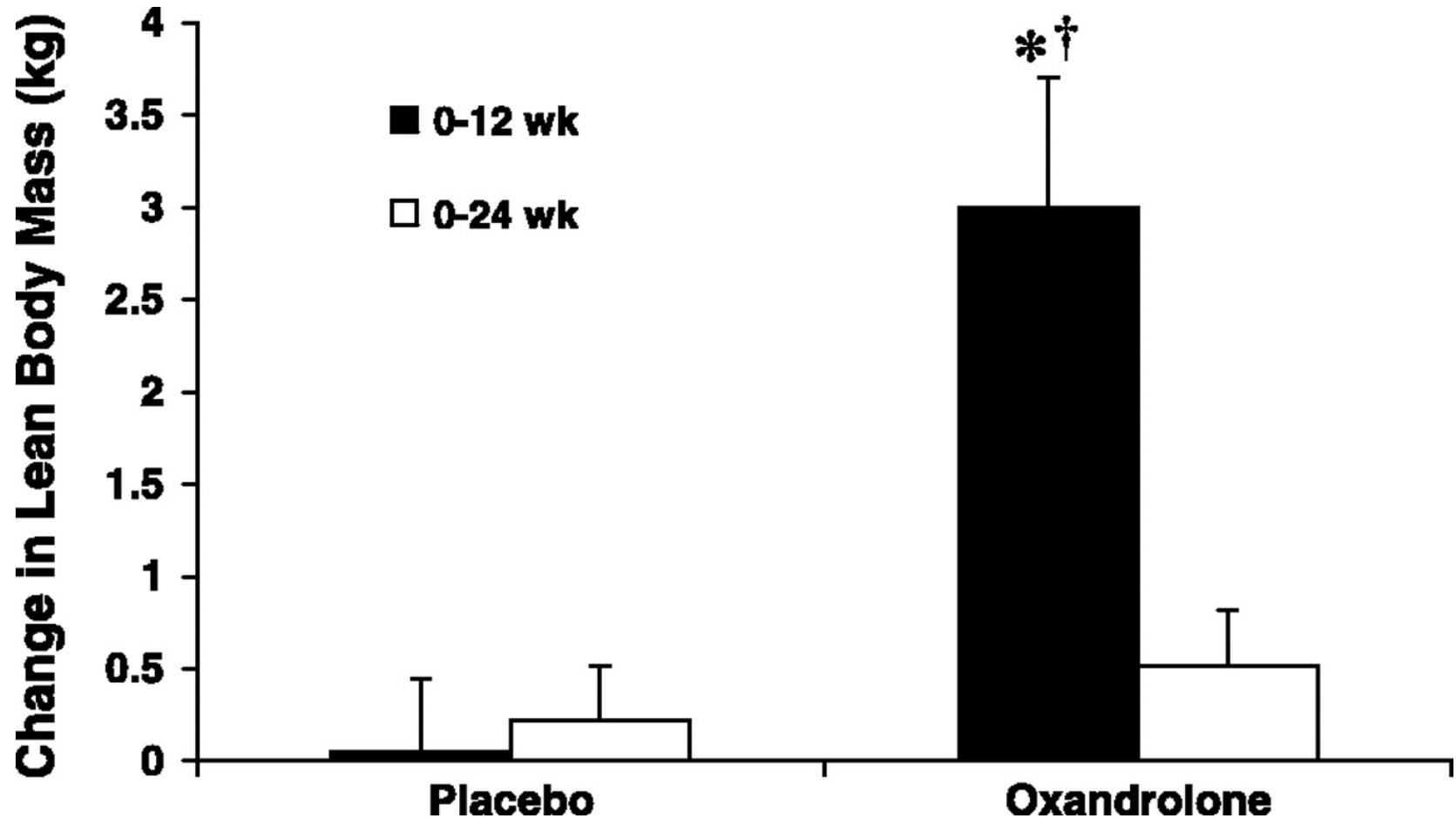


Relative (%) change from baseline to study week 12 in one-repetition maximum (1-RM) strength for the nandrolone-only (open bars; n = 15) and nandrolone plus progressive resistance training (PRT; solid bars; n = 15 groups.



