

NucleoCell

With Nucleotides

Product description

NucleoCell contains a mixture of natural RNA and nucleotides, which are the primary components of the cell synthesis. These substances, produced out of yeast extracts, are identical to those the body produces itself. NucleoCell supplies the body with these cell components and thus contributes in a natural way.

At the Bath university, UK, a double-blind placebo-controlled study made on healthy men showed a decreased lactate value and a cortisol reduction: After physical activities, the lactate and the cortisol values were significantly lower after the 60 days NucleoCell diet than after the placebo diet or before the supplementation (1). Cortisol is a stress hormone and it increases during physical activities, which delays the recovery and the protein synthesis as well as it reduces the defence forces. In sport, a high cortisol value deduces from a high intensive physical load.

Another study done with NucleoCell found substantially enhanced (good) HDL-cholesterol of 15% versus placebo and even a drop in the control group after supplementation for 60 days. Additionally, slightly lower total cholesterol levels and, in consequence, lower (disadvantageous) LDL-cholesterol levels were measured (2).

Earlier studies on NucleoCell examined the influence on immunity with respect to colds and flu symptoms. NucleoCell supplementation for 28 days reduced the symptoms of a common cold or flu infection or secondary infection: painful sinuses, earache, dry mouth, sore throat, muscle aches, and headache (3).



Advantages

- Effectiveness of the nucleotides scientifically proven in 3 clinical studies
- Reduced stress markers after physical exercise
- Accelerated recovery time after physical exercise

Utilisation

2 x 2 capsules every day. In order to take advantage of the full effects spectrum, it is recommended to take NucleoCell on a regular basis. It is also recommended to double the dosage for about a week during physical loads and in case of an infectious disease beginning (cold, influenza). Do not take in case of yeast allergy and after organ transplantations.

Ingredients

DL-methionine, food yeast 19%, yeast extracts with nucleotides 18.5%, inositol, L-lysine, vitamins, sodium citrate, magnesium stearate, silicic acid. Capsule envelope: cellulose.

NucleoCell

With Nucleotides

Flavours / nutrition facts

Neutral. Box of 80 Capsules.

nutrition facts		per 4 capsules (= 1 daily ration)	
energy kJ (kcal)		17 (4)	
proteins		0.6 g	
carbohydrates		0.4 g	
fat		0 g	
vitamins		per 4 caps.	%ETD*
C		48 mg	80%
folic acid		160 µg	80%
pantothenic acid		4.8 mg	80%
biotin		120 µg	80%
E		6 mg	60%
B12		0.6 µg	60%
amino acids		Per 4 capsules	
methionine		290 mg	
lysine		70 mg	

* recommended Daily Intake

Literature

- [1] McNaughton et al.,(2006): The effects of a nucleotide supplement on salivary IgA and Cortisol after moderate endurance exercise. J Sports Med Phys Fitness, 46:84-9.
- [2] McNaughton et al, (2007): The effects of a nucleotide supplement on the immune and metabolic response to short term, high intensity exercise performance in trained male subjects. J Sports Med Phys Fitness, 47(1):112-118.
- [3] Davidson et al., (2002): A randomised, double blind placebo controlled Phase II exploratory trial to assess the effect of Nucell® supplementation on perceived symptoms of the common cold and markers of immune function. Queen Margaret University College, Dep. Of Dietetics, Edinburgh, Scotland).

Nucleotides – the building blocks of life

Remo P. Jutzeler van Wijlen, Head R&D Sponser Sports Food
Ing. Appl Food Sciences, MAS Nutrition & Health ETHZ

