Sustained and Widespread Improvements in Cognitive Function Produced by an Energy Shot in Healthy Volunteers

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ABSTRACT

BACKGROUND: Energy drinks and liquid energy supplements have been shown to temporarily ameliorate fatigue and improve aspects of cognitive function. Many such products contain glucose, and their positive effects have been generally seen during the hour following consumption. This study evaluated the effects of a liquid energy supplement, containing glucose, on cognitive function and mood over a 6 hour period.

METHODS: 94 healthy volunteers participated in a double-blind, placebo-controlled, two-period crossover study of an energy supplement, containing glucose, and its positive effects have been identified using the CDR System. Compared to placebo, positive effects were seen to be significant at 6 hours for the three attention measures and episodic memory. The effect sizes of the improvements were in the small to large range, for example the improvement in sustained attention being over 0.6 at 6 hours. Self-rated alertness and calmness were also improved over the first 6 hours.

RESULTS: The analyses identified significant main effects of treatment for six validated factor scores from the CDR System. Compared to placebo, positive effects were seen to three measures aspects of attention and information processing as well as measures of executive control, working and episodic memory. These improvements were still significant at 6 hours for the three attention measures and episodic memory. Compared to placebo, positive effects were seen to the three measures aspects of attention and information processing as well as measures of executive control, working and episodic memory. The effect sizes of the improvements were in the small to large range, for example the improvement in sustained attention being over 0.6 at 6 hours.

CONCLUSIONS: This study has identified widespread cognitive enhancement in mildly fatigued healthy volunteers with effect sizes comparable to those of effective treatments in ADHD and also the approved symptomatic treatments for the cognitive deficits in Alzheimer’s disease. Energy drinks can produce sustained and marked benefits to cognition in healthy volunteers, and may have applications in conditions beyond everyday fatigue.

BACKGROUND

Energy drinks and liquid energy supplements have been shown to temporarily ameliorate fatigue and improve aspects of cognitive function. Many such products contain glucose, and their positive effects have been generally seen during the hour following consumption. This study evaluated the effects of a liquid energy supplement, containing glucose, on cognitive function and mood over a 6 hour period.

The CDR System

The CDR System has been used from Phase I through IV & investigator initiated research in:
- > 1200 Clinical Trials
- > 140 Phase I Units
- > 300 Sites in patient studies in > 60 countries
- > 500 Compounds
- > 60 Pure populations

The CDR System has: 50 alternate forms of each test
- 65 language versions

Scientific Presentations
- > 300 peer-reviewed publications
- > 500 conference abstracts

Effects of Attention

RESULTS

• The analyses identified significant main effects of treatment for six validated factor scores from the CDR System.
• Compared to placebo, positive effects were seen to three measures aspects of attention and information processing as well as measures of executive control, working and episodic memory.
• These improvements were still significant at 6 hours for the three attention measures and episodic memory.
• The effect sizes of the improvements were in the small to large range, for example the improvement in sustained attention being over 0.6 at 6 hours.

ANALYSIS: Repeated Measures Mixed Modelling on change from baselines with baseline as a covariate.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Treatment</th>
<th>P-value</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>Control</td>
<td>0.0001</td>
<td>0.6</td>
</tr>
<tr>
<td>Episodic Memory</td>
<td>Placebo</td>
<td>0.001</td>
<td>0.5</td>
</tr>
</tbody>
</table>

DISCUSSION & CONCLUSIONS

Sustained benefits to cognitive function can be obtained from an energy shot without glucose.

Effect sizes of energy drinks on sustained attention are comparable to attention training in ADHD and mild cognitive impairment.

For future research:
- Would these effects occur without sleep deprivation?
- Are they lost following prolonged exposure to sleep deprivation?

Incorporated technologies within the CDR System are: Pycnogenol, DHEA, Citicoline, Alumiloid, N-acyetyl-L-cysteine, L-phenylalanine.