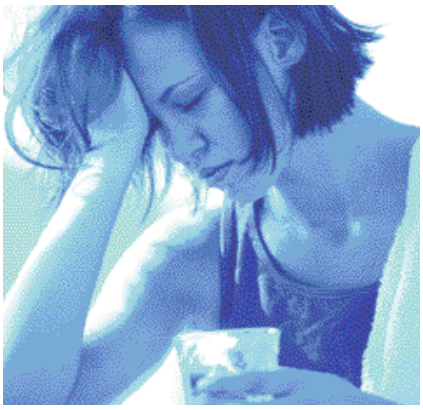
Why do athletes seem prone to infection?



PETER FRICKER MB BS, FACSP **DAVID PYNE** PhD, FACSM

Series Editor
KEN CRICHTON MB BS(Hons), FACSP

Some athletes appear to sustain more than their fair share of respiratory illness, although the reasons remain unclear. How should such patients be managed?

The most common respiratory illnesses in athletes are viral and bacterial infections, asthma, allergy and noninfectious inflammation. Over the past two decades, it has been recognised that there is a link between exercise load and illness, and that the risk of illness – particularly upper respiratory illness – in adolescents and adults is increased with a bout of intense exercise, or over time with an accum u-lation of training.

These risks, however, have been identified in studies of large groups of athletes, and it should be recognised that not all athletes are equally affected. Current thinking holds that it is probably a subset of athletes (perhaps around 15%) who seem prone to exercise-related illness, and this should be seen within the context of risk to athletes overall compared with the 'normal' (or nonathletic) population. Studies are difficult to perform, but one comparison of the incidence of upper respiratory illness in the Australian community and in a population of elite Australian athletes revealed that the incidence for both groups was the same, and that one can expect three or four upper respiratory illnesses each year.[1] Elite athletes often train two to three times a day and take very little time off. Recreational athletes train most days of the week, and usually exercise for 30 to 60 minutes at a time.

It thus appears that a small group of athletes sustain more than their fair share of illness, and there may be something peculiar about their immune responses to training that make them vulnerable. Some may complain of up to 10 or 12 upper respiratory illnesses of both infectious and noninfectious origin in one year.

Influences on the immune system

A higher risk of illness in highly trained athletes is thought to result from excessive physical and psychological stress on the immune system and increased exposure to pathogens in the training or competition environment. The relationship between immune status and nutrition is another important consideration.

Physical stress

Some athletes are particularly sensitive to higher training workloads when the frequency, volume (or duration), and intensity of training are increased. Most athletes with an extensive training background can cope with high or very high training loads, but they may be at an increased risk of fatigue and illness during periods of peak workloads (often the 'pre-season' in team sports or the phase of peak volume in individual sports).

Psychological stress

The psychological stresses experienced by athletes are likely to reflect the pressures experienced by all individuals (related to family, education, employment and social responsibilities of daily life) as well as sports-specific anxiety induced by high level training and competition. High levels of stress before and during competition are often associated with poor competition performance and sometimes health concerns and illness: the 'sick with worry' scenario. Physicians should be encouraged to ascertain all the underlying physical, psychological and psychosocial factors that may be contributing to a pattern of poor performance, health concerns and illness.

Pathogen exposure

The degree of pathogen exposure influences the likelihood of illness. Exposure to infected individuals is increased through direct or indirect contact with team-mates, opponents, team officials, spectators and the general public, particularly during large national or international competitions. Environmental conditions can also be problematic for some athletes – these include the increase in pollen counts during spring, and the need to exercise in hot or cold temperatures or polluted air or at medium to high altitudes. Any of these factors may trigger inflammatory responses associated with hyperventilation and the presentation of irritants to airways. Drying of airways may also be a factor.

Nutritional status

It is clear that prolonged and/or intensive exercise establishes competition between

Professor Fricker is Acting Director and Dr Pyne is a Senior Physiologist at the Australian Institute of Sport, Canberra, ACT.
Series Editor: Dr Crichton is Director of Sports Medicine at North Sydney Orthopaedic & Sports Medicine Centre, and a Visiting Physician at the Children's Hospital Institute of Sports Medicine, Westmead, Sydney, NSW.

immune cells and active skeletal muscle for essential nutrients like glucose, glutamine and other amino acids, electrolytes and select minerals. The direct immunological and performance benefits of nutritional supplements remain contentious in the scientific and medical literature, but the key dietary recommendations of adequate caloric intake, macronutrients and appropriate fluids should be emphasised by physicians and dietitians.

