



(RESEARCH ARTICLE)



## Experience with a medium chain triglyceride complex and changes in mental focus and score in different modes of golf transport and play

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### Abstract

Medium Chain Triglyceride (MCT)- based supplements have increased cognitive function in general and specific functional realms. Can an MCT complex improve mental focus in sports with a high, active cognitive component? This pilot investigation tested whether the proprietary MCT complex utilized could result in positive gains in mental focus or perception of enhanced energy on the course. Each of the ten subjects played a 9-hole round using a motor cart, pushcart, carry bag, or electric trolley (which simulated playing with a caddie) while wearing a portable metabolic system to determine baseline energy expenditure, mental focus, and score baseline. Data points recorded and averaged included the volume of oxygen used per minute total (VO<sub>2</sub>/L/min), oxygen used per kg of body weight per minute (VO<sub>2</sub>ml/kg/min), converted to kcal per hour, and heart rate. A 10-point mental focus scale had golfers rating tee shots, second through fourth shots, and the short game from 100 yards in. Using their preferred mode of transport and play, the subjects completed one more, 9-hole round after once-daily consumption of the supplement for seven days. The average rating of mental focus and perceived energy increased from a level of 5.77 to 7.22 out of 10, statistically significant at P= 0.0120. Actual play scores decreased from 10.8 to 8.9 over par for the 9-hole rounds, trending positively. This initial trial suggests that a proprietary MCT complex can improve actual golf performance and the golfer's perceptions of focus and energy regardless of which mode of transport and play is used.

**Keywords:** Medium chain triglycerides; Golf scores; Golf focus; Golf energy perception; Golf improvement

### 1. Introduction

Sports, where cognitive function and focus are essential, have not received the same supplement options for performance enhancement as those with high physical demands. Can specific supplements improve function in this arena of sports performance?

The supplement industry has exploded in the last twenty years with numerous claims for specific supplements and increased sports performance [1-4]. While bodybuilders pioneered using nutritional strategies to gain an edge, conventional exercise physiology, directly and indirectly, impacted nutrition for performance.

Exercise physiology came of age in the 1960s and 1970s, with prominent physiologists producing textbooks that clarified and defined the field and provided a springboard for additional questions about performance relationships and enhancements. Many of these early studies focused on the energy dynamics of the sport. Carbohydrate-based compounds and sports drinks were the results when paired with endurance performance [5-11].

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Increased protein consumption through supplementation received a commercial push as weight training/resistance training gained acceptance to improve sports performance [12-16]. Leading the next historical charge were compounds related to increased strength and anaerobic or sprint performance [17-21]. These compounds have evolved to include many components besides protein, aiming to improve the training experience and results.

While thinking and reaction time in sports is critical, these aspects of sports performance have received less product attention. Some supplement applications have limited investigations of cognitive benefits of sports focus and thinking [22-24]. Several of the compounds used for increasing physical performance, containing caffeine, have been applied to the mental focus arena [25, 26]. Some caffeine can improve mental focus by increasing arousal, narrowing, and heightening attention. However, this is only desirable in some sports or activities.

In sports where there is a fine motor skill component, increasing focus by increasing physiological arousal can be a detriment to performance. What the individual may gain by increased attention is offset and diminished by decreasing the ability to think broadly and the decrement in fine motor performance. In animal and human studies, a few compounds have shown promise of increasing focus and cognition without adverse motor effects from increased arousal.

In recent applications, MCT-based compounds have demonstrated increased cognition along a broad spectrum of abilities [27-30]. Moreover, it appears without any effects of incompatible arousal components, which is the potential case with compounds relying on caffeine. MCT studies have focused on the effects concerning dementia and Alzheimer's, with some investigations on non-affected individuals in this regard [31-35]. The body of work has been positive about MCT compounds improving cognitive function [36-41], with no reported adverse effects associated with caffeine. In other words, cognitive function was improved with no negative physiological or neurological ramifications.

## 2. Material and methods

Ten golfers were recruited: six males (n=6) and four females (n=4). All were regular participants at an accessible golf course where they were familiar with the course and terrain (Table 1). A further requirement was golf participation at least once per week at the course to ensure that both golf course familiarity and attention to mental focus were high.

