Pain and the canine athlete: pain threshold, pain tolerance and drugs in competition

Lowri Davies

It is often assumed that pain perception in athletes differs from the population at large. Whilst this belief is primarily based on anecdotal evidence of individuals that continue to exercise in the face of severe injury, research has highlighted the fact that long-standing physical activity may alter pain thresholds and pain tolerance. The data on pain perception in athletes, however, is inconsistent and often contradictory and in general pain tolerance is only weakly related to the pain threshold.

Evidence suggests that after a bout of intense physical activity, pain perception is reduced for a limited time period (exercise-induced analgesia). Endurance exercise is known to promote sustained antinociceptive effects, potentially mediated through central opioidergic neurotransmission. Pain is a natural protective mechanism designed to prevent or limit tissue damage and overuse and in general it is not directly correlated with tissue damage. Studies have shown, however, that athletic competition modulates behavioural responses to noxious stimuli and consequently may facilitate unnecessary tissue damage.

Exercise performed over certain intensities or over a prolonged period of time can result in a feeling of pain and discomfort. Such exercise-induced pain has been shown to impede training and performance. Consequently, in the human field, athletes are four times more likely to use pharmacological analgesic substances before training and competition than their age-matched general population. Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly used in sports medicine both to manage injury and to facilitate training in the face of said injury. Their analgesic action, however, is not significantly greater than paracetamol for musculoskeletal injury but they have a higher risk profile, with side effects including gastrointestinal and renal complications. They may also have an inhibitory effect on cellular regeneration and tissue healing.

The ergogenic effect of various drugs in sports medicine is a controversial area and potentially analgesics commonly used to treat pain and inflammation may also have a performance-enhancing effect. In comparison with what is known about the use of analgesics for treating sporting injury, much less is known about their effects on exercise-related physiology and performance.

KEY LEARNING OBJECTIVES

- To define pain threshold, pain tolerance and pain perception
- To distinguish between tissue tolerance limit and pain protection with respect to activity
- To consider the use of pain medication in the competing athlete

MULTIPLE CHOICE QUESTIONS

1. Use of NSAIDs in sporting injuries may result in which of the following?
 - (A) Lead to reduced fibrosis when used in the later stages of muscle healing
 - (B) Can assist with isolated chronic tendinopathies
 - (C) Limit odema without affecting satellite cell and fibroblast proliferation in the subacute phase when macrophage-mediated processes have been initiated
 - (D) Assist healing in ligament and bone
2. What is pain threshold defined as?
 - (A) The lowest intensity at which a given stimulus is perceived as painful
 - (B) The greatest level of pain that a subject is prepared to endure
 - (C) The recognition of pain by the brain
 - (D) The series of events required for an organism to receive a painful stimulus and convert it to a molecular signal and recognise and characterise the signal
3. Which of the following is a feature of an ergogenic substance?
 - (A) Is anti-inflammatory in nature
 - (B) Provides pain relief
 - (C) Has performance-enhancing properties
 - (D) Is a nutritional supplement