1

FOAM ROLLING

This is a small article on Foam Rolling with some research on the benefits of Foam Rolling and some information on how and where to Foam roll. As an introduction we'll first go over the research on foam rolling. Subsequently we give some points to keep in minds while foam rolling and in the last part we give advice on which video to use for foam rolling including some pictures to illustrate the techniques.

1.1 RESEARCH ON FOAM ROLLING

Gregory et al.[7] researched the effect of foam rolling directly post workout, 24 hours and 48 hours post workout compared to no foam rolling on sprint speed, jump height, broad jump distance, pressure pain threshold, change of direction of speed, and squad repetitions. They found that foam rolling had positive effects on all these tests. With the biggest effect at 24hours on the pain threshold with the biggest recovery at 72 hours for the broad jump distance. Their results can be found in figure 7.

The effect of foam rolling before exercise on perceived fatigue and performance was done by [3]. They found no considerable effect of foam rolling on performance (figure 9), but they did find an effect on perceived fatigue after the work out(figure 10). Similar results were found by [4].

A review article on myofascial release therapy [5] concludes that these therapies should be done before exercise as they increase ROM without a decrease in muscular function[1].

The effect on range of motion(ROM) was researched by [6]. The found that foam rolling in combination with static stretching increased the ROM[2] most dramatically. Their results can be found in figure 8.

For more information on foam rolling we refer to [2]. This is a great review article concerning definitions, anatomy, physiology, and bio-mechanics.

1 Static stretching has been shown to decrease strength output. We refer to [1] for a review article on the effects of stretching.

2 For a summary of normal ROM for 30 to 40 old males we refer to figure **??**.

1.2 FOAM ROLLING ADVICE

Next we will give some points to keep in mind while foam rolling, then we'll shortly expand on some of these points.

1. Only roll muscles.
2. Rolling tendons is not useful.
3. Don't roll your spine.
4. In general, try to roll in the direction of the microfibers.
5. Try to find points that hurt and massage them out.
6. Roll stiff muscles.
7. Don't roll weak muscles.

In general foam rolling is used to decrease muscle soreness, muscle recovery, and increase in ROM. In all cases focus on rolling the muscles, preferable in the direction of the muscle fibers. The muscle fibers run from the point of origin to the point of insertion. In figure 1 a picture is shown of the muscles of the back the lines on the muscles indicate the direction of the muscle fibers.One should only roll muscles, as rolling tendons has no physical effect, and rolling the spine can cause injuries.

To decrease muscle soreness and improve muscle recovery we want to roll tight muscles. We can focus points that hurt so called trigger points. To prevent injury, we want to abstain from rolling weak muscles as these can worsen our condition as these muscles are not tight enough from the start.

Some information on foam rolling and the lower part of the spine (the so called Lumbar Spine), information on knee pain connected to the IT-band, and general info on foam rolling by Jeff Nippard can be found in the videos listed below.

ATHLEANX - LS https://www.youtube.com/watch?v=ePDIhxIf2CI

ATHLEANX - ITBAND https://www.youtube.com/watch?v=Bq6NcAoQDSk&t

JEFF NIPPARD https://www.youtube.com/watch?v=9fvaZ_U6o3Y

1.3 FOAM ROLLING VIDEOS AND TECHNIQUES.

Yoga Dose does most exercises for the upper back. I would be careful with the lower back rolling and only do the stretch shown in a video by critical bench. If you want some ideas for a full body routine you can check Bob and Bret their video. If you want a routine focused