**Table 1** Subject Demographics

Subject	Weight	Height	Age	VO2/ml/kg/min	Max HR	AT/ml/kg/min	Handicap/9 Holes
1	220	71	69	22.8	148	19.1	12.15
2	220	74	73	29.5	138	19.4	6.9
3	163	69	69	33.9	152	22	7.26
4	165	69	48	31.8	148	21.9	0.05
5	220	74	58	30.4	144	22.4	5
6	228	71	69	25.4	124	13.9	12.1
7	105	60	59	26.9	136	19.2	6.2
8	183	65	65	20	148	13.7	16.5
9	114	67	60	26.9	131	15.5	21.5
10	183	67	66	14.5	146	12.3	21
<b>Mean</b>	<b>180.10</b>	<b>68.7</b>	<b>64</b>	<b>26.21</b>	<b>141.5</b>	<b>17.94</b>	<b>10.9</b>

Before supplementation with the proprietary MCT complex, the golfers completed trials with the selected modes of transport and play. This included a motor cart (MC), pushcart (PC), carry bag (CB), and electric trolley (ET). The subjects were measured for metabolic response during those nine-hole rounds with a VO2 Master portable analyzer [42], (Figure 1, Figure 2).



**Figure 1** Subject using Pushcart with metabolic sensor



**Figure 2** Golf, putting with metabolic sensor

To assess mental focus and feeling of energy in golf, the literature revealed there was no simple instrument for this purpose [43]. A short survey was developed, then tested with two golfers. Feedback resulted in minor modifications,

and the survey was converted into an online rating and assessment [44, 45]. The survey included rating tee shots, second to fourth shots, the short game defined by 100 yards, and in and feelings of energy. The survey used a ten-point rating scale. A rating of five was considered average, with scores above five indicating increased focus and energy, while those below that number indicated less-than-average values. The subjects were given additional exposure to the scale during a sister project on energy expenditure in various models of transport and play. In addition, each participant kept score.

The subjects used the energy expenditure (EE) portion to choose their preferred mode of transport and play. Nine holes were played in that mode and assessed for score and mental focus. The preferred transport/play among the subjects was six ET, one MC, two PC, and one CB. The subjects then used that same mode of play after taking the supplement for seven days, (Figure 3).



**Figure 3** Supplement label

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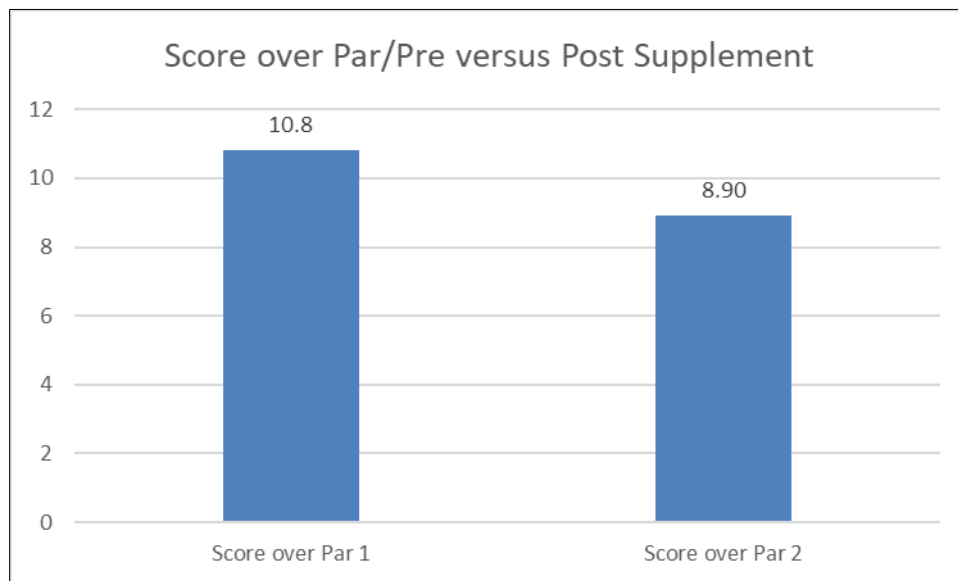
### 3. Results

When comparing mean energy expenditure, there was no statistically significant difference between the first round without the supplement and the second with the supplement (234.10 kcal per hour versus 232.51 kcal per hour).

Actual play scores decreased from 10.8 to 8.9 over par for the 9-hole rounds, trending positively. (Table 2, Figure 4).

**Table 2** Score to par comparison, pre versus post-supplement

Subject	Mode	Score over Par 1	Score over Par 2
1	ET	10	9
2	PC	7	6
3	ET	4	4
4	CB	4	2
5	ET	5	5
6	MC	11	9
7	PC	9	2
8	ET	19	21
9	ET	21	14
10	ET	18	17
<b>Mean</b>		<b>10.8</b>	<b>8.9</b>

