

# The Effects of Stretching on Muscle Cross Sectional Area and Echogenicity



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## INTRODUCTION

Static stretching is a common “warm-up” practice prior to athletic performance. Traditionally, warm-up routines are used to increase core temperature and blood flow to working muscles. If stretching increased blood flow, it could be seen as beneficial part of a warm-up routine, offsetting the possible negative effects that have been reported as a result of stretching.

## PURPOSE

To determine if acute static stretching increases cross sectional area and echogenicity of the Vastus Lateralis as a response to increased blood flow.

## METHODS

Thirty-eight participants ( $68.2 \pm 3.9$  cm,  $72.3 \pm 16.9$  kg, Age  $23.6 \pm 8.8$  years) had three panoramic ultrasound images taken of the largest circumference of the vastus lateralis before and after static stretching. The transducer was positioned in the center of the muscle belly just inferior to the largest circumference of the muscle. Static stretching was performed via a standing quad stretch where the participant reached back, grabbed their foot, and pulled posteriorly and superiorly until a slight discomfort caused by the stretching muscle was felt. This was repeated for 5 sets of 60 seconds with 30 sec rest in-between for 5 total minutes of stretching. Images were analyzed for cross sectional area (CSA) and echogenicity (EI). Values were then averaged across all three images (pre and post) and compared using paired t-tests.

## RESULTS

There was no significant difference between CSA ( $P=0.13$ ) and echogenicity ( $P=0.18$ ) measurements. Values for CSA (mean  $\pm$  SD) were pre  $15.1 \pm 3.8$  vs post  $15.4 \pm 4.4$  cm<sup>2</sup>. Values for echogenicity (mean  $\pm$  SD) were pre  $59.9.7 \pm 12.0$  vs post  $60.81 \pm 8.7$  au.

## CONCLUSION

There were no significant differences concerning CSA or echogenicity following stretching. Changes in muscle size and echogenicity following intervention are commonly believed to be because of an increase in blood flow to the muscle. Since there were no changes in CSA or echogenicity, then an increase in blood flow to static stretched muscle is unlikely.

## APPLICATIONS

Stretching appears to not have an effect on muscle size and echogenicity. Static stretching should not be considered part of a “warm-up” routine and does not elicit increased blood flow to the muscle; it may serve other purposes, but should not be considered to increase blood flow.