Function and mechanisms of nucleotides

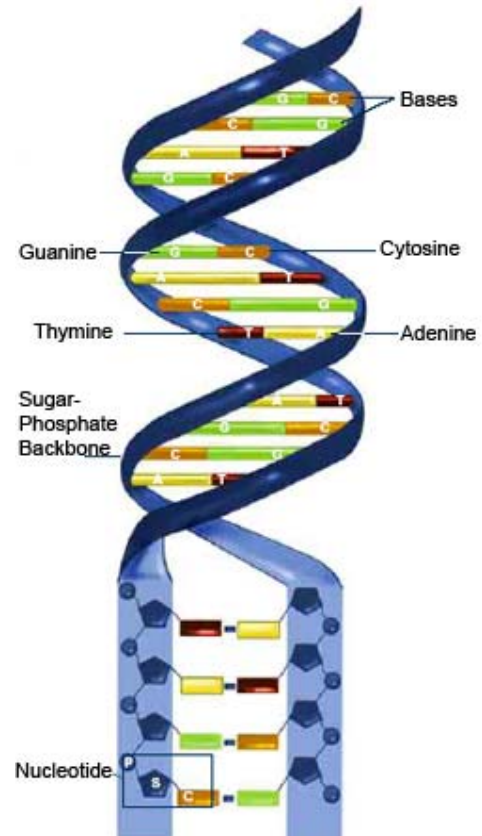
DNA is the substance inside each and every cell that carries our genetic blueprint. It is made from building blocks called nucleotides (see pict. 1). There is a particular need of sufficiently available nucleotides for cells that need to divide often. This is the case for our immune cells, which have to divide rapidly in order to respond fast enough to an infection. But also the cells lining our digestive tract, called intestinal villi, are frequently replaced and need nucleotides for repair. The body is able to recycle old nucleotides from worn out cells (“salvage pathway”) or to make new nucleotides (“de novo synthesis”) from sources such as glucose and glutamine. However, this process is not very energy-efficient; it’s time-consuming and metabolically taxing. Thus, since the body has a limited capacity to provide its own nucleotides, it is uniquely able to extract them from foods in our diet which contain them in substantial quantities. In order to stay healthy, it is crucial for our bodies to be able to rapidly respond to special needs and stressful circumstances. For example, when infected with the Flu, millions of viruses invade our body which need to be destroyed in order to regain normal health. Here, it becomes crucial that the body has the availability of sufficient nucleotides to rapidly and efficiently respond by producing enough leucocytes (white blood cells) to overcome the infection. If the nucleotide supply is insufficient, the Flu viruses will proliferate unhindered which may lead to more severe symptoms and prolonged illness. With enough nucleotides the infection can be quickly counteracted during its initial stage.

As with many other nutrients, the evidence of the effectiveness and importance of dietary nucleotides was first demonstrated in animal nutrition where they are widely used in fish, poultry, pigs, cattle and horses to enhance performance and to intensify and accelerate natural immune response. Nucleotides are not yet considered essential nutrients for humans, but stress, physical exertion, illness, poor diet and excessive use of antibiotics and alcohol increase their need in order to facilitate timely and effective cell proliferation to address a specific need such as growth, reproduction, or disease management. Human breast milk is especially rich in nucleotides. Many infant formulas now contain them because studies have shown that babies fed nucleotide-supplemented infant formula experience better growth and development, maintain a healthier immune system, and have increased levels of beneficial intestinal bacteria which reduce gastrointestinal distress.

In adults, advantageous effects were found in markers of immune function, i.e. salivary immunoglobulin-A (IgA), which is involved in the first defence against coughs and colds. From a more holistic point of view, it is interesting that both innate and acquired immunity need rapid and unhindered cell proliferation for proper functionality. Unfortunately, cells of the immune system lack the potential to synthesise nucleotides themselves. Other cells not capable of producing sufficient amounts of nucleotides include gastrointestinal and blood cells. Importantly, RNA/nucleotides do not *stimulate* innate or acquired immunity, but rather provide the resource for unhindered cell proliferation, gene expression, and response to special environmental and physical challenges. Furthermore, in contrast to pro-, pre- or synbiotics, purified dietary RNA/nucleotides are not restricted to species or conditions. Their universal, valid use and fundamental functionality and efficacy in every living organism make them a valuable management tool for many stress and health related conditions.

Dietary and supplemental nucleotides

Nucleotides have also gained interest in the area of food hypersensitivity because the gut and the immune system are dependent on their ready supply to meet the rapid “turnover” of implicated cells. Nu-



Pict. 1: nucleotide structure within a DNA string

cleotides modulate the expression of inflammatory reactions in the intestine. In infants, nucleotides boost the production of Immunoglobulins and increase the tolerance of food (antigens). Another outcome, and probably the most interesting one, is the improvement of gut health. Nucleotides strikingly increase the length of intestinal villi, the structures in our gut which constitute the enormous surface of our gastrointestinal tract (see pict. 2). For instance, the incidence and duration of childhood diarrhoea is reduced when supplemental nucleotides are given. Modest improvements were also found in patients with irritable bowel syndrome (IBS), a very common gastrointestinal disease. The prevalence of IBS may be underestimated because poor gut integrity and function is frequently misdiagnosed as wheat gluten or milk allergy or lactose intolerance.



Pict. 2: intestinal villi

The problem is that foods rich in nucleotides are now rarely on our menu.