A clinical approach

Diagnosis

An appropriate history and physical examination should establish the diagnosis in most cases. Athletes suffer the same upper respiratory and systemic infections that are seen in the broader community. Viral causes include the rhinoviruses, adenoviruses, coronaviruses, Epstein–Barr virus, and viruses causing influenza. The occasional bacterial infection should be recognised and treated appropriately with antibiotics. A large number of sore throats are probably noninfective in origin, and it is worth treating these conservatively if there is no evidence to the contrary.

Rarely, an athlete may require blood tests or specific serological investigations for coxsackie virus or more sinister infections (e.g. HIV) that may present with fatigue. It is worth remembering that athletes travel and that exotic infections (e.g. malaria) must also be considered.

Management

When a diagnosis of illness or infection has been established, management depends on appropriate rest until fever, myalgia, arthralgia, headache and lassitude have settled.[2] The athlete should then be allowed a gradual return to exercise – a structured approach is presented in the box above. The timing of return to training and competition is a primary consideration for athletes (and coaches), and the amount of time off training will depend on the nature and severity of the disease process and the rate of recovery for individual athletes. As a rule of thumb, symptoms above the neck only (e.g. sore throat, runny nose, headache) can be considered relatively benign and an early return to exercise can be considered, whereas any systemic symptoms should preclude vigorous activity.

Management should also include isolation from other athletes (as appropriate), good nutrition and hydration. Athletes should also be encouraged to avoid rapid changes in body temperature because these appear to precipitate or prolong illness. The efficacy of vitamin C and zinc supplements is debatable – vitamin C is probably not of much value, whereas zinc doses of 100 mg daily during the illness might help.

Final comments

Despite a large volume of scientific and medical literature on many aspects of exercise, training and the human immune system, the mechanisms that explain why some athletes are more prone to illness remain unclear. Similarly, the explanations behind experimental and epidemiological evidence pointing to a healthier immune system with moderate exercise in previously sedentary individuals are lacking. It appears that interactions between the endocrine and immune systems and the balance between the proinflammatory and anti-inflammatory cytokines are central to host defence and the ability to maintain good health. MT

The return to training after respiratory illness

The Australian Institute of Sport has developed an approach to assist physicians, coaches and athletes regarding the return to training and competition after respiratory illness.[1,2] The duration of this process may take only one or two days for a mild illness, days to weeks for a moderate illness, and, on occasion, weeks to months for a severe illness. Athletes should be encouraged to monitor carefully their training performance and well being for several days after an illness to ensure their recovery from illness is complete. A medical practitioner should be consulted if fatigue and symptoms of illness persist or recur, particularly after a period of reduced training.

The approach involves a hierarchy of three steps:[3]

- Step 1 – increase duration of exercise
- Step 2 – increase frequency of exercise
- Step 3 – increase intensity of exercise.

Duration of exercise. Using this approach, the athlete can resume low intensity training or exercise after systematic symptoms have disappeared and when other contraindications to exercise (such as fever, hepatosplenomegaly or tachycardia) are absent. Recommendations centre on low intensity aerobic exercise of 20 to 30 minutes' duration each day. Exercise should only be repeated the following day if his or her recovery is complete and there has been no recurrence of symptoms. The resting pulse rate provides a guide to recovery (which should lower with improved fitness).

Frequency of exercise. When the athlete can exercise and recover safely over several consecutive days, it is appropriate to increase the frequency of exercise to twice daily and move towards the regular pattern of training. At this point, the athlete can increase the duration of exercise until the full duration and frequency of training are reached.

Intensity of exercise. The final step is to increase the intensity of training in small increments until full training and competitive capacities are reached.

References

1. Fricker PA, Gleeson M, Flanagan A, Pyne DB, McDonald WA, Clancy RL. A clinical snapshot: do elite swimmers experience more upper respiratory illness than non-athletes? J Clin Ex Physiol 2000; 2: 155-158.
2. Pyne DB, Gray AB, McDonald WA. Exercise, training and immunity. In: Bloomfield J, Fricker P, Fitch K, eds. Textbook of science and medicine in sport. Melbourne: Blackwell Science; 1995. pp. 602-615.
3. Young M. How I treat: return to sport after post-viral fatigue. Br J Sports Med 1999; 33: 173.

DECLARATION OF INTEREST: None.