

PERFORMANCE NUTRITION

DECIPHERING THE LATEST SCIENTIFIC RESEARCH TO HELP YOU GET THE MOST FROM YOUR TRAINING, DIET AND SUPPLEMENTATION

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SET YOUR BODY CLOCK TO REGULATE ENERGY METABOLISM

Physiological processes in the human body follow a recurring 24-hour cycle known as the circadian rhythm.

The circadian rhythm is influenced by various external factors including seasonal changes in daylight, working shift patterns and jet lag. Chronic changes to the circadian rhythm are associated with increased risk of obesity, diabetes and cardiovascular disease.

A recent study, published in the *American Journal of Clinical Nutrition* investigated how alterations to the circadian rhythm affect the functioning of the body. Acute changes to the body's natural clock over a period of just three days were found to disrupt carbohydrate and protein metabolism, which could theoretically exacerbate the development of obesity and metabolic disease. It could also have major implications for gym-goers.

Interestingly, changes to the circadian rhythm did not influence appetite regulation or energy expenditure during the three-day period.

MAIN FINDINGS

■ Circadian misalignment (either a shortened or lengthened cycle) influenced metabolic markers. These included a flattening of the cortisol secretion pattern, increased insulin concentrations, increased carbohydrate oxidation, decreased protein oxidation, increased carbohydrate

concentrations and increased sleeping metabolic rate.

■ No changes in subjective feelings of appetite or energy expenditure were observed. However circadian misalignment resulted in a decrease in circulating levels of glucagon-like peptide-1 (GLP-1), a hormone that alleviates feelings of hunger.

SIGNIFICANT METHODOLOGY

This study focused on 13 healthy adults who each made three separate visits to the department of human biology at Maastricht University in the Netherlands.

The volunteers were kept unaware of the time and remained in a light-adjusted respiratory chamber for the duration of each three-day visit.

The first visit followed a regular 24-hour day cycle, with the volunteers sleeping eight hours each day. The second and third visits followed either a phase advance or phase delay format.

The phase advance visit followed a shortened 21-hour day cycle, sleeping seven hours a day, while the phase delay visit followed a lengthened 27-hour day cycle, sleeping nine hours a day.

During each visit, sleep, energy expenditure, substrate oxidation and appetite were assessed. Blood samples were also collected and analysed for various energy metabolism markers.

TAKE-HOME MESSAGE

This study demonstrates that changes to the circadian rhythm, over a period of just three days, had a significant effect

on markers of energy metabolism.

This could help to explain the link between having an irregular circadian rhythm and being at increased risk of obesity and metabolic disease.

Such disruption to energy metabolism could have major implications for gym-goers and could compromise performance during and recovery after events or training sessions.

This is particularly relevant to endurance athletes who rely on the optimal delivery of energy to the working muscles throughout their event.

Those who focus on building muscle mass, strength and power should bear in mind that disruptions to energy metabolism, specifically protein metabolism, could blunt recovery and adaptation to training.

To combat this, gym-goers should stick to a regular daily routine, waking up and going to sleep at similar times each day. If this is not possible, due perhaps to long-haul travel or shift work it is vitally important to still get at least seven hours' sleep and plan your meals carefully to get enough nutrients.

REFERENCE

Gonnissen HKJ, Rutters F, Mazuy C, Martens EAP, Adam TC, Westerterp-Plantenga MS. (2012) **Effect of a phase advance and phase delay of the 24-h cycle on energy metabolism, appetite, and related hormones.** *American Journal of Clinical Nutrition* 96:689-97

COGNITIVE PERFORMANCE—DHA SHARPENS MEMORY AND REACTION TIME

A number of scientific studies have identified a link between the dietary intake of omega-3 and cognitive performance.

Omega-3 refers to a group of three fatty acids: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

DHA has been found to have the greatest influence on cognitive performance, possibly modulating aspects such as memory, reaction times, learning and concentration.

The human body is able to create small amounts of DHA itself, but an adequate dietary intake is required to support neural function.



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HOLA IMAGES

The major dietary source of DHA (and EPA) is seafood, especially oily fish, such as tuna, mackerel and sardines.

Several studies have investigated the effects of increasing dietary intake of DHA on cognitive performance but they have tended to focus on children, older adults and people with learning difficulties. However, a group of New Zealand-based researchers recently conducted a large-scale study on young healthy adults, which could have implications for sportsmen and women who need to make quick decisions.

MAIN FINDINGS

- DHA supplementation improved memory and reaction times in young adults with a low habitual intake of DHA.
- The response to DHA appears to differ in males and females. Males were found to have improved reaction times in working memory (temporary storage and manipulation of information necessary for complex cognitive tasks), whereas females had improved accuracy in episodic memory (the memory of events, times, places etc.).

SIGNIFICANT METHODOLOGY

The six-month study followed 176 healthy adults aged 18 to 45 with a low habitual intake of DHA.

For the duration of the study, one group of 85 (33 men and 52 women) consumed three DHA tablets per day, providing 1.16 g DHA and 0.17 g EPA.

The other group of 91 volunteers (33 men and 58 women) consumed three placebo tablets a day, containing sunflower oil.

At the beginning and end of the study, volunteers attended study days where they gave blood samples and completed a range of cognitive performance tests to measure working and episodic memory, attention, reaction times and processing speed. Blood samples were measured for fatty acid levels.

TAKE-HOME MESSAGE

This study demonstrates the importance of an adequate intake of omega-3, specifically DHA, in the diet of young adults.

The amount of DHA provided in the study is equivalent to that found in two to three portions of oily fish per week.

This intake is easily achievable in the diet but supplementation with DHA/EPA is highly recommended for those who dislike seafood or other sources of omega-3.

This is a simple way to support cognitive health and could potentially lead to improvements in performance at work. It could also have implications for sportsmen and women that need to think quickly, such as those playing team and racquet sports.

The intake of omega-3 may provide other health benefits, such as improved blood triglyceride levels, supporting joints by reducing inflammation and boosting the immune system. **M&F**

REFERENCE

Stonehouse W, Conlon CA, Podd J, Hill SR, Minihane AM, Haskell C, Kennedy D. (2013) **DHA supplementation improved both memory and reaction time in healthy young adults: a randomized controlled trial**, *American Journal of Clinical Nutrition* [Epub ahead of print]

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