

NUCLEOTIDES: STRENGTHEN THE IMMUNE SYSTEM AND SPEED RECOVERY

Lars McNaughton Discusses his Recent Work on Dietary Nucleotide Supplementation

Professor Lars McNaughton recently published a paper in the prestigious Journal of Sports Medicine and Physical Fitness, where he looked at how nucleotide supplementation can mitigate stress on the body from endurance exercise. He sat down with the NuCell producers recently to answer questions about the implications of this study for athletes.

Lars McNaughton is Head of the Department of Sport, Health & Exercise Science at the University of Hull in England. A native of England who grew up in Australia, Professor McNaughton completed his PhD at the University of Oregon (home of coach Bill Bowerman and runners Steve Prefontaine, Alberto Salazar, etc). He has published over 100 publications in peer reviewed journals during a 21 year career including stints in Australia, the US, the UK and Europe. He is a Fellow of the American College of Sports Medicine (ACSM), the Australian Association for Exercise and Sports Science (AESS) and the European College of Sports Science (ECSS).

McNaughton, L., Bentley, David J., and Koepfel, P. (2006). **The effects of a nucleotide supplement on salivary IgA and cortisol after moderate endurance exercise**, J. Sports Medicine and Physical Fitness, 46:84-89.

Q What was the purpose of the study you recently published in the JSMPF?

A The goal of this study was to determine whether the consumption of a dietary nucleotide supplement had any effect on endurance athletes. The model we used was to look at stress, because that's how athletic training works ... it's a stressor to the system. In training, an athlete stresses their system and then in recovery, the body adapts to that stress and increases its capacity. In this sense, stress is positive. However, there are additional repercussions of stress which have negative effects on the body. For example, there is substantial evidence that over-training (or a large increase in training load and/or a major effort, such as racing a marathon) depresses the immune system. It is well documented that endurance athletes have a higher incidence of colds and other upper respiratory infections as a result. Similarly, during and after exercise, the body releases the hormone cortisol into the bloodstream in response to stress. Cortisol is a catabolic hormone, which means that its effect is to degrade tissue. While the release of cortisol is part of the body's normal response to stress, prolonged high levels of cortisol can possibly lead to muscle wastage, which is the opposite from what an athlete wants.

In our study we measured the stress imposed on the body by a prolonged exercise stress, and looked at the question of how dietary nucleotide supplementation

Q What was the protocol for the study?

A We measured the two markers in all subjects at the start of the trial two times: prior to exercise and after a 90 minute endurance cycling test at approximately 60% of VO₂max. The subjects were then provided the supplement or a placebo for 60 days, on a double blind basis (ie, neither the researchers nor the subjects knew who had the supplement, NuCell, and who had the placebo). At the end of the supplementation period the subjects again underwent testing for the two markers, prior to and following the 90 minute endurance cycling test.

Q What were the results of the study?

A After 60 days of supplementation, we found significant differences in the two markers between the control and the experimental groups. Those subjects who were taking the nucleotide supplement had significantly higher levels of salivary IgA than the control group. Analogously, cortisol levels were significantly lower in the experimental group than the control.

This work suggests that a dietary nucleotide supplement may offset the hormonal response associated with demanding endurance activity. Specifically, the body's reaction to the stress of training may be lessened.

The implications are that nucleotide supplementation strengthens the immune system, leading to fewer colds and upper respiratory infections, and that it lowers the hormonal reaction to stress, meaning lower levels of cortisol during and after exercise, and thus to less tissue damage, which in turn permits faster recovery.

Q You looked at two markers (salivary IgA and cortisol). What relevance do these have to athletes?

A These two markers are the most common indicators used to measure stress in the field of exercise physiology. They have multiple advantages, they are both easily measured via a test of the athlete's saliva and since they are widely measured, this provides a broad basis for comparison with other studies.

Salivary immunoglobulin (IgA) is the main form of immunoglobulin found in saliva and the mucosal membranes, thus it plays a front line role in defending the body against colds and other respiratory infections. It is a readily measured marker for immune system function.

Cortisol is a hormone released when the body is under stress. While it is normal for an athlete to have a higher level of cortisol after exercise, elevated levels indicate higher stress. All things being equal, an athlete with a lower level of cortisol post-exercise will have a faster recovery, since there is less catabolism [tissue degradation] during exercise.

Together, these markers for immune function and hormonal change provide a good picture of how the body reacts to stress. Differential reactions to stress can be attributed to the supplementation regime we studied.

affected the reaction to this stress.

Q Aren't dietary nucleotides metabolized completely in the stomach? What benefit can oral supplementation provide?

A The current study does show measurable benefits from dietary nucleotides, although it didn't examine the mechanism of these benefits. The traditional view had been that nucleotide supplementation was not needed as the body could synthesize all the nucleotides needed on its own. Research over the past several years has shown that under conditions of stress, the body does utilize dietary nucleotides.

Research into dietary nucleotides is an area of active interest. In fact, I have another paper on this topic, currently undergoing the peer review process, which should be published in the next year.

Q Are there any WADA or NCAA restrictions on oral nucleotide supplementation?

A No, there are no restrictions. The food supplement, NuCell, simply provide a concentrated form of purified nucleotides (Nutri-tide formula), which are present in all food products to some degree.

Q Would you recommend NuCell to athletes?

A Yes, I would. I take a nucleotide supplement every day, even though I consider myself to have a pretty balanced diet. It's not expensive, it certainly does no harm and based on our results there is a real benefit.