Physical and mental stress can compromise immune response

Dr. Peter Koeppel

Pro Bio Ltd, Switzerland

Stress is a worldwide challenge to health and can come from both physical and emotional sources.

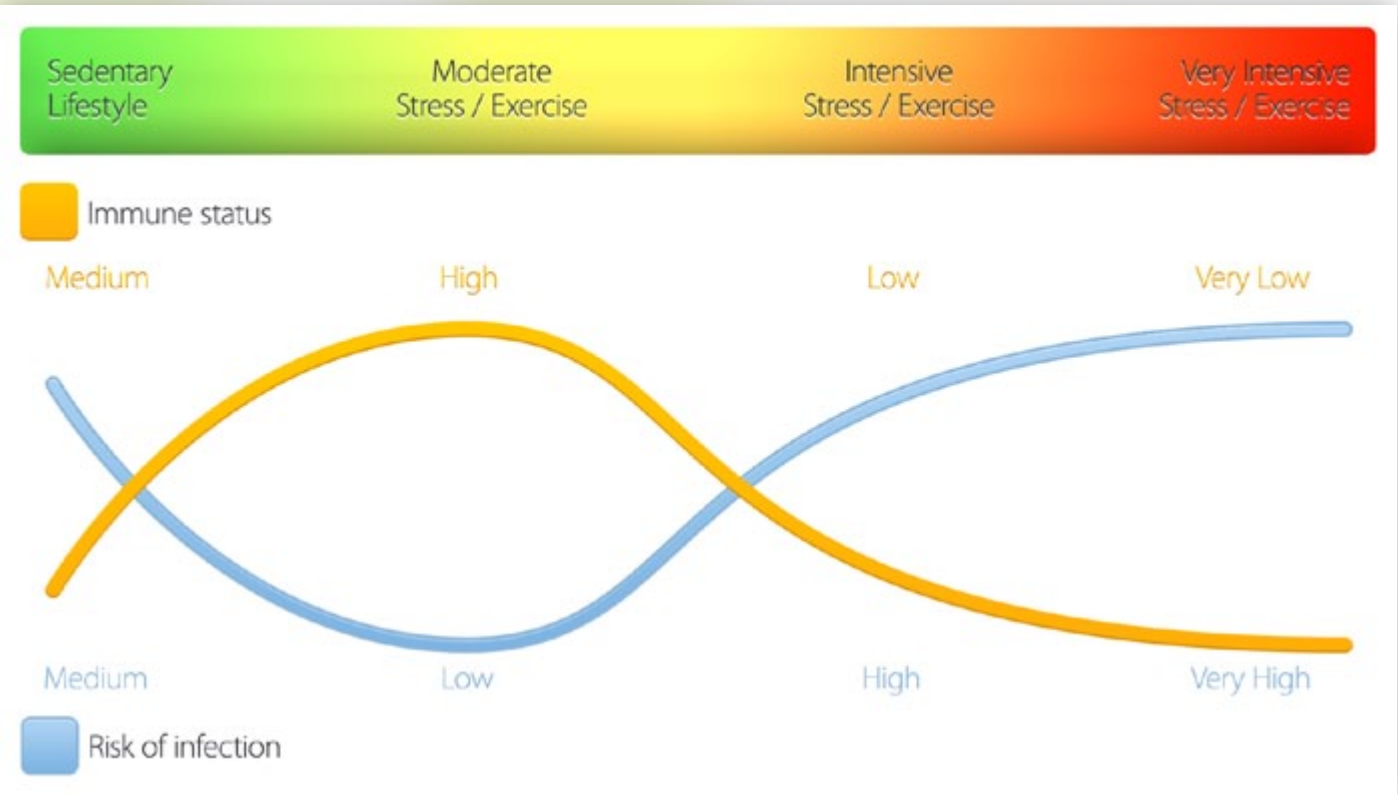
Sometimes it comes from extreme conditions like poverty, starvation, persecution, or war. It can also be the result of caring for a sick family member, the loss of a loved one, troubled relationships or being in an occupation that involves a high level of responsibility or danger. Heavy workloads and the challenges of balancing professional and family life are increasingly common factors.

