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RAPID RESEARCH

April 2021

Inside This Week: Supplements & Sports Performance

-
- ✓ Caffeine and Exercise Performance

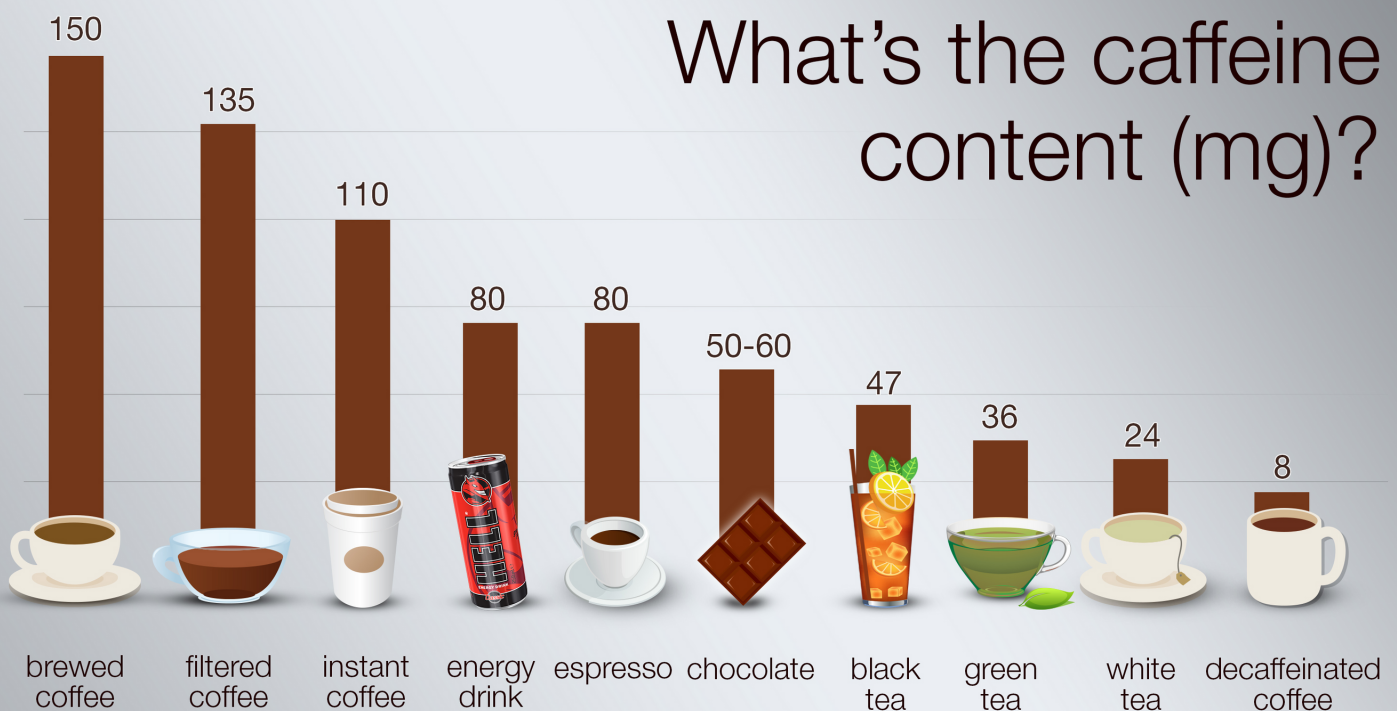
 - ✓ Sodium Bicarbonate & Energy Metabolism During Exercise

 - ✓ Creatine: Common Questions & Myths Answered



CAFFEINE AND EXERCISE PERFORMANCE

The International Society of Sports Nutrition critically evaluated available research on caffeine to better understand the impact on various types of exercise performance, as it has dominated the ergogenic aids and sport supplement research domain over the past several decades.



11 KEY POINTS & TAKEAWAYS

1. Small to moderate benefits for:

Muscular endurance & strength.

Movement velocity.

Sprinting, jumping, & throwing performance.

Aerobic and anaerobic output.

2. Moderate to Large benefits for:

Aerobic endurance (magnitude of effects differs between individuals).

