Impact of Caffeine on Macronutrient Metabolism: A Review of Literature

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Introduction

Inspiried by the profound use of everyday caffeine consumption in the United States, our group is interested in the interaction between macronutrient metabolism and caffeine consumption. Further exploration of how macronutrient metabolism is impacted when caffeine is ingested with food was probed.

Aim

To investigate the benefits or risks or harm between macronutrient metabolism and macronutrient consumption.

Method

• A review was conducted (Figure 1) using the guidelines published by the Centre for Reviews & Dissemination (CRD’s Guidance for Undertaking Reviews in Health Care, 2009).

• Two databases were used: 1. EBSCO Host Academic Search Complete 2. Google Scholar

• Search terms (used in varying combinations): “the metabolic effects of caffeine”, “carbohydrates”, “proteins”, “metabolism” and “insulin response to caffeine”

• Research databases were searched between July 2015 and April 2016

• Summarized based on specific research characteristics

Results

Figure 1. Characteristics table of Published Papers of Impact of Caffeine Metabolism on Macronutrient Metabolism

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
<th>Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hattori K, et al.</td>
<td>2010</td>
<td>Caffeine and macronutrient metabolism</td>
<td>Obesity Reviews</td>
</tr>
</tbody>
</table>

Discussion

Carbohydrate and Fat

Figure 2. Flowchart of impact of caffeine on carbohydrate and fat metabolism

Protein

Few studies focused on the relationship between caffeine and protein, and the main focus of those studies were exercise or muscle performance instead of studying the impact of supplemental amino acid and caffeine has small improvement in running performance compared to a placebo, only caffeine or only essential amino acid (Kendall, Moon, Fairman 2014). Having amino acid and caffeine might be beneficial for sport performance. However, here is a clear gap in the literature, and studies investigating the effects of caffeine on protein metabolism are needed.

Conclusion

All but one human-subject experiments reviewed in this study recruited only healthy (screened for medical history and BMI=25), young (age 18-28) males for their experiments. Previous medical conditions, high BMI or age variations can impact the subject’s response to caffeine. The largest age range in the studies we examined was 8 years (age 20-28). Males were preferred over female subjects in the studies for consistency; even with an all-female population it is difficult to achieve homogeneity, due to individual menstrual positions, oral contraceptive use, possible pregnancy and other conditions that may affect metabolism on top of caffeine metabolism.

Reference