

# HOW ELECTROLYTES ENHANCE THE EFFECTS OF CREATINE AND IMPROVE PHYSICAL PERFORMANCE

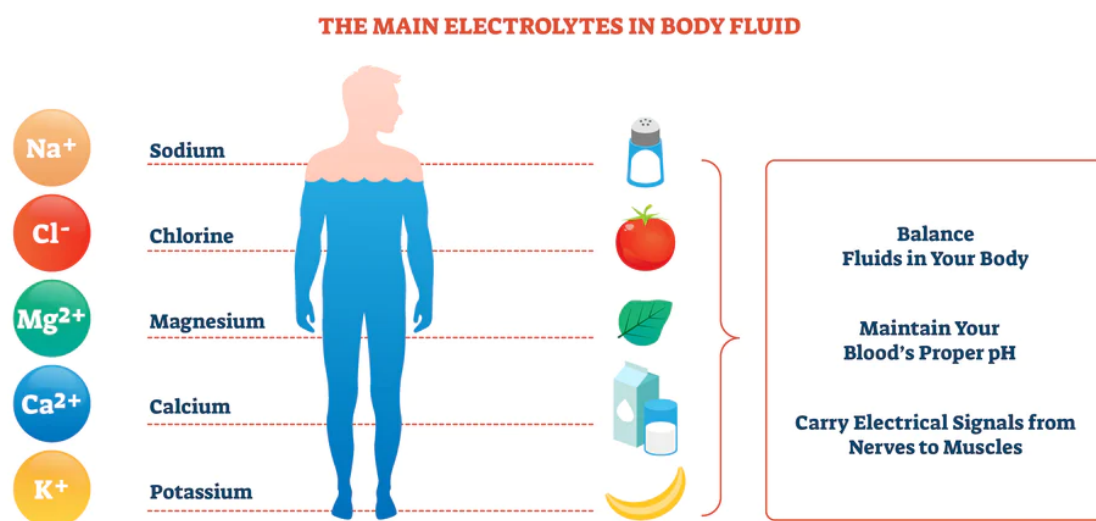
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Creatine phosphate is a naturally occurring molecule in the human body and is responsible for replenishing adenosine triphosphate (ATP) during fast muscular movements through the phosphagen system [1].

We know from research and real-world experience that increasing the storage of free creatine and creatine phosphate inside the muscle cell can help prolong the usage of the phosphagen system.

It's well known that **creatine supplementation** has been shown to enhance the total storage of creatine phosphate and helps increase anaerobic power and strength performances [2].

**Electrolytes such as sodium, potassium, and magnesium are transporters used to aid in the absorption and utilization of creatine by the body [3].**



While some studies have combined the use of creatine supplementation with beta alanine and other solutions, there is very little literature on creatine supplementation coupled with electrolytes.

## **RESEARCH ON CREATINE AND ELECTROLYTES**

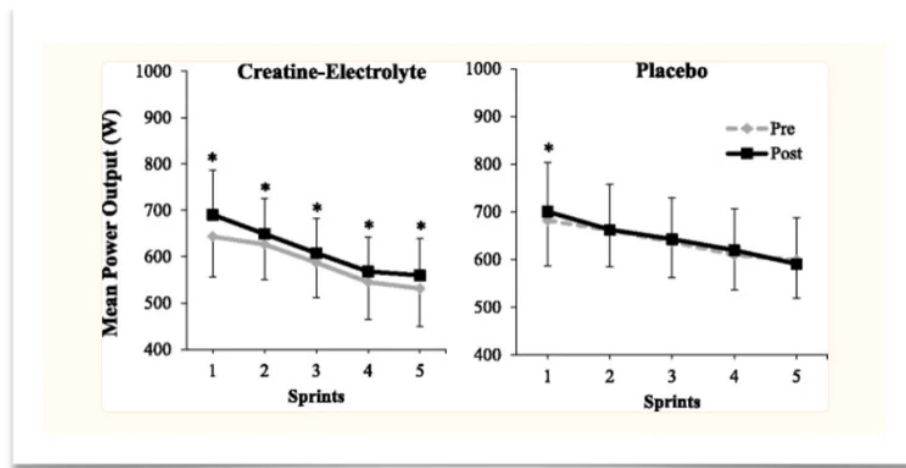
A study published in 2019 investigated the effects of a creatine supplement formulated with various electrolytes on upper and lower limb anaerobic power, and strength outcomes for recreationally-trained, college-aged individuals. Results showed that creatine combined with phosphorus, magnesium, calcium, potassium, and **sodium** for six weeks led to significant improvements in bench press, back squat max strength, and multiple repetition tests to fatigue, compared to a placebo.