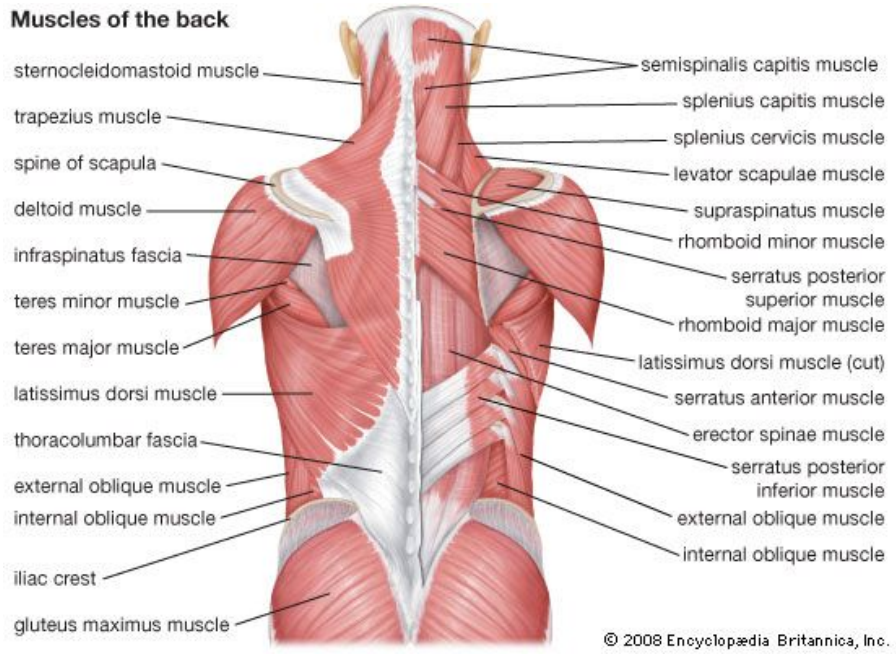


Figure 1: Muscles of the back

on the lower body you can check the video by YogiApproved. For information on rolling the neck you can check the video by critical bench on this topic.

YOGA DOSE https://www.youtube.com/watch?v=ilvMYKDKs9Q

CRITICAL BENCH - BACK https://www.youtube.com/watch?v=bJM7BwUEQog

CRITICAL BENCH - NECK https://www.youtube.com/watch?v=RcwfX-YKnIw

YOGI APPROVED https://www.youtube.com/watch?v=H7wSCpnbfB4

HOWCAST https://www.youtube.com/watch?v=lF58M-25CoM

BOB & BRED https://www.youtube.com/watch?v=TvTNfKMreMM

Figure 2: Foam rolling the lower back by Yogi Approved.

(a) Foam rolling your traps. Make sure you don't reach the Lumber Spine

(b) Rotate the roller 90 degrees and lie down on the roller.

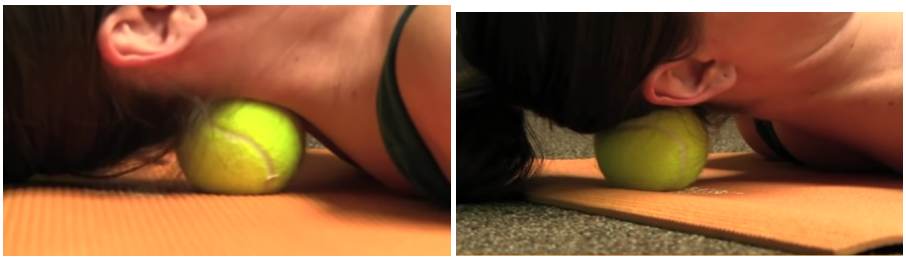
Figure 3: Guide on Howcast

Figure 4: Foam rolling Lats (Latissimus dorsi) by Bob & Brad.

(a) Foam rolling your, neck front view

(b) Foam rolling your neck, mainly the upper traps, rear view

Figure 5: Guide from critical bench on foam rolling the neck.These are done against the wall to reduce the amount of pressure.



(a) Muscles on the lower part of the neck. *(b) Muscles close to the skull.*

Figure 6: Using the tennis-ball to massage the muscles in the upper neck close to the skull by Healing Touch.

For work on the lower back, neck, and reaching some specific (trigger) points, a small ball is preferred. Again a full video has been done by Yogi approved. However, her explanation is not very detailed and informative. For a more thorough explanation for the neck I would suggest the Healing Touch video for the lower back wizard of health. And finally some help fix rounded shoulders by rolling the pecs is nicely demonstrated by Kai Simon

YOGI APPROVED `https://www.youtube.com/watch?v=vtncXgu7UN4`

HEALING TOUCH `https://www.youtube.com/watch?v=Y5VkX9SygWQ`

WIZARD OF HEALTH `https://www.youtube.com/watch?v=PVHQF0yHtSM`

KAI SIMON `https://www.youtube.com/watch?v=Wvpq7JldRfU`

1.4 APPENDIX

Table. Raw Data for All Dependent Variables Throughout the Experimental Conditions

