Cognitive Sports Nutrition
Supplement Smart

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• PhD Nutrition, MS Exercise Physiology, BS Nutrition
  • Florida State University
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Overview

• Cognitive Sports Nutrition Defined
• A focus on acute supplementation
  • Not on cognitive function in aging
• Having the guts to perform
• Review of some products to consider
Why Cognitive Function has our Focus

• The importance of cognitive health has grown more than 20 percent (from 61 percent in 2005 to 74 percent in 2017) among all American consumers, according to data from the Natural Marketing Institute (NMI).
• Brain injury awareness
• Performance pressures
• The brain is the focus of science
• Performance in many sports depends on decision-making, timing, memory etc. ........ often while fatigued
Nootropics: A space that needs focus

• Nootropic is a compound that increases mental functions including memory, motivation, concentration, and attention. (Lanni, 2008)
Performance: It’s all in your head

• “Mental energy” is a three-dimensional construct consisting of mood (transient feelings about the presence of fatigue or energy), motivation (determination and enthusiasm), and cognition (sustained attention and vigilance). (Gorby et al. 2010)

• Motivation
  • Mental fatigue interacts with drive and performance in endurance exercise.
  • Increases perceived effort and/or decreases reward (Schiphof-Godart, 2018)

• Focus
• Acuity
• Performance

(Schiphof-Godart 2018)
Model of Mental Energy

Mental Energy

- Cognition
- Mood of energy
- Motivation

Variables that can influence mental energy (genetics, nutrition, pain, sleep & others)

Mental energy – can be defined as the ability to perform mental tasks, the intensity of feelings of energy/fatigue, and the motivation to accomplish mental and physical tasks.

O’Connor 2006
Definitions

• Cognitive performance

• Memory involves storing and retrieval of information. working (short-term) and secondary (long-term) memory.

• Recall, Alertness, reaction time

• Attention or concentration: the ability to selectively process certain information while simultaneously inhibiting other information.

• Cognitive Flexibility switch between different concepts
Some Challenges

• Many tests: many done in lab conditions
• Many terms
• May not be cross over to different populations
  • (many done in aging population)
• Cognition vs sport specific skill testing
• Important to know what you are measuring and in what population
Do you have the guts to perform?
Potential applications for bacteriophages (phages) in human health.

Caffeine works but how much?

• 3–6 mg/kg of caffeine before and/or during training or competition can improve motor skill and cognitive performance.
• ~200 mg for vigilance, mood, alerting, orienting, and executive control
CBD

• CBD administration has been found to have no adverse effect on cognition in animals
• May reverse the working memory deficits induced by THC, ratio.
• Is it different in fit people?
  • acute exercise increases the release and circulation of endocannabinoids
  • A role in motivation and reward
  • Facilitates dopamine release “runners High”
• Does CBD use inhibit or enhance this?
• lowers anxiety in stressful situations

CBD

• CBD 400 mg significantly reduced anxiety measures compared to placebo with correlated reductions in MRI-measured limbic/paralimbic activity in subjects with social anxiety disorder

• Results from a naturalistic study: cannabis-smokers who smoked CBD-rich marijuana had no memory impairments, those who smoked CBD-poor marijuana showed marked impairment in the prose recall task
Omega 3s

• Both blood and dietary omega-3 fatty acid levels are associated with general but not sport-specific anxiety in female collegiate athletes during an off-season period.
Creatine

- There is growing evidence to support the role of Cr in negating the effects of mild sleep deprivation and in cognitive enhancement via its effect on catecholamines.
- An effect of Cr supplementation on the central executive task where a group × time interaction was seen.
- “Oral creatine administration may improve short-term memory and intelligence/reasoning of healthy individuals but its effect on other cognitive domains remains unclear. Findings suggest potential benefit for aging and stressed individuals”. (Avgerinos et al. 2018)
- Neuroprotective?
Nitrosigine

- FDA GRAS unique compound comprised of arginine & inositol: inositol-stabilized arginine silicate.
- ASI has been previously shown to significantly enhance blood levels of arginine up to six hours post-dose. Dose, 1500 mg/d.
- Interesting blood flow and exercise effects:

> Clinical Pharm: Adv and Applica. 2015; 7:103-109, ² FASEB Journal. 2015;29:748.2
Study #1: Results (Trail Making Test B)

Change in Time to Complete Trail Making Test B

Table 3. TMT B Times (sec ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Day 1</th>
<th>Day 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrosigine</td>
<td>47.3 ± 29.7</td>
<td>35.5 ± 18.5</td>
<td>33.9 ± 13.1</td>
</tr>
<tr>
<td>Placebo</td>
<td>43.6 ± 17.8</td>
<td>31.3 ± 10.1</td>
<td>38.2 ± 18.8</td>
</tr>
</tbody>
</table>
Study #2: Results (Trail Making Test B)

### Table 4. TMT B Times (sec ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Day 1</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrosigine</td>
<td>52.7 ± 21.1</td>
<td>40.8 ± 19.4</td>
<td>38.0 ± 17.2</td>
</tr>
<tr>
<td>Placebo</td>
<td>59.1 ± 26.3</td>
<td>54.8 ± 28.8</td>
<td>54.0 ± 44.7</td>
</tr>
</tbody>
</table>

**p<0.001, versus baseline
†=p<0.05 between groups
Tyrosine

• TYR beneficial effective in stressful or challenging (ie prolonged exercise, environmental extremes).

• Studies in military are promising, in athletes they have not shown benefit but may be because the stress is not high enough
Still hanging around

• Guarana: Minimal evidence it increases working memory with exercise in fasted state
• Gingko: lack of evidence
• Ginseng: “ginseng is not currently recommended for motor skill or cognitive performance in athletes”.
• L-Theanine: only when combined with caffeine
A few more

• *Salvia*...Sage: evidence for the cognitive-enhancing and protective effects is promising (Lopresti, 2017).

• P-Synephrine (Jung et al 2017):
  • *Citrus aurantium* is found in the peel of bitter orange and contains p-synephrine which is a protoalkaloid with sympathomimetic properties
  • *Citrus aurantium* (generally containing 20–100 mg of p-synephrine) has been purported to serve as a mild central nervous system stimulant and has been shown to improve memory
  • Recent study by Jung et al 2017 found limited additional benefit when 20mg p-synephrine was added to a preworkout drink given to 25 healthy active male and female participants
Keep a watch on these areas

- CBD: more to come
- Astaxanthin
- Curcumin
- Theacrine
- Studies in gamers
Conclusions

• Carefully Compare (know what is being tested in what population)
• Several Nootropic options to enhance the mental game
• Can’t ignore diet and sleep, of course
• The Gut Brain Axis should be the focus
• Consider combinations but beware of lack of substantiation
• A call for “focused” studies