The stretching debate: What does recent research tell the coach?

by Angela Calder, November 2002

Limitations of the Debate

During the last five years there have been several controversial articles in science journals and in the popular press questioning the benefits of stretching. The debate has been centred on the role of ***static stretching*** in the warm-up as a means of preventing soft tissue injuries. Disappointingly for coaches, the issues raised have been less concerned about the impact of static stretching on performance. This bias is largely a reflection of the clinical focus of many of the authors of the articles, few of whom present their information from a coaching perspective. So what does this new information tell the coach? And how can the coach use it in the training environment?

Static Stretching and Injury Prevention

Shrier (1999) reviewed 138 clinical and sport science articles related to injury and stretching in order to examine whether stretching before exercise prevents injury. From this he concluded that:

> "Stretching before exercise does not reduce the risk of local muscle injury." (pp. 221)

His conclusion has been confirmed by research from independent randomised clinical trials conducted in Australia (Pope, Herbert & Kirwan, 2000), and in the USA (Hartig & Henderson 1999).

In a later article Shrier (2000) elaborated on the above. He argued that the assumption that a compliant (more flexible) muscle is less likely to be injured is fallacious. He noted that most injuries occur during eccentric muscle actions undertaken within the normal range of motion. Consequently, increasing the length of the muscle would not prevent these injuries. In addition, a recently stretched muscle is less able to absorb force / energy and this would compromise its performance in a subsequent activity. Also, he commented that even mild stretching can cause microtrauma in the muscle cell and as stretching masks pain, this can lead to a reduction in body sensations and proprioceptive awareness.

Hartig & Henderson (1999) and Shrier (1999; 2000) recommend that an active warm up that increases muscle and joint temperatures, may be a better means of preventing localised muscle injuries than a warm-up that consists of static stretching alone. Warm-up activities should be based around activities that increase muscle and joint temperatures, increase neural firing rates, switch-on the neural movement patterns required for the session, and optimise psychologically readiness for action. Static stretching in the warm-up does not fulfil any of these roles.

Summary of the recent research

To help reduce the likelihood of injury, a graduated active warm-up that includes moving stretching sequences is more effective than a warm-up based on static stretches alone.

Static Stretching and Performance

The fact that a muscle stretched statically is less able to absorb force (Shrier 2000) raises concerns about the impact of static stretching on performance. While there is no review article on this topic there are several scientific studies that have examined this issue (Kokkonen, Nelson, & Cornwell, 1998; Fowles, Sale, & MacDougall, 2000; Behm, Button, & Butt, 2001). These independent articles add support to the fact that a warm-up based on static stretching does not prepare athletes to perform at their best. For example, maximal strength performances are inhibited by acute static stretching (Kokkonen, Nelson, & Cornwell, 1998). The authors of this research recommend that:

> "…intense static stretching of the prime-mover muscles of a particular skill should not be undertaken just prior to any event in which success is related to maximal strength output." (pp. 415)

Fowles, Sale, & MacDougall (2000) have indicated that static stretching prior to maximal strength training can result in decreased in muscular strength for up to 1 hour. Researchers in Canada have examined some of the factors that may be responsible for force loss after prolonged static and/or passive stretching (Behm, Button, & Butt, 2001). They concluded that the reduction in force is probably a result of a reduction in muscle activation, rather than any changes in muscle elasticity. Muscular force production and absorption are complex neurological events and rely on more that the length of the muscle during contraction. If static stretching inhibits any of the neurological factors, the effect is a reduction in the force that can be generated or absorbed. This will impact on performance. This claim was confirmed by research on vertical jump performances following static stretching by Knudson, et al. (2001). These researchers concluded that static stretching undertaken prior to plyometric actions (like a vertical jump) results in small decreases in performance in some subjects (55% in their study).

Summary of the recent research

Static stretching as part of the warm-up prior to strength or explosive performances can reduce the force produced and absorbed by the muscles. A warm-up based on incremental active stretching including some sport-specific actions provide for the best preparation before performance.

Conclusion

There is no reliable scientific evidence to support the view that static stretching in the warm-up will prevent local muscle injury. More importantly for a coach there is a growing body of evidence that suggests that static stretching does not prepare the athlete for numerous sporting actions and may, in some cases, be counter productive to performance. Coaches should focus on active stretching techniques and sport specific warming-up activities when preparing athletes for training or competition.

References

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