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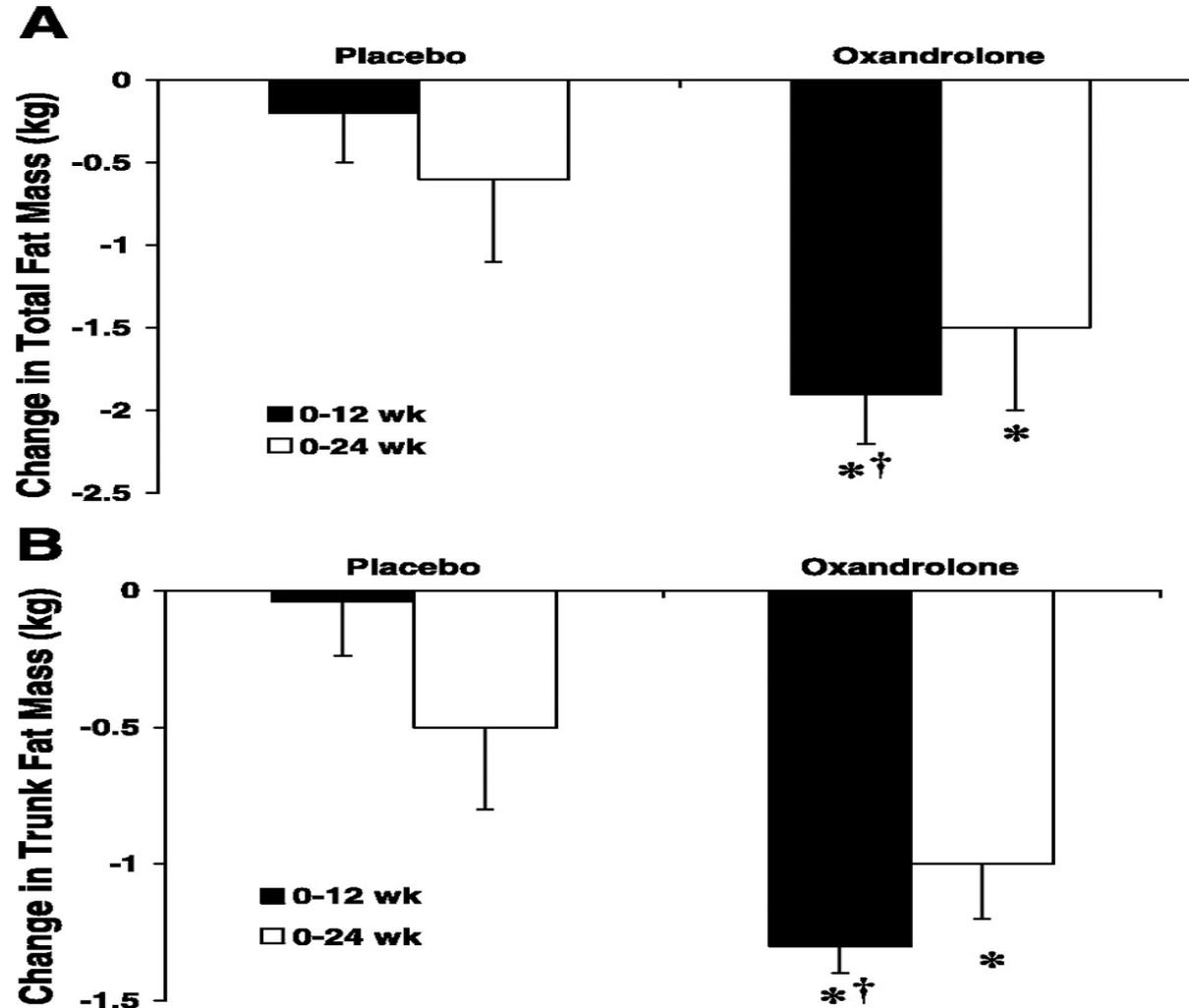
Absolute change in lean body mass by dual-energy X-ray absorptiometry from baseline to study week 12 (solid bars) and from baseline to study week 24 (open bars) in the placebo (n = 12) and the oxandrolone (n = 20) study groups.



