

Background Information for AGF-1 Ingredients



D-ASPARTIC ACID

Supports **natural testosterone production** via:

- ↑ Luteinizing hormone
- ↑ Follicle-stimulating hormone
- ↑ Growth hormone

ZINC

Zinc is well-known for its roles in **supporting testosterone function**.

Supplementation may be beneficial for those who **exercise regularly**, especially at a high intensity, as zinc levels can be depleted through sweating.



L-CARNITINE L-TARTRATE

- Studies show supplementation results in an increase in **androgen receptor availability** in the muscle, making your body's testosterone more effective
- May also reduce **muscle soreness**

BORON

Reduces Sex-Hormone Binding Globulin

- Supplementation has been shown to increase **free testosterone** levels

PHOSPHATIDYLSERINE

Can modulate **cortisol levels**.

High cortisol levels are associated with low levels of testosterone.

(Please note there are not currently any permitted health claims for these ingredients, except for Zinc. Our job at PAS is to think ahead of the game and formulate products based on the current available research and our experience as Nutritionists working with elite athletes).

D-Aspartic Acid (DAA)

The research on DAA has certainly been mixed since we first launched it to the UK market. We initially launched a simple powder form of DAA, and then after positive feedback we went on to develop AGF-1 the following year.

Research on DAA:

This is an excellent summary from Examine.com, which we highly recommend as a source of unbiased nutrition and supplement information:

Initial research in humans was similarly promising. The first human trial to investigate the effects of DAA supplementation reported a significant 42% increase in testosterone levels when healthy men supplemented with three grams of DAA per day for 12 days. A follow-up study involving infertile men reported a significant 30-60% increase in testosterone levels with DAA supplementation (three grams a day for 90 days). However, two other studies involving resistance-trained young men found no effect on testosterone levels with three grams a day for 14 days or 28 days

We want to share with you all research - good or bad, to be honest and allow you to be informed.

Our Experience as Nutritionists working with Athletes:

From our experience with athletes, DAA works. There is probably a timescale for the best results with DAA; usually when it is taken for up to 1 month - but in athletes using the AGF-1 formula (consisting of DAA and the additional ingredients mentioned in this download) we have seen excellent results when it is used over 2-month periods as well.

L-Carnitine L-Tartrate

L-carnitine is an amino acid found in red meat and fish and is also available as a supplement. It plays a crucial role in the production of energy, by transporting fatty acids into your cell's mitochondria. The mitochondria act as engines within your cells, burning these fats to create usable energy.

There are various forms of L-Carnitine, but the one used for sports nutrition is L-carnitine L-tartrate, due to its rapid absorption rate.

We added this to AGF-1 for its potential benefits on androgen receptor availability, but since then, studies have also shown benefits on muscle soreness, recovery in exercise, and even performance:

Research on L-Carnitine:

- **L-Carnitine L-Tartrate at 2g daily for 21 days increased the amount of androgen receptors in human muscle tissue, which may increase the effects of testosterone independent of testosterone increases.**
Kraemer WJ. (2006). Androgenic responses to resistance exercise: effects of feeding and L-carnitine.
- **It has been shown that to reduce muscle soreness by preventing creatine kinase rise post exercise. L-Carnitine L-Tartrate supplementation can beneficially affect post exercise markers of metabolic stress, muscle disruption and muscle soreness in men and women.** *Jen -Yu-Ho, Metabolism 2010*
- **L-Carnitine enhances exercise performance while attenuating blood lactate and oxidative stress response to resistance training.** *Majid et al. Effects of 9 week L-Carnitine supplement on exercise performance, anaerobic power and exercise induced oxidative stress in resistance trained males. Journal Exercise Nutrition Biochem 2008.*
- **L-Carnitine affected performance positively in terms of running speed in professional footballers.** *Orer, Gamze 2014. The effects of acute L-Carnitine Supplementation on endurance performance of athletes. Journal of Strength and Conditioning Research.*
- **L-Carnitine supplementation with 3 to 4 g ingested between 60 and 90 min before testing or 2 to 2.72 g/day for 9 to 24 weeks improved high-intensity exercise performance.** *Mielgo-lyuso et al. Effect of Acute and Chronic Oral L-Carnitine Supplementation on Exercise Performance Based on the Exercise Intensity: A Systematic Review, Nutrients 2021.*

Boron

Boron is a trace element that is naturally present in many foods including fruits, mushrooms, and nuts, and is also available as a dietary supplement.

