

References: Another Weighty Issue: Why Isn't There a Muscle GLP-1?

Antonio, J., Candow, D. G., Forbes, S. C., Gualano, B., Jagim, A. R., Kreider, R. B., Rawson, E. S., Smith-Ryan, A. E., VanDusseldorp, T. A., Willoughby, D. S., Ziegenfuss, T. N., & Wackerhage, H. (2021). Common questions and misconceptions about creatine supplementation: What does the scientific evidence really show? *Journal of the International Society of Sports Nutrition*, 18, Article 13.

<https://doi.org/10.1186/s12970-021-00412-w>

- Some say it doesn't
- Testosterone is one of the body's key anabolic ("building up") hormones

Arora, G., Conde, K. R., & Desouza, C. V. (2026). Pharmacologic treatments for the preservation of lean body mass during weight loss. *Journal of Clinical Medicine*, 15(2), Article 541.

<https://doi.org/10.3390/jcm15020541>

- It is one of the body's most metabolically active organs
- Do your progressive resistance training at least twice weekly
- Ensure your daily protein intake is 1.2–1.6 g /kg/day
- Active muscle helps you
- combining GLP-1 medications with drugs that help preserve—or even increase—muscle while fat is being lost

Atkinson, D. (2025, June 6). *Why I take these supplements in menopause* [Audio podcast episode]. In *The Flipping 50 Show*. Voice for Fitness, LLC.

- early weight gain is water retained within muscle

Basheer, B., Ila, V., Barros, R., Mesquita, F., Lopes, L. S., Lima, V. F. N., Favorito, L. A., & Ramasamy, R. (2025). Management of adverse effects in testosterone replacement therapy. *International Brazilian Journal of Urology*, 51(3), Article e20259904. <https://doi.org/10.1590/S1677-5538.IBJU.2025.9904>

- Increased red blood cell production
- Reduced fertility
- Acne and oily skin
- Fluid retention
- Worsening of sleep apnoea
- Increased oestrogen levels and breast enlargement
- Liver function concerns
- The increased need to monitor prostate health

Bikman, B. (2025, June 16). *Creatine demystified: Brain, muscle & metabolic benefits* [Video]. YouTube.

<https://www.youtube.com/watch?v=Z7TRG6em3DA>

- Creatine monohydrates

Buratto, J., Kirk, B., Phu, S., Vogrin, S., & Duque, G. (2023). Safety and efficacy of testosterone therapy on musculoskeletal health and clinical outcomes in men: A systematic review and meta-analysis of randomized placebo-controlled trials. *Endocrine Practice*, 29(9), 727–734.

<https://doi.org/10.1016/j.eprac.2023.04.020>

- prescription hormone replacement therapies, which can be highly beneficial for people with genuine deficiencies
- contributing to increased lean muscle mass and reduced fat mass
- in older men with clinically low testosterone levels

Cleveland Clinic. (2022, June 21). *Human growth hormone (HGH): What it is, benefits & side effects.*

<https://my.clevelandclinic.org/health/articles/23309-human-growth-hormone-hgh>

- Fluid retention
- Increased oestrogen levels and breast enlargement
- Synthetic GH (somatropin)
- Acromegaly
- recognised risks include
- Perhaps the biggest concern

Cleveland Clinic. (2023, February 7). *Anabolic steroids.*

<https://my.clevelandclinic.org/health/treatments/5521-anabolic-steroids>

- progressively greater biological costs and increasingly unfavourable risk-benefit profiles
- Increased red blood cell production
- Acne and oily skin
- Fluid retention
- Worsening of sleep apnoea
- Increased oestrogen levels and breast enlargement
- Liver function concerns
- The increased need to monitor prostate health
- Synthetic versions of testosterone designed to exaggerate its muscle-building effects, because they:
- They remain valuable medications for certain medical conditions, including muscle wasting associated with cancer or AIDS, hypogonadism, some breast cancers, osteoporosis and endometriosis

Davis, S. R., Baber, R., Panay, N., Bitzer, J., Cerdas Perez, S., Islam, R. M., Kaunitz, A. M., Kingsberg, S. A., Lambrinoudaki, I., Liu, J. H., Parish, S. J., Pinkerton, J. V., Rymer, J., Simon, J. A., Vignozzi, L., & Wierman, M. E. (2019). Global consensus position statement on the use of testosterone therapy for women. *The Journal of Clinical Endocrinology & Metabolism*, 104(10), 4660–4666. <https://doi.org/10.1210/jc.2019-01603>

- For the ladies, the picture is rather different
- these gains have not consistently translated into meaningful improvements in strength or physical function

Dias, J. P., & Dobs, A. S. (2026). Will selective androgen receptor modulators ever reach the clinic? *The Journal of Clinical Endocrinology & Metabolism*, 111(5), e1467–e1471.