Researchers stated that the current study combined both creatine and various electrolytes that potentially increase the absorption of creatine, increase transport into the muscle, and increase performance [4].

A study published in 2018 investigated the effects of a six week creatine-electrolyte supplementation intervention on overall and repeated peak and mean power output during repeated short duration sprint cycling performance, in a group of recreational cyclists.

Results demonstrated significant increases in overall and repeated peak and mean power output during repeated sprint cycling when the sprint and recovery durations are 15 sec and 2 min, respectively.

The increase in peak power output observed in this study is the first time a significant increase in overall and repeated peak power output has been observed during sprint cycling following creatine-electrolyte supplementation [5].



**Figure:** Mean power output (W) during each of the five 15-s sprints in the CE and P group, pre- and post-supplementation. \* Indicates significant improvement in sprint performance from pre- to post-testing adapted from [5]

**Another study contrasted the effects of creatine-electrolyte vs creatine monohydrate on anaerobic power in NCAA division II athletes.**

- For the creatine-electrolyte group, they found significantly greater improvement in anaerobic power (i.e. bench press 1RM, vertical jump height, and 100-yard dash time) compared to the creatine monohydrate group [6]. These results indicate that sustained supplementation with a creatine-electrolyte material may yield greater effects than [supplementing with creatine monohydrate](#) alone.

A 1999 study found that creatine uptake was significantly reduced by 47% when both calcium and magnesium were absent from an extracellular fluid.

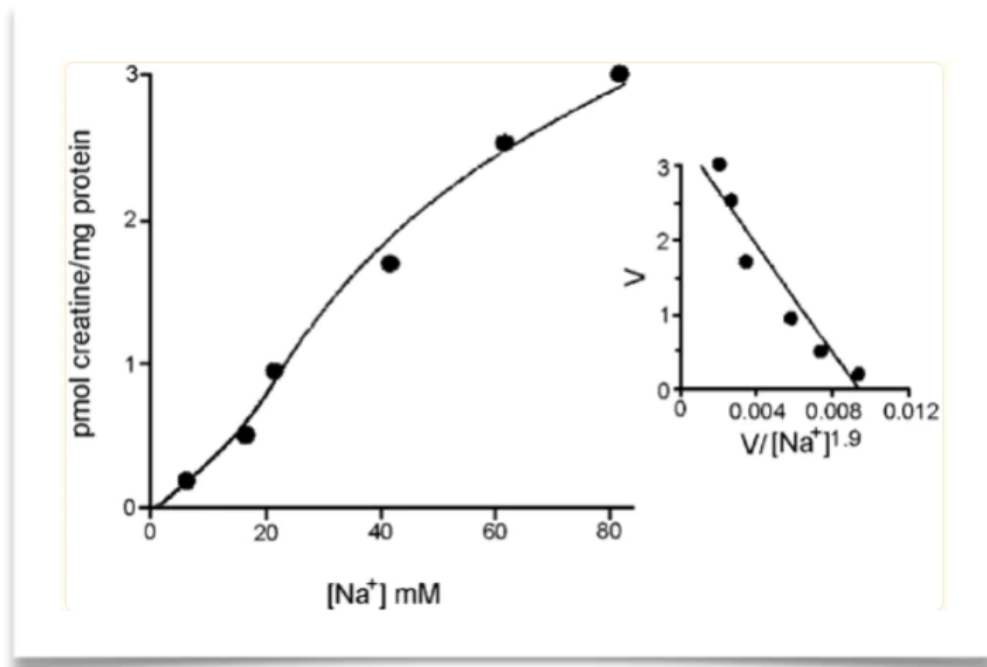
- The same group of researchers also found that in a similar fluid,
- [creatine uptake is increased](#) when concentrations of sodium and chloride are increased, even when creatine concentration remains constant [7]. For optimal creatine transportation, the body requires both sodium and chloride ions to

transport the creatine molecules. Supplementing creatine with these electrolytes' aids with increased uptake and storage of muscular creatine, thus potentially increasing performance.

## MECHANISM

Despite all the fascinating properties of oral creatine supplementation, the mechanism(s) mediating its intestinal absorption have not been investigated.

A 2002 study characterized [intestinal creatine transport](#) and demonstrated for the first time that mammalian and avian enterocytes express creatine transporter along the villus, where it mediates high-affinity, sodium, and chloride-dependent, apical creatine uptake [8].