3. Improve exercise performance in doses of 3–6 mg/ kg body mass.

4. The most commonly used timing of caffeine supplementation is 60 min pre-exercise.

5. Improves physical performance in both trained and untrained individuals.

6. Genetic variations for caffeine metabolism affect differences in:

Sport and exercise performance.

Adverse effects on sleep.

Feelings of anxiety.

Physical response.

Psychological response.

7. Can be ergogenic for cognitive function, including attention and vigilance, in most individuals.

CONTINUED

8. Can improve cognitive and physical performance in some individuals under conditions of sleep deprivation.

9. Use in conjunction with endurance exercise in the heat and at altitude is well supported when dosages range from 3 to 6 mg/kg and 4–6 mg/kg, respectively.

10. Alternative sources of caffeine such as caffeinated chewing gum, mouth rinses, energy gels and chews have been shown to improve performance, primarily in aerobic exercise.

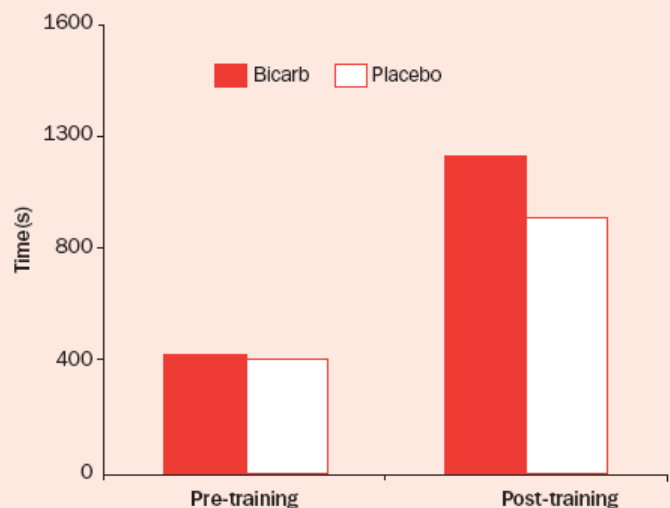
11. Energy drinks and pre-workout supplements containing caffeine have been demonstrated to enhance both anaerobic and aerobic performance.

SODIUM BICARBONATE & ENERGY METABOLISM DURING EXERCISE

This study analyzed the contribution of NaHCO_3 (Sodium Bicarbonate) to energy metabolism during exercise, as ingesting NaHCO_3 , can increase the blood pH, making it less acidic and allow for higher concentrations of lactic acid in the blood.



Figure 1: How training with bicarb increases endurance



Time to fatigue during a constant-load exercise test performed at 100% of pretraining VO_2max . Although both groups improved their endurance after the 8-week training programme, the bicarb group had a bigger improvement (41%) than the group that drank a salt solution.

KEY FINDINGS

Meta-analysis of **17 articles**, including **215 patients** indicated

NaHCO₃ ingestion **improves**:

pH levels.

HCO₃ – levels.

Base Excess levels.

Blood Lactate levels.

Partial Pressure of CO₂ levels.

No differences versus placebo found for:

VO₂ (Oxygen Uptake).

VCO₂ (Carbon Dioxide Production).

PO₂ (Partial PResure Oxygen).

MAIN TAKEAWAYS

Ingestion of NaHCO₃ may be beneficial to exercise based on the anaerobic metabolism and glycolytic systems.

Ideal way is to ingest:

