FACT SHEETS

Grading Criteria

A	**The evidence strongly supports this effect** The A ranking is given when the effect is supported by at least two double-blind placebo-controlled trials with similar methodologies or (a meta-analysis of) numerous double-blind placebo-controlled trials with dissimilar methodologies, in addition to a logical explanation (mechanistic evidence) for the effect. Qualitative review articles are not considered strong evidence.
B	**The evidence supports this effect** The B ranking is given when the effect is supported by many human trials with very different methodologies or a few human trials corroborated by animal or *in vitro* studies. The B ranking is also given when the effect is supported by convincing epidemiological evidence that does not have accompanying interventions proving the mechanism of action.
C	**The evidence is weak or equivocal** The C ranking is given when the effect is supported only by a few human trials of lackluster design, by animal trials, or by observational studies. Alternatively, there may be many human trials with different methodologies reporting dissimilar outcomes.
D	**The evidence is against this effect** The D ranking is given when the effect is opposed by many human trials with very different methodologies or a few human trials corroborated by animal or *in vitro* studies. The D ranking is also given when the effect is opposed by convincing epidemiological evidence that does not have accompanying interventions proving the mechanism of action.
F	**The evidence is strongly against this effect** The F ranking is given when the effect is opposed by at least two double-blind placebo-controlled trials with similar methodologies or (a meta-analysis of) numerous double-blind placebo-controlled trials with dissimilar methodologies, in addition to a logical explanation (mechanistic evidence) for the lack of effect. Qualitative review articles are not considered strong evidence.

CREATINE

How it became a Supplement

Creatine was known by biologists for a long time before it was used as a dietary supplement as an extra reserve for energy in a cell where it helps replenish the main cellular energy currency, ATP, in situations where the cell undergoes stress. Due to the presence of creatine in high levels in meat products and meat's historical association with exercise and strength, as well as the general curiosity of seeing what happens when you consume a compound that is so vital in the cell, research started in rodents and it was very quickly apparent that not only could it get to the cell but it could increase muscular strength.

Ever since then creatine has seen consistent sales and usage due to its efficacy and overall benefits, although it is at times somewhat unreliable when it comes to how much people respond beneficially to it. For those lucky few who can get all the benefits of creatine it stands as a testament that sometimes, things that are too good to be true may exist.

Evidence

A	**Muscle Growth (with Exercise)** Creatine is most well known as the 'king' of exercise supplements, and this is partially due to robust evidence that shows people who supplement creatine and exercise grow muscle tissue at a faster rate than people who do similar exercises without creatine supplementation. The general benefit of creatine increasing the rate of muscular growth is beyond a shadow of a doubt, but the degree it benefits does seem to differ based on the individual using creatine.
A	**Improving Strength (Athletes)** In concert with the increased muscular growth is increased strength in power-based activities. While a large part of this is due to the increased muscularity, creatine also appears to increase strength in these activities before any additional muscle is even built. The temporary strength increase creatine confers leaves when supplementation is stopped, but the strength gained from the new muscle tissue remains.
A	**Power-based Sports Performance** While creatine has mixed benefits in sports performance overall, sports that have power-based segments such as basketball (jumping) or hockey (sprinting) see localized benefits on these parts due to creatine supplementation. Sports based almost exclusively on power such as sprinting and powerlifting see unanimous benefits from creatine supplementation.