Meat products from organs such as liver, kidney, intestines, and lung are particularly rich sources of nucleotides, but are now rarely eaten. Modest vegetarian sources include yeast extract, mushrooms, broccoli, and cauliflower. In the light of a widespread tendency to cut down on adequate animal-derived foods and the common low consumption of vegetables, it seems reasonable that our overall intake is substantially lower than in pre-industrialised times and populations where a "Paleo Diet" was common. Adding nucleotide-rich foods or taking supplements derived from yeast may improve gut integrity, digestive processes and possibly diminish some food intolerances. It may also be relevant for patients of celiac disease in helping speed up the recovery of the gut villi damaged by a gluten-containing diet.

Nevertheless, because of its purine content, the intake of supplemental nucleotides and nucleotide-rich food sources is contra-indicated in people who are genetically predisposed, have a history of, or suffer from hyperuricemia (gout). Furthermore, the strong immune-enhancing effect prohibits the use of nucleotides for sufferers of auto-immune diseases and users of immune-repressive medications, e.g. after organ transplantation.

Nucleotides for athletes – improved recovery, muscle-to-fat ratio, and digestion

Body tissue is constantly catabolised through training and competition and has to be rebuilt. No muscle build-up, strength enhancement and performance improve without prior physical training and concomitant tissue catabolism. Yet, the more quickly cells are resynthesized after workout, the faster and better the recovery. Tissues or cells with a high turnover rate such as the skin, gut-lining cells, white and red blood cells, immunity related cells, as well as growing and recovery tissues, need a steady resynthesis of DNA with a concomitant high turnover rate of RNA. Particularly, in phases of intensive training, an additional supply of nucleotides through dietary intake is needed. Nucleotides are essential for muscle function in different ways. Besides protein synthesis they improve oxygen transport and reduce the effects of lesions in the intestinal tract and muscles.

Hard physical training is a significant stress factor for athletes with various, negative outcomes. The levels of immunosuppressive substances like cortisol increase and reduce the defence forces of our body. As a result, decreased salivary IgA has been found in athletes prone to physical stress. Nucleotide supplementation for 60 days significantly increased IgA compared to a placebo. In the liver and muscles, lower serum levels of other stress indicators like creatinase and lactate dehydrogenase were found after nucleotide supplementation versus the placebo. This indicates improved recovery from physical stress. Nucleotides also reduce the incidence of infections after injury on wounds and abrasions, and they accelerate wound healing.

Regarding lipoprotein metabolism, nucleotides are advantageous for endurance and strength athletes alike. Nucleotides are first transported to the liver where they promote the synthesis of protein instead of fatty acids, thereby optimising the muscle-to-fat ratio. This effect is not only significant for lean muscle build-up, but also for weight management. In conjunction with lipoprotein metabolism, studies on nucleotide supplementation have demonstrated increased levels of (good) HDL-cholesterol.

Dietary nucleotides offer pre-absorptive benefits in that they serve as substrate to the gut flora (e.g. bifidus bacteria) which improves intestinal health and nutrient absorption. Our gut is the organ with the highest immunity capacity of the body. Therefore, a sufficient supply of nucleotides reduces the incidence of intestinal infections. Improved gut health is positive on overall health in general. The absorption of all nutrients like amino acids, minerals, vitamins and other micronutrients takes place in the gut.

NucleoCell – a clinically tested nucleotide supplement

Studies on nucleotides in athletes were undertaken at University of Bath, UK, with the supplement corresponding to our **NucleoCell**, manufactured by Swiss biochemical company Pro Bio and exclusively distributed by SPONSER in Switzerland.

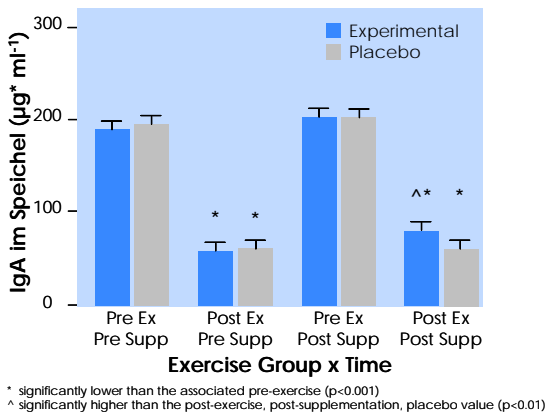


Fig. 1: Salivary IgA with NucleoCell supplementation or placebo.

Another study done with **NucleoCell** found substantially enhanced (good) HDL-cholesterol of 15% versus placebo and even a drop in the control group after supplementation for 60 days (see graph below). Additionally, slightly lower total cholesterol levels and, in consequence, lower (bad) LDL-cholesterol levels were measured (McNaughton, 2002; unpublished).