Boron is not classified as an essential nutrient for humans because research has not yet identified a clear biological function. However, it might have beneficial effects on:

- **reproduction and development**
- **calcium metabolism**
- **bone formation**
- **brain function**
- **insulin and energy substrate metabolism**
- **immunity**
- **the function of steroid hormones (including vitamin D and oestrogen).**

Boron and Testosterone:

Basic blood tests may only check **total testosterone levels** – which account for **bound testosterone** (testosterone that is bound to either sex-hormone binding globulin (SHBG), or albumin). This can account for about 98% of testosterone; **while the remaining 2% is free testosterone.**

While total testosterone is a useful measure, it's also a good idea to know **free testosterone** levels, as **this can attach with testosterone receptors, allowing positive effects on bone and muscle.**

As men age, free testosterone levels can decrease due to more binding with SHBG. Low levels of free testosterone can lead to poor muscle development and lowered sex drive.

Exercise can help maintain free testosterone levels and Vitamin D, Boron and Zinc play an important role as well.

Research on Boron and Free Testosterone:

10mg Boron for 6 days was able to reduce oestrogen without influencing total androgen status, but increased free testosterone (possibly via a reduction in SHBG) in 6 healthy average male adults. Pro inflammatory markers were also decreased. *Comparative effects of daily and weekly boron supplementation on plasma steroid hormones and proinflammatory cytokines. Naghi et al. J Trace Elem Med Biol 2011.*

Phosphatidylserine (PS)

We included PS in the AGF-1 formula for its potential benefits on cortisol (the stress hormone) levels. High cortisol levels are associated with low levels of testosterone.

Cortisol levels may be elevated in response to stress / exercise:

“I have believed for a long time that some athletes have higher cortisol output in response to exercise / stress than others, this has not been studied in athletes, probably due to the fact it would be very hard to standardize all elements needed in a professional or indeed amateur setting. I’m sure we all know some people who never get stressed and then others who seem to live on the edge all the time. There is some evidence to support this in the general population” Wolf Scholtz et al 2011, *Biological Psychology*.

Individual differences in the cortisol response to stress in young healthy men: Testing the roles of perceived stress reactivity and threat appraisal using multiphase latent growth curve

The research: Does PS lower Cortisol levels?

- **Research has shown promise for the use of PS to blunt or modulate cortisol levels in athletes.** *Blunting by chronic phosphatidylserine administration of the stress-induced activation of the hypothalamo-pituitary-adrenal axis in healthy men, European Journal Clinic Pharmacology 1992*
- **However, this study used bovine sourced PS, by the time we had brought AGF-1 out, soya as was used as the source of PS (as bovine sources were considered a risk for Creutzfeldt–Jakob disease). Human studies using soy derived PS have not been shown to be effective for cortisol suppression.** *Kingsley et al, 2005. Med Sci Sports Exercise. Effects of phosphatidylserine on oxidative stress following intermittent running.*
- **... But the same researchers found positive benefits on performance** *Kingsley 2006, Med Sci Sports Exercise. Effects of phosphatidylserine on exercise capacity during cycling in active males.*
- **And a more recent study in rats again showed some potential for PS and cortisol.** *A soy-based phosphatidylserine/ phosphatidic acid complex (PAS) normalizes the stress reactivity of hypothalamus-pituitary-adrenal-axis in chronically stressed male subjects: a randomized, placebo-controlled study, Lipids Health Dis, 2014.*

In summary: the inclusion of PS may have beneficial effects on cortisol in some athletes, (maybe the ones with heightened cortisol response?) and may also have positive effects on **cognition** and **anaerobic running capacity**.

Zinc

We included zinc in our AGF-1 formula as zinc plays key role in testosterone function; it has an approved health claim for supporting normal physiological levels of testosterone in men.

In essence, zinc deficiency can cause low testosterone, immune function problems and affect fertility.

How does Zinc effect Testosterone levels?

Zinc deficiency affects the enzyme complex *aromatase* – which is normally inhibited by zinc - resulting in an excessive conversion of testosterone into estradiol. This is not desirable from either aspect (lower levels of testosterone & higher levels of a female hormone).

Research on Zinc and Testosterone:

- **An excessive conversion of testosterone into estradiol is not desirable from either aspect (lower levels of testosterone and higher levels of a female hormone)** *Kilic et al. 2006, Neuro Endocrinol Lett. The effect of exhaustion exercise on thyroid hormones and testosterone levels of elite athletes receiving oral zinc.*
- **A further study backed up these results in terms of total testosterone, free testosterone and thyroid hormones in 10 men.** *Kilic et al 2007, Neuro Endocrinol. Effect of fatiguing bicycle exercise on thyroid hormone and testosterone levels in sedentary males supplemented with oral zinc*
- **Men with low levels of testosterone are more likely to see beneficial effects on fertility from zinc supplementation, and in this study following supplementation 9 couples were able to conceive.** *Netter et al, 1981. Effect of zinc administration on plasma testosterone, dihydrotestosterone, and sperm count.*