<https://doi.org/10.1210/clinem/dgaf700>

- Beyond these lie anabolic steroids, growth hormones and Selective Androgen Receptor Modulators (SARMs). These can certainly increase muscle mass
- Increased red blood cell production

- They were investigated as possible treatments for: age-related muscle loss (sarcopenia) ...

Duncan, O. (Host). (2025, June 10). *Episode 98: Creatine! Collagen! Cortisol! with Dr. Lauren Colenso-Semple* [Audio podcast episode]. In *Goals, Grit, and Some Woo Woo Sht**.

<https://www.oonaghduncan.com/episode-98-creatine-collagen-cortisol-with-dr-lauren-colenso-semple/>

- the gains with respect to lean muscle mass are small

Endocrine Society. (n.d.). *Hypogonadism*. Retrieved July 7, 2026, from <https://www.endocrine.org/patient-engagement/endocrine-library/hypogonadism>

- Further along are prescription hormone replacement therapies
- (TRT) *has* been shown to increase lean muscle mass, reduce fat mass and produce modest improvements in strength

Kubala, J. (2025, January 9). Essential amino acids: Definition, benefits, and food sources. Healthline.

<https://www.healthline.com/nutrition/essential-amino-acids>

- EAA's also help with muscle repair and recovery and muscle repair
- modest additional benefits when combined with resistance training and generally have favourable safety profiles

Lyon, G. (Host). (2025, March 18). *Steroids & testosterone: The science behind anabolic therapies* (with Nelson Vergel) [Audio podcast episode]. In *The Dr. Gabrielle Lyon Show*. [https://dr-gabrielle-](https://dr-gabrielle-lyon.captivate.fm/episode/steroids-testosterone-the-science-behind-anabolic-therapies-nelson-vergel)

[lyon.captivate.fm/episode/steroids-testosterone-the-science-behind-anabolic-therapies-nelson-vergel](https://dr-gabrielle-lyon.captivate.fm/episode/steroids-testosterone-the-science-behind-anabolic-therapies-nelson-vergel)

- If healthy metabolism depends on both reducing excess visceral fat *and* preserving lean muscle mass
- am I restoring normal physiology or trying to exceed it?
- progressive resistance training, sufficient protein, adequate recovery, sleep and stress management
- some clinicians prescribe testosterone off-label
- If muscle loss itself eventually becomes recognised and treated more as a disease process, anabolic therapies may well have a larger role in carefully selected patients

Lv, Z., Shi, W., & Zhang, Q. (2022). Role of essential amino acids in age-induced bone loss. *International Journal of Molecular Sciences*, 23(19), 11281. <https://doi.org/10.3390/ijms231911281>

- EAA's also help with muscle repair and recovery and muscle repair

Matsuyama, T., Okada, H., Saijo, Y., Hasegawa, Y., Nakajima, H., Okamura, T., Nakatani, R., Ushigome, E., Nakanishi, N., Hamaguchi, M., & Fukui, M. (2026). Effects of vitamin D intake alone on elderly body composition: A systematic review and meta-analysis of RCTs. *Archives of Gerontology and Geriatrics*, 142, Article 106093. <https://doi.org/10.1016/j.archger.2025.106093>

- found little evidence that supplementation *alone* increases muscle mass or strength

Moore, T. (2025, April 21). *Creatine for women: Benefits, safety, and how to take it right | Quick & Dirty EP. 203* [Video]. YouTube. <https://www.youtube.com/watch?v=D4UEA5LvnJ0>

- modest additional benefits when combined with resistance training and generally have favourable safety profiles
- postmenopausal *and* you are going to take it
- creatine supplementation may come with early weight gain is water retained within muscle

Naddafha, S., Antonio, J., Kreider, R. B., & Stout, J. R. (2026). Creatine monohydrate for lean mass, strength, and bone density in postmenopausal women: A systematic review and meta-analysis. *Journal of Dietary Supplements*. Advance online publication. <https://doi.org/10.1080/15502783.2026.2668435>

- modest additional benefits when combined with resistance training and generally have favourable safety profiles
- produce slightly greater gains in muscle and strength than training alone

Nunes, E. A., D'Souza, A. C., Steen, J. P., & Phillips, S. M. (2025). Limited evidence for n-3 fatty acid supplementation in enhancing fat-free mass, strength, and function in oncologic and non-oncologic conditions: An overview of reviews. *Current Developments in Nutrition*, 9, Article 106455. <https://doi.org/10.1016/j.cdnut.2025.106455>

