

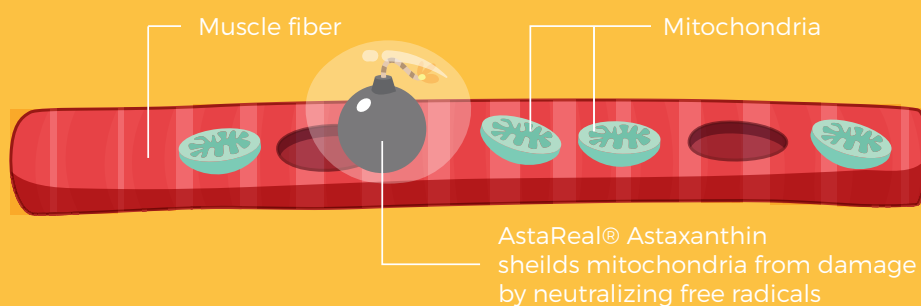
IMPROVE MUSCLE ENDURANCE AND MUSCLE RECOVERY WITH ASTAREAL®

Benefits of natural astaxanthin for muscle performance

HOW ASTAREAL® ASTAXANTHIN WORKS IN MUSCLE

Muscle tissue is rich in mitochondria that help meet significant energy demands, especially during exercise. Free radicals are formed by muscle mitochondria as a byproduct of energy production. If these free radicals are allowed to build up during exercise, they can damage mitochondria causing a shift towards burning sugar outside the mitochondria, producing lactic acid as a byproduct. This is a fast but inefficient way of producing energy, called anaerobic respiration.

By protecting mitochondria from damage, natural astaxanthin can keep energy production churning inside the mitochondria using aerobic respiration for better endurance. AstaReal® Astaxanthin has also been shown to promote the use of fat as an energy source in the mitochondria over sugar. This adds another level of energy efficiency, since 1g of fat can produce six times more energy as compared to 1g of sugar.



AstaReal® Astaxanthin neutralizes free radicals during exercise, and it continues to work after exercise to reduce soreness caused by a second wave of free radicals. The mechanical force produced during exercise causes muscle microtraumas that need to be repaired by white blood cells. These white blood cells migrate into muscles to clean up the damaged tissue. The metabolic activity of white blood cells produces free radicals that contribute to exercise-induced inflammation and cause delayed onset muscle soreness (DOMS). Because AstaReal® Astaxanthin is poised in muscles after exercise to neutralize free radicals, this powerful mitochondrial nutrient has been shown to alleviate exercise-induced inflammation that leads to DOMS.

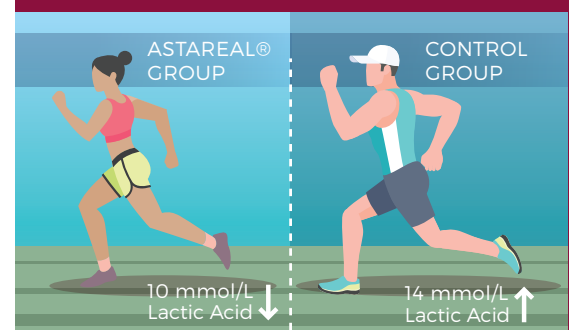
ASTAREAL® ASTAXANTHIN FOR PRE-WORKOUT & ENDURANCE

Clinical studies with AstaReal® Astaxanthin support the following suggested structure/function claims for endurance*:

- AstaReal® Astaxanthin supports endurance and muscle performance^{1,2}
- AstaReal® Astaxanthin supports sustained energy and athletic performance^{1,2}
- AstaReal® Astaxanthin helps improve power output¹
- AstaReal® Astaxanthin reduces buildup of lactic acid^{3,4}

REFERENCES	DOSAGE
1. Earnest et al. International Journal of Sports Medicine. 2011 Nov; 32(11):882-8.	4mg/day
2. Malmsten et al. Carotenoid Science. 2008; 13:20-2.	4mg/day
3. Sawaki et al. Journal of Clinical Therapeutics & Medicines. 2002; 18(9):1085-100.	6mg/day
4. Fukumauchi M, et al. FOOD STYLE 21. 2007; 11(10).	12mg/day

*These are suggested structure/function claims based on AstaReal studies. These suggested structure/function claims have not been verified for promotional use by a regulatory team. We encourage you to review the studies together with your regulatory affairs team to confirm their suitability for promotional applications.