Stress affects the hormone cortisol produced by the adrenal glands. In small quantities cortisol is helpful. It is anti-inflammatory, speeds tissue repair and controls excess immune cell production. However, continued stress raises cortisol levels beyond healthy levels and slows the production of "good" prostaglandins. "Good" prostaglandins support immune function, dilate blood vessels, inhibit "thick" blood and are anti-inflammatory. The slowed prostaglandin production allows for the opposite - inflammation, immune suppression, etc.

Even healthy people with a balanced immune system can go through phases of suboptimal immune function due to situations of overexertion, stress and exhaustion, which make them more vulnerable to infections. In Switzerland e.g. a new survey revealed that 50% of young people suffer stress.

Excessive stress, either physical or mental, has a detrimental effect on the optimal functioning of the immune system. During a period of stress induced raised cortisol, the immune cells nearly disappear from the blood. The part of the immune system most sensitive to increased cortisol levels are the Natural Killer Cells. A non-scientific analogy to this is that playing card that finally tips the balance on the house of cards, bringing everything crashing down.

The diagram below shows how lifestyle stresses influence immune status and the risk of infection.



The effect of stress on the immune system is comparable to the effect of exercise on the muscle. An unused muscle will degenerate, a moderately or intense used muscle will strengthen, but very intensive muscle efforts can lead to severe damage of the muscle.

Pioneering research using nucleotides to overcome the effects of stress

Nucleotides are key components in major processes within the body and play key roles in many biological processes. The requirements for nucleotides increase during times of elevated stress, as indicated previously or additionally when recovering from major tissue injury, systemic infection or when liver function is suppressed.

It has been found that the application of a nucleotide free diet significantly suppresses the cellular immunity. In several studies nucleotide supplementation has been shown to reverse the immunosuppression caused by malnutrition and starvation. A trial with race horses revealed that the level of cortisol after an anaerobic test was significantly lower in horses fed on diet supplemented with nucleotides compared to horses fed the non-supplemented diet, with immunity parameters simultaneously improved. In the same trial a significant increase of the liver enzymes was found in the horses supplemented with nucleotides.

Until recently, there has been limited data available on nucleotide supplementation on the immunologic effects and on stress parameters in humans. This is an area of research that Pro Bio Ltd, Switzerland, along with Nucleotide Nutrition Ltd, have been pioneering. Pro Bio's exclusive formulation of purified nucleotides has been shown to lower the formation of cortisol and therefore to prevent the decline of the immune system in endurance athletes.

Effects of a nucleotide supplement in trained male subjects on IgA, Cortisol and Lactate after endurance exercise

Aim

The aim of this research was to examine the effect of a nucleotide supplement on IgA and Cortisol levels after endurance exercise of young healthy males.

Endurance exercise trials

Prior to the supplementation period, each subject undertook an incremental exercise test to exhaustion on a cycle ergometer to determine VO2max.

On a separate day the subjects completed a prolonged endurance exercise trial. This comprised 90 minutes at a power output (W) representing 60% VO2max.

Analysis of IgA and cortisol

Prior to the to the endurance trial and immediately upon cessation another saliva and a blood sample was obtained. The saliva was analysed for both Cortisol and IgA and the blood for lactate.

Results

After supplementation of nucleotides IgA was significantly ($p<0.01$) higher after exercise in test persons compared with placebo subjects. The pre-exercise level of cortisol were not significantly different ($p>0.11$). However, after supplementation of nucleotides cortisol was significantly ($p<0.0001$) lower after exercise in test persons compared with placebo subjects.

After the exercise the level of lactate was also significantly lower in athletes receiving a nucleotide supplement.

Conclusion

Nucleotides can help reduce cortisol accumulation and therefore reduce stress.

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