Test	Time Point, h (Mean ± SD)			
	Before Delayed-Onset Muscle Soreness	24	48	72
Foam roll				
1-Repetition maximum squat, kg	145.41 ± 31.50	NA	NA	NA
Pressure-pain threshold, kPa	940.78 ± 215.82	767.14 ± 168.73	758.31 ± 240.35	832.87 ± 205.03
30-m Sprint time, s	4.39 ± 0.18	4.49 ± 0.20	4.53 ± 0.22	4.44 ± 0.17
Broad-jump distance, cm	226.75 ± 28.36	217.75 ± 22.11	219.00 ± 21.97	222.13 ± 20.79
Change-of-direction speed, s	10.28 ± 0.60	10.62 ± 0.62	10.44 ± 0.55	10.41 ± 0.62
Squat repetitions, No.	17.00 ± 6.59	13.88 ± 6.90	17.75 ± 6.69	17.38 ± 8.07
Control				
1-Repetition maximum squat, kg	142.58 ± 33.73	NA	NA	NA
Pressure-pain threshold, kPa	934.90 ± 247.21	691.61 ± 190.31	650.4 ± 214.8	821.10 ± 253.10
30-m Sprint time, s	4.38 ± 0.14	4.54 ± 0.17	4.51 ± 0.26	4.51 ± 0.22
Broad-jump distance, cm	233.88 ± 26.91	218.50 ± 26.76	215.00 ± 32.02	216.50 ± 29.25
Change-of-direction speed, s	10.40 ± 0.61	10.63 ± 0.43	10.60 ± 0.62	10.58 ± 0.52
Squat repetitions, No.	16.88 ± 5.64	13.50 ± 7.05	15.25 ± 6.48	16.63 ± 7.87

Abbreviation: NA, not applicable.

Figure 7: Effect of foam rolling post workout on muscle soreness and other measures.

Table 1 Average Change in Passive Hip-Flexion Range of Motion From the Pretreatment Measure, 95% Confidence Intervals, and Calculated Effect Size

Time	Static stretch only	Foam roller + static stretch[a]	Foam roller only	Control
Change from baseline	12.26 ± 4.21	23.55 ± 3.53	6.88 ± 3.97	3.74 ± 1.81
Confidence interval	(2.62, 21.83)	(15.57, 31.53)	(–2.07, 15.84)	(–.037, 7.85)
Between-groups effect size	2.63	7.06	1.81	—

Note: These average changes were based on the unequal variance between pretreatment ranges of motion (n = 10 subjects/treatment; mean ± SE).

[a] Foam roller + static stretch > static stretch only, foam roller only, and control, postintervention; $P < .05$.[2]

Figure 8: Effect of foam rolling on range of motion of the quadriceps.

TABLE 2. Results for athletic performance tests.*

	Foam rolling trial		Planking trial	
	Women	Men	Women	Men
Vertical jump height, cm	39.95 ± 7.77	58.32 ± 7.21†	37.81 ± 7.09	58.03 ± 7.4 1†
Vertical jump power, W	2276.92 ± 343.56	3793.77 ± 518.00†	2361.23 ± 411.41	3897.46 ± 836.45†
Isometric squat force, N	1631.39 ± 439.81	2637.69 ± 683.50†	1596.23 ± 456.61	2510.77 ± 842.55†
Pro agility drill speed, s	6.24 ± 0.65	5.37 ± 0.36†	6.39 ± 0.79	5.24 ± 0.27†

*cm = centimeters; W = Watts; N = Newtons; s = seconds.
†Significant difference ($p \leq 0.001$) compared with women in corresponding trial.

Figure 9: Effect of foam rolling before workout on performance

TABLE 3. Results for fatigue, exertion, and soreness scales.*

	Foam rolling	Planking
Pre-CR-10	0.40 ± 0.59	0.82 ± 0.74†
Post-CR-10	2.21 ± 1.76‡	2.89 ± 1.61‡
Pre-soreness	0.23 ± 0.49	0.21 ± 0.40
Post-soreness	0.92 ± 1.33‡	1.40 ± 1.48‡
Pre-soreness on palpation	0.25 ± 0.43	0.44 ± 0.69
Post-soreness on palpation	1.63 ± 1.79‡	1.78 ± 1.61‡

*CR-10 is the Borg CR-10 Scale of perceived exertion.
†Significant difference ($p \leq 0.05$) compared with corresponding foam rolling trial.
‡Significant difference ($p \leq 0.05$) compared with pre-exercise within the same trial.

Figure 10: Effect of foam rolling before workout on perceived fatigue

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