**Figure:** *In vitro* Na<sup>+</sup>-dependent creatine uptake vs. Na<sup>+</sup> concentration. Adapted from [8]

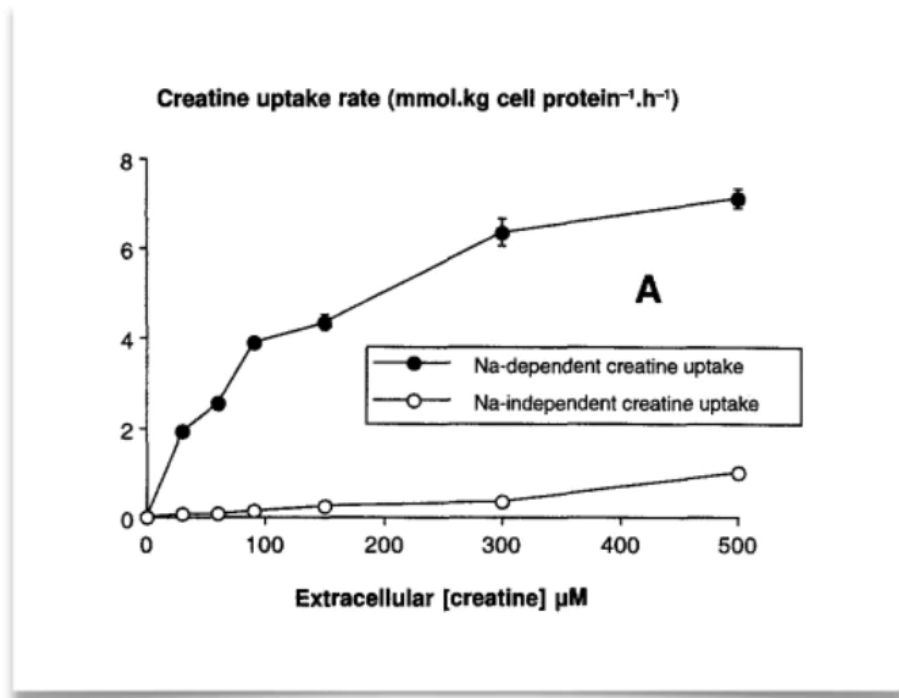
**It is evident from past research that electrolytes further improve creatine uptake and the ergogenic effects associated with exercise.**

- Potassium is involved in maintaining the balance of fluids inside and outside the cells, which can affect the uptake of creatine into the muscles.
- Sodium helps to regulate the osmotic pressure in the cells, which can also impact creatine uptake.

In addition, creatine transport into cells is mediated via transporter proteins, which operate in an electrogenic fashion, requiring sodium and chlorine ions.

Essentially, the sodium-creatine cotransporter makes use of the free energy of the sodium concentration gradient and also of the inside-negative membrane potential [9].

Research indicates that the sodium-creatine transporter is not near equilibrium of max capacity and therefore is a potential site for the control of intracellular creatine content [10].



## SUMMARY AND RECOMMENDATIONS

Research indicates that the rate and magnitude of creatine uptake is enhanced when the extracellular solution contains **electrolytes**, compared to when these electrolytes are absent. It's also very clear that creatine and electrolytes such as sodium and potassium could be beneficial for people wishing to increase their performance.

**If you're looking for a powerful electrolyte and creatine combination to improve your performance, look no further than Hyperade and ATP-Fusion.**

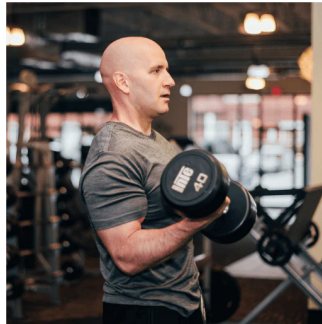
**HyperAde quickly replenishes muscle glycogen and electrolytes** that are depleted from intense bursts of energy and **ATP-Fusion is 100% pure creatine monohydrate powder** infused with a precise amount of sodium and potassium to deliver more of the performance enhancing benefits you're looking for.

You can find them both [here](#).

**References:**

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## **ABOUT DR. PAUL**

I'm currently an Army officer on active duty with over 15 years of experience and also run my own health and wellness business. The majority of my career in the military has focused on enhancing Warfighter health and performance. I am passionate about helping people enhance all aspects of their lives through health and wellness. [Learn more about me](#)