

52 The Immune System and Endurance Sport

The immune system is an integral part of training and exercise. Hormones that help you tolerate 'stress' also help you fight infection.

It is generally accepted that regular participation in physical activity is an important factor in the maintenance of health and well-being. But in recent years, it has been noted that athletes have an increased risk of developing infections, particularly of the upper respiratory tract (a sore throat), during periods of heavy training or competition. Not only can athletes catch a new infection, but viruses may also 'reactivate' in athletes who are particularly run down from excessive exercise.

EXERCISE AND THE IMMUNE SYSTEM

The immune system consists of special cells that protect the body against attack from bacteria, viruses, and fungi that cause illness and infection. Physical activity affects all the systems in the body, including the immune system. Too much exercise alters the ratios of anabolic to catabolic hormones in the body, causing a breakdown of protein and suppression of the immune system. When an athlete overtrains, lymphocytes, granulocytes, and macrophages — the soldiers of the immune system assigned to eliminate or neutralise foreign invaders — are not available and infection sets in.

High levels of intense exercise and competition, even without overtraining, also negatively affect immune function. They produce an 'open window' of

altered immunity lasting 3 to 72 hours, when an athlete's risk of contracting an infection is increased. Serious athletes will undertake repeated bouts of training throughout this period, which further stresses the already weakened immune system. This response is thought to be due of insufficient recovery between training sessions, coupled with a persistent elevation of stress hormones (in particular cortisol), causing a fall in the circulating levels of cells that fight infection.

NUTRITION AND THE IMMUNE SYSTEM

A well-balanced diet with adequate energy, carbohydrate, protein, fat, and micronutrients is very important in maintaining the immune system. Chronic caloric restriction leads to immunosuppression and should be avoided during heavy training. In addition, the absence of certain vitamins and minerals contained in fruits and vegetables has been linked with immunosuppression.

Carbohydrate is probably the most important nutrient for a healthy immune system. Because immunosuppression occurs in response to low blood glucose and depleted muscle glycogen, a carbohydrate-rich diet is recommended for athletes taking part in regular training and competitions.

A reduction in carbohydrate availability during exercise causes an increase in the release of stress hormones, which

negatively influences the production of many immune cells. Therefore, maintaining blood glucose levels during exercise, by consuming a carbohydrate drink for example, can reduce or even prevent immunosuppression that occurs after prolonged exercise. This also helps to maintain the flow rate of saliva, which contains several proteins that protect against infection.

Several vitamins and minerals are essential for the normal functioning of the immune system (see Box). Correcting existing deficiencies can be effective in restoring normal immune function. The most commonly advocated supplements are vitamin C and zinc. However, there is controversy about the use of zinc supplements, and oversupplementation of vitamins and minerals can impair immune function, so supplements should be taken only on the advice of a nutritionist or doctor.

Vitamins and Minerals Essential for Immune Function

- Fat-soluble vitamins (A and E)
- Water-soluble vitamins (folic acid, B6, B12, and C)
- Zinc
- Iron
- Magnesium
- Manganese
- Selenium
- Copper

LEAVE ASTHMA BEHIND.
TO CHECK YOUR ASTHMA CONTROL IS ALL IT COULD BE. SEE YOUR DOCTOR.