Earlier studies on **NucleoCell** examined the influence on immunity with respect to colds and flu symptoms. NucleoCell supplementation for 28 days reduced the symptoms of a common cold or flu infection or secondary infection: painful sinuses, earache, dry mouth, sore throat, muscle aches, and headache (Davidson, 2002).

One double-blind study demonstrated reduced cortisol values after 60 days of **NucleoCell** supplementation compared to the placebo and pre-supplementation, along with improved IgA levels. Cortisol is a stress marker and its reduction after physical exercise points to reduced exertion and improved recovery. Because cortisol is also a testosterone inhibitor, its reduction is also advantageous for protein synthesis and muscle build-up. As mentioned above, the increased salivary IgA values indicate a strengthening of the athletes' immunity. The measured differences on IgA and cortisol were highly significant (p<0.0001) (McNaughton, 2006). The results have been confirmed in another publication of the same group (McNaughton, 2007).

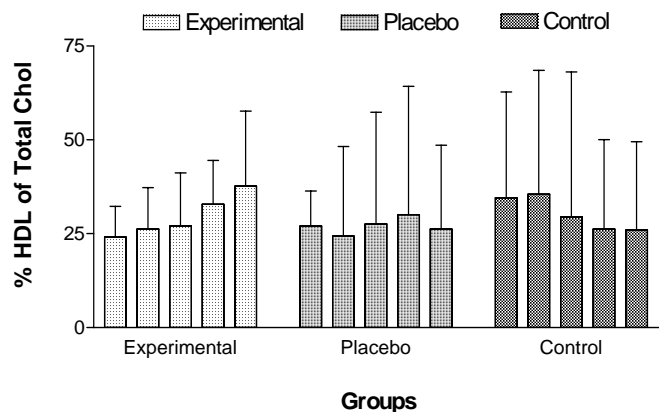


Fig. 2: HDL-cholesterol increasement after NucleoCell supplementation versus placebo and control.

Supplementation with NucleoCell

In conclusion, supplemental nucleotides may constitute for the serious athlete the needed extra amount of building blocks during times of extraordinary demand, such as growth, recovery from strenuous exercise or injury, and as prophylaxis to prevent or overcome infections. Even the harmful effects on gut flora from antibiotics may be reversed more rapidly. In several studies, supplemented nucleotides were also shown to more rapidly restore reduced hematocrit values (red blood cell counts) which, in turn, improved oxygen supply and uptake. An optimal oxygen supply is of utmost importance for the athlete. Additional oxygen is transported by red blood cells to muscles and organs, thereby positively influencing all organs, muscles, and tissues. The energy from glucose is more efficiently metabolised (aerobic glycolysis) and this aerobic phase may be longer maintained during high-intensity exercise. Less lactate is formed, allowing improved overall performance and endurance.



Sources:

Studies with **NucleoCell**:

McNaughton et al., 2006: The effects of a nucleotide supplement on salivary IgA and Cortisol after moderate endurance exercise. *J Sports Med Phys Fitness*, 46:84-9.

McNaughton et al, 2007: The effects of a nucleotide supplement on the immune and metabolic response to short term, high intensity exercise performance in trained male subjects. *J Sports Med Phys Fitness*, 47(1):112-118.

Davidson et al., 2002: A randomised, double blind placebo controlled Phase II exploratory trial to assess the effect of Nuclell[®] supplementation on perceived symptoms of the common cold and markers of immune function. Queen Margaret University College, Dep. Of Dietetics, Edinburgh, Scotland.

Other studies:

Grimble, G.K., 1996: Why are dietary nucleotides essential nutrients? British Journal of Nutrition, 76, 475-478, London

Jyonouchi, H., 1994: Nucleotide Actions on Humoral Immune Responses. Journal of Nutrition, Vol 124, 138S-143S.

Uauy, R., 1994: Nonimmune System Response to Dietary Nucleotides. Journal of Nutrition, Vol 124, 157S-159S.

Van Buren, C.T., 1994: The Role of Nucleotides in Adult Nutrition. Journal of Nutrition, Vol 124, 160S-164S.

Köppel, P., 2001: The Role of Nucleotides in The Body. Unpublished, Pro Bio, Switzerland

Tanaka et al., 1980: Improved Medium für Selective Isolation and Enumeration of Bifidobacterium. Applied and Environmental Microbiology, Vol 40/5, 866 ff.