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Ibuprofen-NSAIDs and Endurance [4/4/2007]

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Over the counter medications, specifically non-steroidal anti-inflammatory (NSAIDs) drugs, are becoming more and more popular among endurance athletes during and following quality training and competition events. It is important to understand what these drugs actually do in the body and if they are suitable for athletes to add to their training and competition programs.

Background

NSAIDs act as non-selective inhibitors of the enzyme cyclooxygenase, inhibiting both COX-1 and COX-2 enzymes. The inhibition of these COX enzymes disrupts the formation of prostaglandins. Prostaglandins are hormone like substances that can act as vasodilators, can enhance and inhibit inflammatory responses, can protect the stomach from gastric acid, and can regulate the sensitization of pain and body temperature and if these are blocked or inhibited, it can reduce inflammation, pain and fever. This sounds very promising for endurance athletes since core temperature may rise during training as well as inflammation occurring due to the training bout itself but inhibiting prostaglandins may also cause fluid imbalance, electrolyte disorders and kidney problems during endurance exercise—certainly not what athletes need to have happen!

NSAIDs can also cause or contribute to gastrointestinal problems including bleeding and ulcers. Newer NSAID products, designed to inhibit only the COX-2 enzyme were produced to help relieve GI issues, yet these come with their own controversy. One research study found an increase in the incidence of myocardial infarctions leading to the withdrawal of COX-2 inhibitors from the market. Aspirin, the only NSAID able to selectively inhibit COX-1, helps protect from adverse cardiovascular events.

Safety and Efficacy

Endurance trained athletes, typically those in longer ultra-endurance events, constantly look for the item, treatment, or recommendation that allows them to fully recover from hard workouts and races. Many will use NSAIDs in order to reduce the soreness associated with hard training bouts. Based on what we currently know, this could be very beneficial for endurance athletes; however, does this really reduce soreness and is this a good idea?

There has been numerous research studies conducted regarding the effectiveness of

NSAIDs on post-exercise muscle soreness, damage and even performance.

NSAIDs and Performance

Several studies looked at the effectiveness of NSAIDs on muscle soreness and found mixed results. One study done on healthy subjects participating in eccentric muscle exercise found that 400mg ibuprofen taken 4 hours before exercise reduced muscle soreness perception but did NOT prevent muscle cell injury as indicated by the release of creatine kinase (Hasson, 1993).

A similar study tested thirty-two volunteers in a crossover design using two bouts of downhill running. Ibuprofen treatment had no effect on endurance time and muscle strength and actually showed an increase in creatine kinase and urea levels. This study indicates that ibuprofen had no effect on performance and may hinder markers for muscle soreness (Donnelly, 1990).

A recent study done on forty-four non-athletic male volunteers looked at the effects of physical activity and ibuprofen before eccentric exercise and its effects on muscle soreness. This study found physical activity prior to eccentric exercise with or without ibuprofen helps to prevent delayed-onset muscle soreness (Rahnama N, 2005). It seems supplementing with ibuprofen had no beneficial effect on muscle soreness in this specific group.

Following the 2002 City of Christchurch Marathon, one hundred and fifty-five runners were tested for sodium, potassium, creatinine and urea concentrations. Those runners who consumed NSAIDs before the marathon were diagnosed with altered renal function (Reid, 2004). Researchers found similar results in a study done following an Ironman Triathlon where the authors concluded "This study shows that NSAIDs are commonly used in ultraendurance events and that their use is associated with an increased risk of the development of biochemically diagnosed exertional hyponatremia. The effect is likely due to an alteration of renal function." NSAID use appears to be a contributing factor in developing clinically diagnosed hyponatremia based on blood sampling post-race (Wharam, 2006).

What about the effects of NSAIDs on athletic populations? Neiman et al. measured the influence of ibuprofen use during the 100 mile Western States trail running race. Athletes were placed in a control group, a group consuming 600mg and 1200 mg ibuprofen the day before the race and on race day. The groups who used ibuprofen had higher plasma levels of many muscle damage markers including serum C-reactive protein, plasma cytokine and macrophage inflammatory protein. Delayed onset-muscle soreness and serum creatine kinase levels did not differ significantly. Interestingly, race times and rates of perceived exertion did not differ

among groups. This study concluded that ibuprofen use compared to nonuse by athletes did not alter muscle damage or soreness and was related to elevated indicators of inflammation-the exact opposite reason that athletes take NSAIDs in the first place!

It is obvious from these research studies that consuming NSAIDs has no positive effect and may in fact cause a serious decrement in performance as well as the health of some endurance athletes.

Recommendations

Based on what we know from research, the use of Ibuprofen can impair health and performance if taken in larger doses and if in combination with dehydration due to altered renal function. Endurance training and competition is highly dependent on your body's ability to move fluids through the kidneys. The restriction of this fluid movement can cause numerous adverse effects including dehydration, hyponatremia and kidney failure. All of which do not bode well for a PR. For races and hard training sessions, the risks seem to outweigh the questionable benefits.

Therefore, the use of NSAIDs should be reserved for post-exercise and taken in moderation. A proper warm-up and good fueling practices may do more for you to prevent muscle soreness and inflammation than popping a few Ibuprofen.

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