ASTAREAL® ASTAXANTHIN MUSCLE ENDURANCE STUDIES

1

Earnest et al. published a randomized double-blind placebo-controlled study in which 14 competitive male cyclists (ages 18-39) supplemented with 4mg/day AstaReal® Astaxanthin (n=7) or placebo softgels (n=7) for 4 weeks. Cyclists performed a 2 hour pre-exhaustion ride followed by a 20 km timed trial at 0 and 4 weeks after supplementation. **The AstaReal® Astaxanthin group improved their time by 121 sec (5%) on average after 4 weeks compared to only 19 sec (0.8%) on average in the placebo group (p<0.05). The AstaReal® Astaxanthin group also improved power output by an average of 20 W (15%) in 4 weeks compared to an average of only 1.6 W (0.5%; p<0.05).**

2

ASTAREAL®
GROUP

49 → 76

55%



CONTROL
GROUP



22%

46 → 55

Malmsten et al. published a randomized double-blind placebo-controlled study in which 40 male paramedic students (ages 17-19) received 4mg/day AstaReal® Astaxanthin (n=20) or placebo hard capsules (n=20) for 6 months. During this 6 months training period, the number of squats performed with a 42.5 kg dumbbell weight was measured at 0, 3, and 6 months. **The AstaReal® Astaxanthin group improved by 55% (27 squats) on average after 6 months compared to only a 22% (9 squats) improvement in the placebo group after 6 months (p<0.05).**

3

Sawaki et al. published a randomized double-blind placebo-controlled study in which 16 male distance runners from a university track team (average age, 20) supplemented with 6mg/day AstaReal® Astaxanthin (n=8) or placebo softgels (n=8) for 4 weeks. Serum lactate levels were measured at 0 and 4 weeks after supplementation. Samples were collected 2 minutes following a 1200 m run. **The AstaReal® Astaxanthin group had 10 mmol/L serum lactate 2min after the run, which was significantly lower than 14 mmol/L in the placebo group (p<0.05).**

4

Fukumauchi et al. published a randomized double-blind placebo-controlled study in which 32 women (ages 23-60) received 12mg/day AstaReal® Astaxanthin (n=16) or placebo capsules (n=16) for 6 weeks. The participants were instructed to take a 40 min continuous walk 3 times a week at 50-70% of the maximum heart rate. At 0 and 6 weeks, participants engaged in an all-out exercise test according to the Bruce protocol, with increasing treadmill speed and the tilt angle. Blood lactate levels were measured at 0 and 6 weeks both before and immediately after the treadmill exercise. The placebo group showed a significant increase in blood lactate levels after exercise compared to pre-exercise levels at 6 weeks (p<0.05). **The AstaReal® Astaxanthin group showed no significant increase in blood lactate levels post-exercise compared to pre-exercise.**

ASTAREAL® ASTAXANTHIN MUSCLE RECOVERY STUDIES

1

Djordjevic et al. published a randomized double-blind placebo-controlled study in which 32 male elite soccer players supplemented with 4mg/day AstaReal® Astaxanthin (n=18) or placebo softgels (n=14) for 90 days. Muscle damage markers creatine kinase (CK) and aspartate aminotransferase (AST) were measured in blood samples taken at 0 and 90 days after supplementation coupled with a soccer training regimen. Samples were taken before exercise and 15 min after 2 hours of soccer exercise. **CK and AST levels post-exercise were significantly lower in the AstaReal® Astaxanthin group after 90 days compared to the placebo group (p<0.05).**

