IMMUNE FUNCTION & DISTANCE RUNNERS

PART II

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In Issue 5 of R4YL, the ability to stay healthy during training and prior to competition was discussed. This article will summarise current scientific research related to immune function in distance runners; specifically how the immune system is affected by training and/or competition, guidelines on maintaining immunocompetence (the ability to produce a normal immune response) and recommendations on returning to training after illness.

Why elite runners are at greater risk of becoming ill

AS MENTIONED in Issue 5, highly trained athletes are generally thought to be at greater risk of illness due to the increased physical and psychological stress on the immune system, and greater exposure to pathogens in training and competition environments. However, only a small percentage (~15%) of highly trained athletes may in fact be at greater risk of developing exercise induced illnesses. These susceptible athletes may experience 10-12 upper respiratory illnesses per year compared to 3-4 in the general population and the majority of highly trained athletes (1). In support of this, a recent study by our research group at the AIS (2) demonstrated that the incidence and pattern of illness were not directly related to training volume or intensity in an elite group of runners who maintained consistent training over a winter training period of four months. These findings suggest that illnesses of the type seen in this study (mainly mild upper respiratory infections that last eight days or so) do not have a major impact on athletic performance, at least in the short term. It appears that runners adjust their training programs when ill to train over shorter distances, accompanied by lower training loads. The finding of a higher perceived training intensity in illness-affected runners is evidence of the increased stress and underlying fatigue. Nevertheless, the laboratory-based measures of performance showed little change in physical work capacity, indicating that mild illness, as reported in our subjects, is not of sufficient severity to impact adversely on the primary processes of running physiology. This finding should reassure athletes and coaches that mild illness, particularly upper respiratory in origin, should have minimal impact on training and competitive performance as long as appropriate adjustments are made to the athletes' training to allow them to recover from the illness. The determination of a training threshold for infection or illness is not easily achieved in an athletic setting and similarly it is unclear why some individuals are more susceptible to illness than others.

Pedersen and Ullum proposed the 'open-window' hypothesis, which indicates that moderate exercise strengthens the immune system, whereas severe exercise is followed by a period of immunosuppression, which means that there is an 'open window' of opportunity for pathogen intrusion after severe exercise (5). There is growing evidence that in the hours following heavy exertion, several components of the immune system exhibit suppressed function. During this 'open window' of altered immunity (somewhere between 3 and 72 hours), viruses and bacteria may gain access through the barriers of the body, such as the upper respiratory tract, increasing the risk of infection (3). During strenuous exercise, a sustained increase in oxygen metabolism leads to free radical-mediated tissue oxidation, which results in many potential immune targets (4). Therefore, it may be beneficial to temporarily suppress the immune system immediately after strenuous exercise in order to avoid an autoimmune response against free radical production (3), however, this suppression places athletes at increased risk of becoming ill. This 'open window' of immune suppression suggests that runners should be careful after intense training and competition, ensuring adequate recovery, dietary intake and avoiding unnecessary exposure to pathogens.

Maintaining immunocompetence

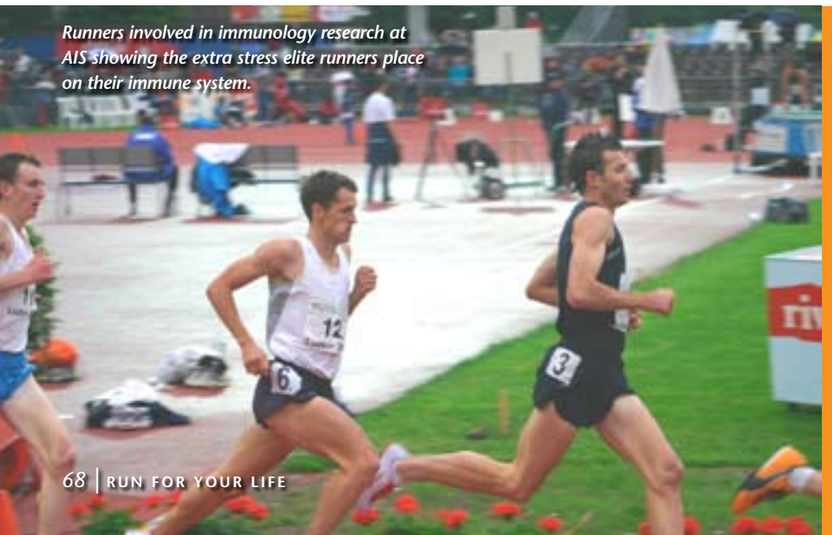
The large majority of studies to date are predominantly reductionist and laboratory-based and their findings may not directly apply to athletes in "real world" situations. Practical recommendations to maintain immunocompetence are summarised below from Pyne and colleagues (6), reflecting a combination of experimental evidence and clinical experience:

1. Careful management of training loads and volumes including a periodised approach when increasing loads, inclusion of variety, cross-training and adequate recovery.
2. Limiting exposure when training or competing in adverse environmental conditions: e.g. hot and humid weather, cold conditions, air pollution, and altitude; athletes should be acclimatised prior to competition.
3. Teaching athletes self-management and coping skills, and monitoring of athletes' responses to the psychological and psychosocial stresses of high-level training and competition.
4. Adopting a well-balanced diet without excessive or inadequate intake of macro- and micro-nutrients.
5. Limiting transmission of contagious illnesses by reducing exposure to common infections, airborne pathogens and physical contact with infected individuals.
6. Close contact with medical staff: medical screening, immunization, routine management of fatigued and illness-prone athletes, and appropriate medication for known conditions.

Returning to training after illness

The Australian Institute of Sport has developed guidelines for athletes returning to training after a respiratory illness. The duration of this process may only take one or two days for a mild illness, days to weeks for a moderate illness, and on occasions, weeks to months for severe illnesses. Athletes should closely monitor their training performance and well-being for several days after the illness. The guidelines are a three step procedure (1):

1. Increase duration of training – begin with low intensity exercise of 20-30 min, only training the following day if recovery is complete and there is no recurrence of the illness.
2. Increase frequency of training from once per day to twice per day only when the athlete can successfully get through several consecutive days of low intensity once per day training.
3. Increase intensity of training – the final progression which should be done in small increments until full competitive capacities are reached. **R4YL**



Runners involved in immunology research at AIS showing the extra stress elite runners place on their immune system.

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