CREATINE

B	**Reducing Depression** Creatine seems to be effective in fighting depression, with all evidence showing mild benefits in women only. There is a lack of evidence overall on creatine and depression in men, but the limited evidence available suggests that this is either a gender-exclusive effect or is simply much more likely to benefit women with depression than men.
C	**Cognition** While the topic of cognitive capacities with creatine is not overly researched, there are a few trials assessing a variety of parameters with generally mild benefits when the subject is in a fatigued state, is vegetarian, or is elderly. Most trials on this general topic are standalones without replication.
C	**Improving Strength (Elderly)** While creatine may be beneficial to the elderly who are also participating in exercise protocols, for the purpose of reducing falls, it is fully reliant on there actually being some manner of exercise. Furthermore, the degree of benefit seems to be lesser than youth supplementing creatine. Creatine also does not appear to help sarcopenia (age-related muscle loss) when supplemented reactively, with lifetime creatine usage on the risk of sarcopenia not assessed.
C	**Endurance-based Sports Performance** Despite the apparent benefits of creatine in sports and exercise based in powerful movements, sports and activities that involve repetitive actions for a prolonged period of time either see minimal benefit or none at all. The benefits of creatine are related to how long one can keep the activity up, with almost unanimous benefits in powerlifting, mixed and moderate benefits in rowing tests, and no apparent benefit (or downside) to marathons and endurance sports. Sports such as hockey and soccer only see benefits to the intermittent bursts of power in these sports, with little to no effect on endurance.

Full references available on https://examine.com/supplements/creatine/

CREATINE

Ready to level up your health?

Looking at the science above, you can see that creatine is great for building muscle.

But what else helps you add muscle and be stronger? What other supplements are backed by human studies?

As an Examine Member, you'll be able to easily stay on top of the latest research.

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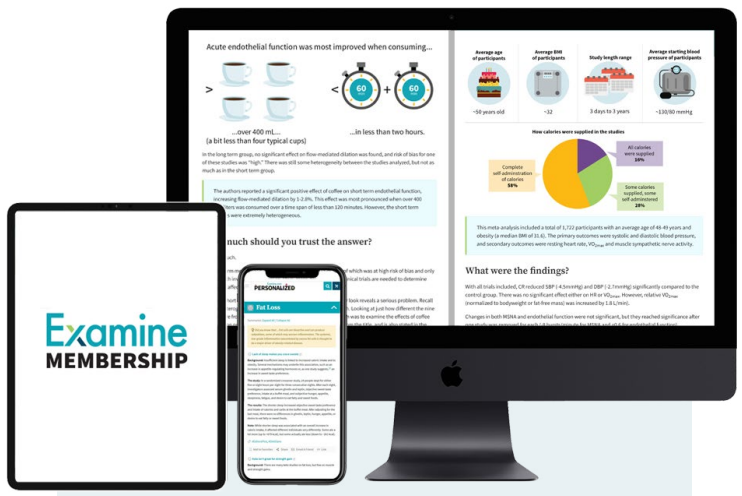
Power Output

Power Output is the ability to procure a large amount of strength in a rapid manner, and considered both muscular and neural factors. Supplements that increase power output are of interest to atheltes and strength enthusiasts.

LEVEL OF EVIDENCE	SUPPLEMENT	MAGNITUDE OF EFFECT	CONSISTENCY OF RESEARCH RESULTS	NOTES
	Creatine	Strong	Very High See all 66 studies	Creatine is the reference compound for power improvement, with numbers from one meta-analysis to assess potency being "Able to increase a 12% improvement in strength to 20% and able to increase a 12% increase in power to 26% following a training regiment using creatine monohydrate".
	HMB	-	Moderate See all 12 studies	Limited evidence supports the increase in power output, which may be due to chance; more often than not, there is no significant influence
	Sodium Bicarbonate	-	Moderate See all 28 studies	Although *technically* an increase in average power output may occur during exercise associated with the 'burn' (metabolic acidosis) to the degree of 1-2%, saying this is an inherent or reliable increase in power would be misleading; it is an attenuation of the decrease in power that acidosis is able to induce
	Caffeine	Notable	Very High See all 9 studies	There appears to be a reliable and significant increase in power output (both weight lifting as well as cycle ergometer measurements) in both trained and sedentary persons with doses of caffeine exceeding 5mg/kg, assuming the subject is not caffeine tolerant. Tolerance, or lower doses of caffeine, are not as effective.
	Beta-Alanine	-	Very High See all 5	No significant effect on acute power output.



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