- a 2025 metanalysis investigating whether Omega 3 fatty acid supplementation

Park, S., Chang, Y., Wolfe, R. R., & Kim, I.-Y. (2022). Prevention of loss of muscle mass and function in older adults during COVID-19 lockdown: Potential role of dietary essential amino acids. *International Journal of Environmental Research and Public Health*, 19(13), 8090. <https://doi.org/10.3390/ijerph19138090>

- When the EAAs are combined with resistance training, they promote muscle protein synthesis
- modest additional benefits when combined with resistance training and generally have favourable safety profiles

Smith-Ryan, A. E. (2023, February 5). *Creatine supplementation in women's health* | Prof. Abbie Smith-Ryan, PhD [Video]. YouTube. <https://www.youtube.com/watch?v=ushtZ5U85k8>

- Creatine is a naturally occurring compound found in our cells

Smith-Ryan, A. E., Cabre, H. E., Eckerson, J. M., & Candow, D. G. (2021). Creatine supplementation in women's health: A lifespan perspective. *Nutrients*, 13(3), Article 877. <https://doi.org/10.3390/nu13030877>

- modest additional benefits when combined with resistance training and generally have favourable safety profiles
- postmenopausal *and* you are going to take it
- creatine supplementation may come with early weight gain is water retained within muscle

Tagliafico, A. S., Bignotti, B., Torri, L., Fisci, E., Martinoli, C., & Derchi, L. E. (2022). Sarcopenia: How to measure, when and why. *Radiologia Medica*, 127(3), 228–237. <https://doi.org/10.1007/s11547-022-01450-3>. Full text: <https://pmc.ncbi.nlm.nih.gov/articles/PMC8960583/>

- muscle isn't simply there to move us around and lift heavy things. It is one of the body's most metabolically active organs
- Active muscle helps you:

The Dr. Gabrielle Lyon Show. (2026, July 2). *The testosterone myth men have been lied to about* [Video]. YouTube. <https://www.youtube.com/watch?v=XiTzk6k6OAg>

- If healthy metabolism depends on both reducing excess visceral fat *and* preserving lean muscle mass
- although this particular concern has been challenged
- This is particularly relevant to hormone reference ranges

The Physiological Society. (n.d.). *The mighty protein: Insulin-like growth factor type 1*. Retrieved July 7, 2026, from <https://www.physoc.org/magazine-articles/the-mighty-protein-insulin-like-growth-factor-type-1/>

- Fluid retention
- Increased oestrogen levels and breast enlargement
- in adults they continue to help maintain and repair tissues
- Many of these effects occur indirectly by stimulating the production of IGF-1
- recognised risks include
- Perhaps the biggest concern

U.S. Food and Drug Administration. (2023, April 26). *FDA warns of use of selective androgen receptor modulators (SARMs) among teens, young adults*. <https://www.fda.gov/consumers/consumer-updates/fda-warns-use-selective-androgen-receptor-modulators-sarms-among-teens-young-adults>

Relevant statement: SARMs are not FDA-approved and are being promoted unsafely online.

- no SARM has been approved by major regulators, such as the FDA

U.S. Food and Drug Administration. (2025, December 2). *Certain bodybuilding products put consumers at risk for heart attack, stroke, serious liver damage and more*. <https://www.fda.gov/drugs/fraudulent-products/certain-bodybuilding-products-put-consumers-risk-heart-attack-stroke-serious-liver-damage-and-more>

- Beyond these lie anabolic steroids, growth hormones and Selective Androgen Receptor Modulators (SARMs). These can certainly increase muscle mass
- Worsening of sleep apnoea
- Sexual dysfunction, infertility, testicular shrinkage
- Psychosis/hallucinations
- Pregnancy miscarriage

Vasireddi, N., Hahamyan, H. A., Gould, H. P., Gregory, A. J. M., Gausden, E. B., Dodson, C. C., Voos, J. E., & Calcei, J. G. (2025). Athlete selective androgen receptor modulators abuse: A systematic review. *The American Journal of Sports Medicine*, 53(4), 999–1009. <https://doi.org/10.1177/03635465241252435>

- Beyond these lie anabolic steroids, growth hormones and Selective Androgen Receptor Modulators (SARMs). These can certainly increase muscle mass
- Reduced fertility
- Liver function concerns
- Tendon injuries

World Anti-Doping Agency. (2026). *The 2026 prohibited list: International standard*. <https://www.wada-ama.org/en/prohibited-list>

- in the world of professional and elite sports