2

Baralic et al. 2013 published a randomized double-blind placebo-controlled study in which 40 male elite soccer players supplemented with 4mg/day AstaReal® Astaxanthin (n= 21) or placebo capsules (n = 19) for 90 days. PON1 activity (enzymatic protection against oxidative damage and lipid peroxidation) and concentration of sulphhydryl groups (a marker of oxidative stress; fewer -SH groups indicative of oxidative environment) were measured in blood at 0, 45, and 90 days after supplementation coupled with a soccer training regimen. **PON1 activity on diazoxonase substrate was higher in the AstaReal® Astaxanthin group after 90 days compared to 0 days after supplementation (p<0.01), where as no increase in PON1 activity was observed in the placebo group. Total sulphhydryl groups increased after 45 days (p<0.05) and 90 days (p<0.001) of supplementation in the AstaReal® Astaxanthin group compared to 0 days, but not in the placebo group.**

3

Baralic et al. 2015 published a second randomized double-blind placebo-controlled study which examined 40 male elite soccer players whom received 4mg/day AstaReal® Astaxanthin (n=21) or placebo capsules (n=19) for 90 days. Blood prooxidant-antioxidant balance (BAP) and C-reactive protein (CRP; a marker of chronic inflammation) were measured before exercise at 0 and 90 days after supplementation coupled with a soccer training regimen. **There was a 39% decrease in BAP in the AstaReal® Astaxanthin group at 90 days as compared to 0 days (p<0.001).** A 24% decrease in BAP observed in the placebo group after 90 days was not statistically significant. A supplementation and training interaction was observed, which resulted in a 57% increase in CRP in the placebo group after 90 days (p=0.05). **No significant increase in CRP was observed in the AstaReal® Astaxanthin group after 90 days of supplementation and exercise.**

ASTAREAL® ASTAXANTHIN FOR POST-WORKOUT AND RECOVERY

Clinical studies with AstaReal® Astaxanthin support the following suggested structure/function claims for muscle recovery*:

- AstaReal® Astaxanthin supports muscle recovery^{1, 2, 3}
- AstaReal® Astaxanthin helps protect against exercise-induced muscle damage^{1, 2, 3}

REFERENCES

1. Djordjevic et al. The Journal of Sports Medicine and Physical Fitness. 2012 Aug; 52(4):382-92.
2. Baralic et al. Phytotherapy research: PTR. 2013; 27(10):1536-42.
3. Baralic et al. Evidence-Based Complementary and Alternative Medicine. 2015; vol. 2015, Article ID 783761.

DOSAGE

- 4mg/day
4mg/day
4mg/day

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ASTAREAL®
GROUP



0% Chronic
Inflammation
Increase

0%

WHY CHOOSE ASTAREAL® ASTAXANTHIN

1

AstaReal pioneered the commercial use of natural astaxanthin as a preventative healthcare approach and built the global astaxanthin market with its unrivaled investment in quality, safety and efficacy. Our vision is helping people all over the world lead happier and healthier lives with our clinically proven astaxanthin brand - AstaReal® Astaxanthin.

2

AstaReal® Astaxanthin is the most studied brand of natural astaxanthin worldwide, with over 60 human clinical studies supporting muscle performance, skin health, eye health, cardiovascular health, and cognitive health.

3

AstaReal® Astaxanthin is the most trusted manufacturer of astaxanthin in over 45 countries and the only natural astaxanthin brand certified by USP and certified Informed-Choice/Informed-Sport.

4

AstaReal has two manufacturing facilities utilizing a fully enclosed indoor cultivation proprietary method. This process uses HEPA filtered air and RO filtered water at every stage to provide the cleanest possible environment for algae and ensures that it is not contaminated by persistent organic air pollutants. The carefully controlled indoor environment also allows for precisely timed harvests that maximizes astaxanthin content and minimizes chlorophyll contamination that can compromise stability.

5

With over 30 years of experience studying and developing novel natural astaxanthin products, AstaReal is not only a preferred natural astaxanthin supplier, but a preferred partner. Formulate with AstaReal® brand Astaxanthin today and experience the benefits of our unsurpassed technical and marketing expertise.



To learn more about natural astaxanthin and your health visit www.astaxanthin.net

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