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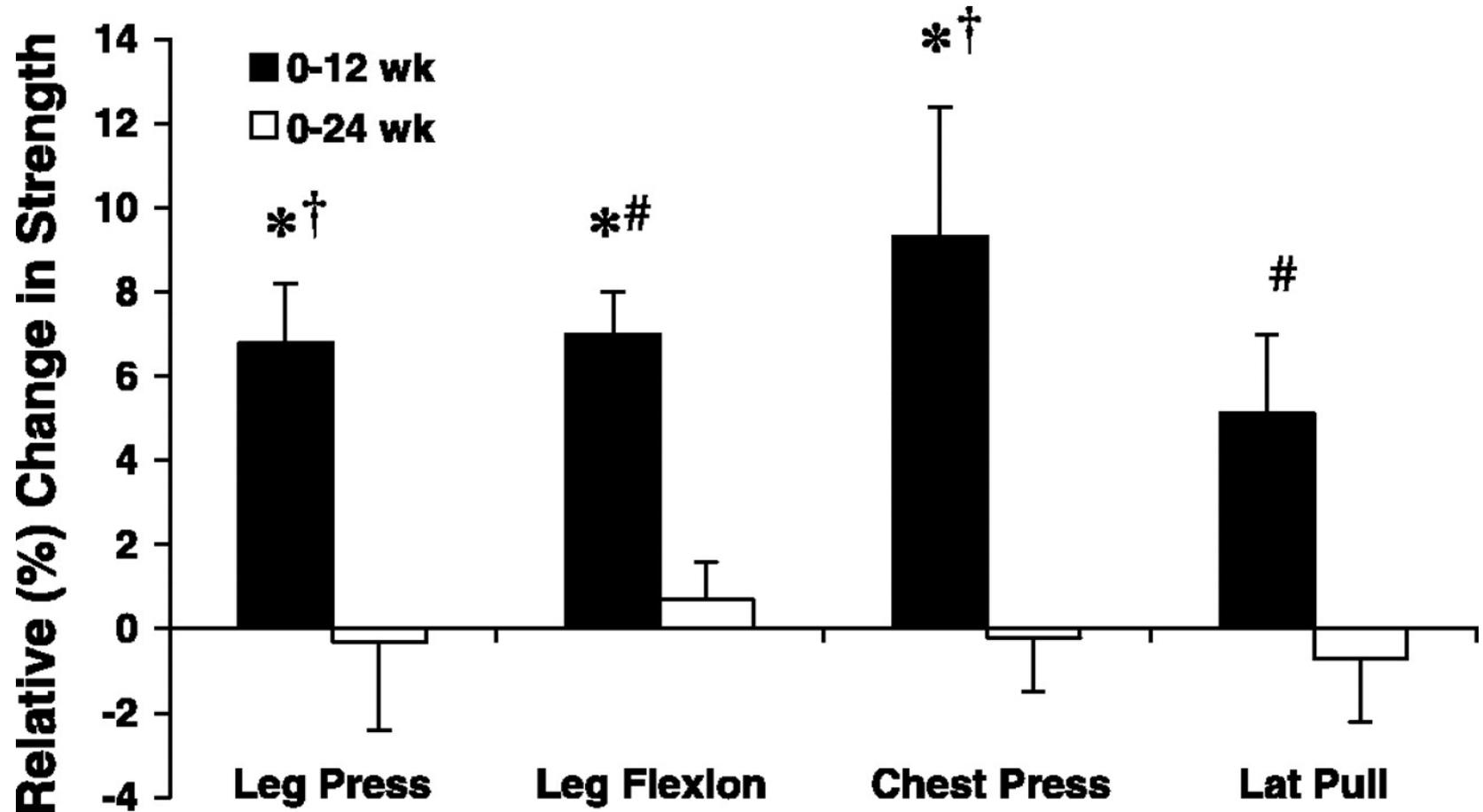
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Absolute change in total fat mass (A) and trunk fat (B) by dual-energy X-ray absorptiometry baseline to study week 12 (solid bars) and from baseline to study week 24 (open bars) in the placebo (n = 12) and the oxandrolone (n = 20) study groups.



