

## Stretching before or after exercising has no effect on muscle soreness or risk of injury

### Synopsis

**Summary of Herbert RD and Gabriel M (2002): Effects of stretching before and after exercising on muscle soreness and risk of injury: a systematic review. *BMJ* 325: 468-472. [Prepared by Gro Jamtvedt and Kåre Birger Hagen, Norwegian Directorate for Health and Social Welfare.]**

**Question:** What are the effects of stretching before and after exercising on muscle soreness after exercise, risk of injury, and athletic performance? **Design:** A systematic review of randomised or quasi-randomised controlled trials. **Setting/population:** Young, healthy volunteers, mainly students and army recruits. **Interventions:** Any stretching technique, before or after exercising. Exercise included step-tests, eccentric contractions or physical workout. **Outcomes:** Muscle soreness, incidence of injury, athletic performance. **Result:** Eight trials were included in the review. Six studies investigated delayed onset muscle soreness and two investigated injury risk. No studies were found investigating the effect of stretching on athletic performance. The methodological quality of the studies was generally moderate. The mean quality score was 4.1 out of 10 on the PEDro scale. Five of the included studies that evaluated onset of muscle soreness were included in a meta-analysis. Three studies evaluated stretching after exercise and two evaluated stretching before. The total stretch time varied from 300 seconds to 600 seconds, but in one study, total stretch time was only 80 seconds. Stretching produced small and statistically non-significant reduction in muscle soreness at 24, 48 and 72 hours. The pooled effect estimate of reduction in muscle soreness 24 hours after exercising was 0.9 mm on a 100 mm scale (95% CI -2.6 mm to 4.4 mm). Two studies that evaluated the effects of stretching before exercising on the risk of injury in military recruits showed no difference in the risk of injury between groups. **Conclusion:** Stretching before or after exercise has no effect on delayed muscle soreness. Stretching before exercise does not produce reduction in risk of injury in army recruits.

### Commentary

Promoting stretching seems to be based primarily on anecdotal evidence, indicated by studies examining the effect of stretching on the muscle-tendon unit (Magnusson 1998, Halbertsma et al 1999) and the present review. It is, nevertheless, important to consider the reason for applying stretching, type of stretching technique and the target population. These three issues are important since different objectives may require different application techniques. Herbert et al's study is a very high quality systematic review that considered the above-mentioned issues within the review. While two of the objectives were relatively unambiguous (could stretching reduce delayed soreness or minimise the amount of injury) the third objective, could stretching improve athletic performance, was a lot more diffuse. This may be the reason why no articles considering this question were found.

The finding that stretching does not decrease delayed onset muscle soreness seems very reliable, since the authors had performed a thorough review of high quality. The conclusion is further supported by an experimental study, where stretching showed no effect on delayed onset muscle soreness, and in addition even led to a significant decrease in muscle strength (Lund et al 1998). Pope's two studies (Pope et al 1998 and 2000) seem to be a very convincing documentation of the authors' conclusion that stretching may not have any effect on the number of injuries. However, experimental data suggest that repetitive stretching will lead to a reduction of load on the muscle-tendon unit at a given length, thus decreasing the risk of strain injuries, since the load is minimised (Garrett 1990). Nevertheless, the result that matters is the results from clinical settings even though experimental studies indicate otherwise.

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### References

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