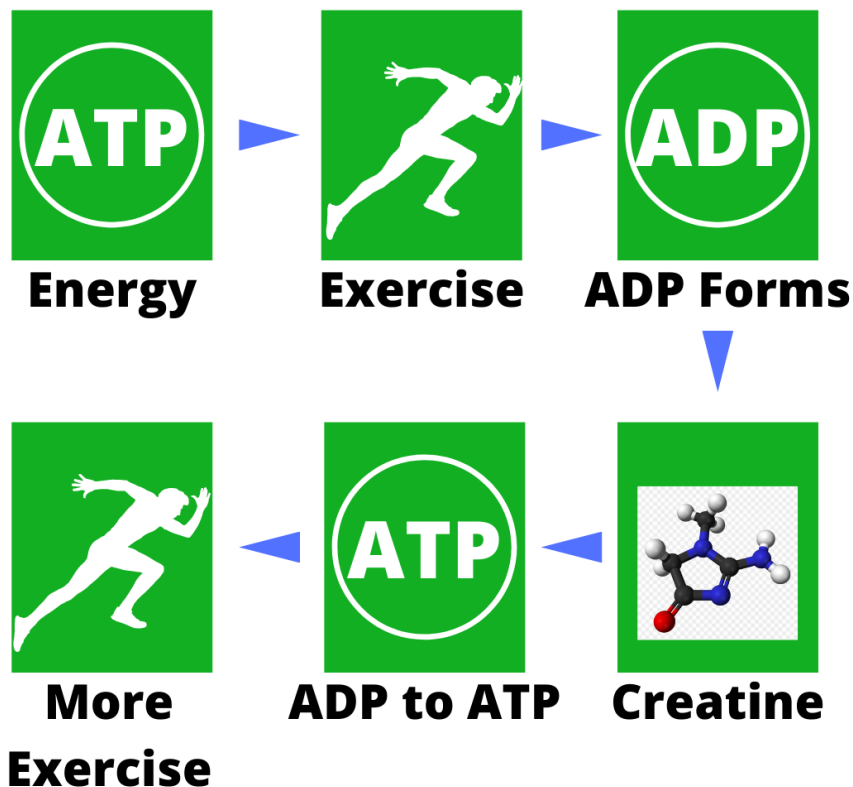
Gelatin capsule.

Dose of 0.3 g/kg weight 90 min before exercise.

Anaerobic & aerobic exercise and sports capacity may be improved by supplementing with NaHCO₃.

CREATINE: COMMON QUESTIONS & MYTHS ANSWERED

This study evaluated research regarding creatine supplementation to find and answer common questions and myths around creatine, because even though 500 peer-refereed publications involving creatine exist, the efficacy and safety of creatine still remain



Common questions around creatine include:

1. Does it lead to water retention?
2. Is it an anabolic steroid?
3. Does it cause kidney damage/renal dysfunction?
4. Does it cause hair loss / baldness?
5. Does it lead to dehydration and muscle cramping?
6. Is it harmful for children and adolescents?
7. Does it increase fat mass?
8. Is a 'loading-phase' required?
9. Is it beneficial for older adults?
10. Is it only useful for resistance / power type activities?
11. Is it only effective for males?
12. Are other forms of creatine similar or superior to monohydrate and is creatine stable in solutions/beverages?

MAIN TAKEAWAYS

1. It increases intracellular water volume, over the short term, but does not alter total body water over longer periods of time.
2. Creatine has a completely different chemical structure, and is NOT an anabolic steroid.
3. When ingested at recommended dosages, does not result in kidney damage and/or renal dysfunction in healthy individuals.
4. Creatine does NOT increase total testosterone, free testosterone, DHT or cause hair loss/baldness.
5. Current research does not validate the notion that creatine supplementation causes dehydration and muscle cramping.

MAIN TAKEAWAYS

CONTINUED

6. Based on the limited evidence, creatine supplementation appears safe and potentially beneficial for children and adolescents.
7. Creatine supplementation does not increase fat mass across a variety of populations.
8. Accumulating evidence indicates that you do not have to 'load' creatine. Lower, daily dosages of creatine supplementation (i.e 3-5 g/day) are effective for increasing intramuscular creatine stores, muscle accretion and muscle performance/recovery.
9. There is growing body of evidence showing that creatine supplementation, particularly when combined with exercise, provides musculoskeletal and performance benefits in older adults.
10. There is a variety of athletic events, not just resistance/power activities, which may benefit from creatine supplementation.
11. There is accumulating evidence that creatine supplementation has the potential to be a multifactorial therapeutic intervention across the lifespan in females, with little to no side effects.
12. While some forms of creatine may be more soluble than creatine monohydrate when mixed in fluid, evidence-based research clearly shows creatine monohydrate to be the optimal choice.

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