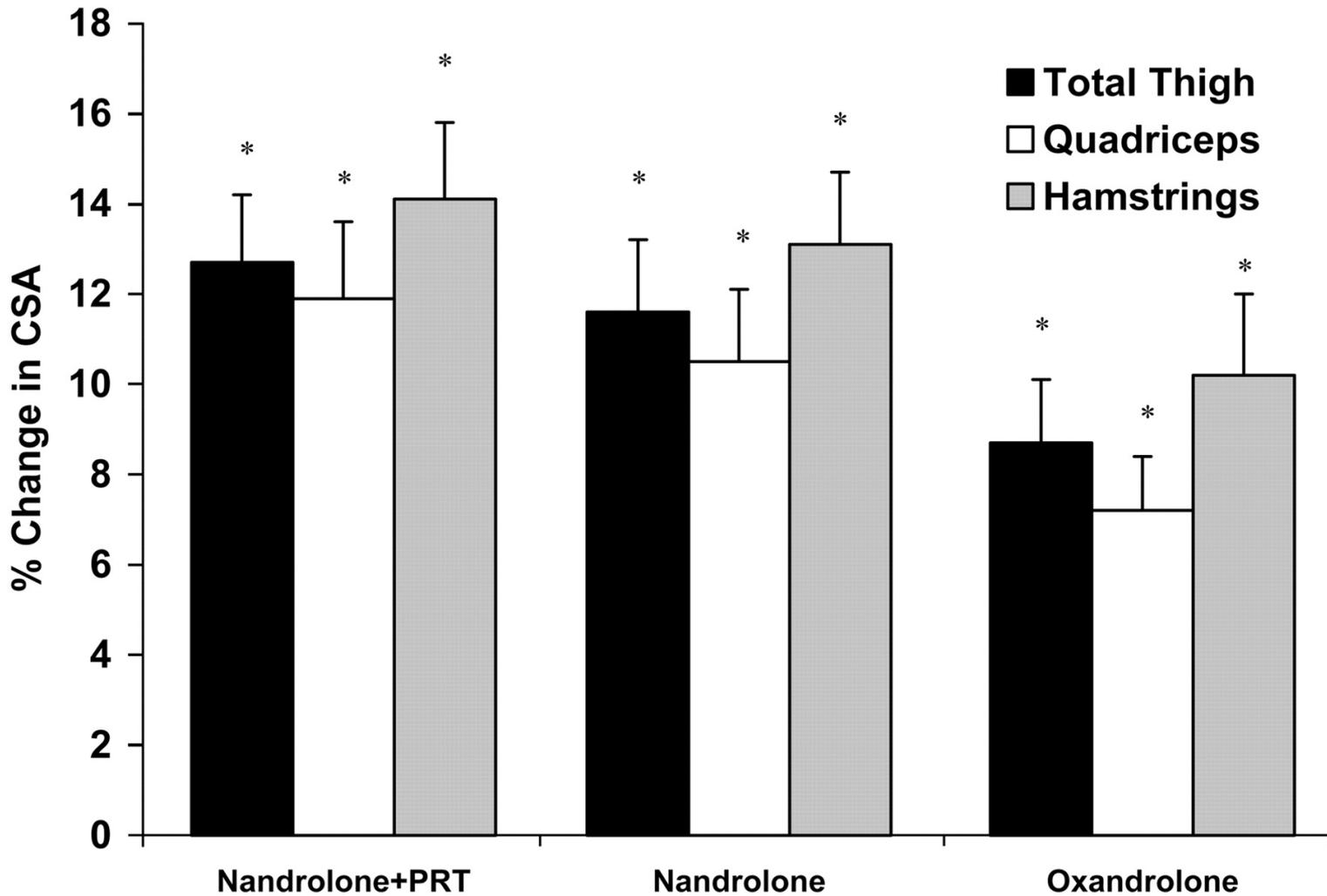
E. Todd Schroeder et al. J Appl Physiol 2004;96:1055-1062

Relative change in maximum voluntary muscle strength from baseline to study week 12 (solid bars) and baseline to study week 24 (open bars) in the oxandrolone (n = 20) study group **only**



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MRI for the total thigh muscle (solid bars), quadriceps muscle (open bars), and hamstrings muscle (gray bars).



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Relative (%) change from baseline to study week 12 in 1-RM strength for the leg press (solid bars), leg flexion (open bars), and leg extension (gray bars) exercises.