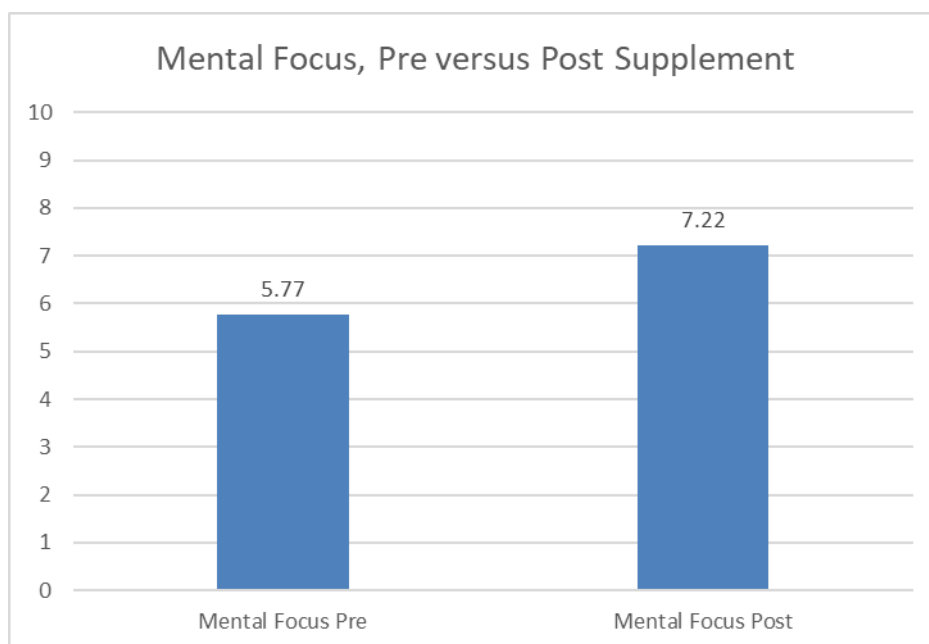


**Figure 4** Score to par, graphic comparison

Rating of mental focus and energy increased from 5.72 to 7.22 out of 10, statistically significant at  $P= 0.0120$ . (Table 3, Figure 5).

**Table 3** Mental focus comparison, pre versus post-supplement

Subject	Mode	Mental Focus 1	Mental Focus 2
1	ET	6	9.5
2	PC	5	8
3	ET	8	8
4	CB	6	8
5	ET	5	5
6	MC	5	7
7	PC	6	7.66
8	ET	5.5	5
9	ET	5.66	6
10	ET	5.5	8
<b>Mean</b>		<b>5.77</b>	<b>7.22</b>

**Figure 5** Graphic comparison of mental focus, pre versus post

#### 4. Discussion

This study is the first investigation to ascertain the effects of a proprietary MCT complex on mental performance in a cognitively based sport. While a limited study, this outcome indicates that MCT-based supplements can have mental focus benefits in sports like golf without increased physiological arousal. This is important as arousal levels, as indicated by heart rate and galvanic skin response, can increase to a point where they interfere with fine motor skill performance.

This brief investigation showed a difference in effect between mental focus and score to par. It is theorized that mental focus was measured on a defined, ten-point scale, in which regular golfers know their levels daily. Score to par has a wide variability as it depends upon the weather, course conditions, physical factors to the golfer in question that day, and handicap/index. Because the subjects had a wide range of handicap levels relative to par, directional trends with a simple pre and post-design are more challenging to observe and attribute without assignment to a specific sub-group and repeated measures.

With the mental focus scale results, the subjects noted that their focus and feeling of energy were enhanced. This was true even with the actual EE, as measured in O<sub>2</sub> and kcal per nine holes, remaining even. Previous research and applying

whole-body energy usage observations from the last 30 years aligned with this result. The exercise intensity was too low in this short golf course round for the compound's potential benefits in either total energy expenditure or measurable substrate changes.

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## 5. Conclusion

This beta study demonstrates a potential enhancement for MCT based complexes in sports and activities where there is a high cognitive component combined with the need to not elevate physiological arousal.

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## Compliance with ethical standards

### *Acknowledgments*

The authors thank the Colorado Golf Association for providing course access and usage for the study.

### *Disclosure of conflict of interest*

NEW has no conflict of interest. GMH and RWK are scientific advisors to UBN, the manufacturer of the supplement.

### *Statement of ethical approval*

This study was conducted in accordance with the Declaration of Helsinki and was approved by the ethics committee of the Colorado Center for Health & Sports Science, Denver, Colorado.

### *Statement of informed consent*

Informed written consent was obtained from each participant after a clear explanation of the study objectives and procedures.

### *Funding*

The Colorado Golf Association provided access and play at CommonGround Golf Course for the study. Ultimate Brain Nutrients provided the supplement for the study. The Colorado Center for Health & Sports Science provided research supervision and equipment used in the study.

### *Author roles*

NEW was primarily responsible for research design, testing, on-course measurement, and data reduction and write up. GMH assisted in research design, write up and final review. RWK contributed to write up and final review.

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