LEUKOCYTE RESPONSE TO FOAM ROLLING FOLLOWING RESISTANCE EXERCISE

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ABSTRACT

BACKGROUND: Foam rolling is a recovery modality employed to improve the recovery process following exercise, however, it may alter the immune repair processes. **PURPOSE:** To determine the effects of foam rolling on leukocyte counts following resistance exercise. **METHODS**: 17 resistance-trained men (22±3yrs; 175.2±6.3cm; 77.8±9.3kg; Relative 1RM: 1.73±0.18 kg/kg body mass) participated in this cross-sectional study. Participants provided written informed consent, were assessed for anthropometrics, and completed a 1RM assessment in the back squat (BS) and deadlift (DL), and an estimated split squat (SS) 1RM on visit one. Participants were then randomly assigned either foam rolling (FR) or sham muscle ultrasound (CON). At least 72 hours later, participants provided a baseline blood sample (PRE) and completed the exercise protocol of 6x10 at 80%1RM in the BS, 4x10 at 70% 1RM in the DL and SS exercises with 2-minutes of rest between sets and exercises. Immediately following exercise (IP), participants provided a blood sample before completing their assigned recovery modality. Following the modality, another sample was collected (REC) as well as one-hour (1H) later. Additional blood samples were collected on visits three and four, which were 24- (24H) and 48-hours (48H) later, respectively. Samples were analyzed by an automated hematology analyzer to assess total counts of leukocytes (WBC), lymphocytes (LY), monocytes (MO) and granulocytes (GR). Four separate two-way (group × time) repeated measures analysis of variance (ANOVA) were used to assess changes in cell counts with a Least Significant Difference (LSD) pairwise comparison for main effects**. RESULTS**: Data are presented in Table 1. No group x time interactions were present for WBC (F=0.896; p=0.427; ηp2=0.56, LY (F=1.113; p=0.330; ηp2=0.069), MO (F=1.431; p=0.248; ηp2= 0.087), and GR (F=0.651; p=0.534; ηp2=0.042). Main effects for time were observed for WBC (F=56.244; p<0.001; ηp2=0.789), LY (F=134.614; p<0.001; ηp2=0.900), MO (F=12.091; p<0.001; ηp2=0.446) and GR (F=58.480; p<0.001; ηp2=0.796). All cell populations were elevated from PRE at IP, REC, and 1H (p<0.001) with no differences at 24H and 48H (p>0.05). **CONCLUSION**: While exercise elevated cell counts for WBC, LY and MO over time, FR seems to have no effect on leukocyte counts when compared to a control following a bout of resistance exercise. Moreover, cell counts returned to near baseline values by 24H and 48H. Therefore, FR had no additional benefits than no recovery modality in improving cell counts days later for recovery following resistance exercise. **PRACTICAL APPLICATION**: While foam rolling does not alter cell counts for recovery following exercise, as well as days later, athletes may utilize the modality if it provides analgesic benefits.

BACKGROUND

- Exercise-induced muscle damage (EIMD) commonly results from participating in vigorous bouts of exercise and consequently leads to decrements in athletic performance (1,2,6)
- Profound immune response is also provoked by EIMD via inflammation to elicit repair and recovery (5,7)
- Performance decrements may be linked to reduced immune response and therefore affect overall recovery
- Foam rolling has been adopted aiming to reduce the prevalent decrements in athletic performance and therefore potentially generate rapid recovery (3)
- Foam rolling has demonstrated a reduced immune response following heavy bout of resistance exercise in an animal model (4)
- Foam rolling displayed greater decrements in performance compared to a control condition in an animal model (4)

PURPOSE

To determine the effects of foam rolling on leukocyte counts in resistance trained males following a bout of resistance exercise

PRACTICAL APPLICATION

FOAM ROLLING MAY BE USED AS A RECOVERY MODALITY WITHOUT ALTERING LEUKOCYTE RESPONSE

METHODS

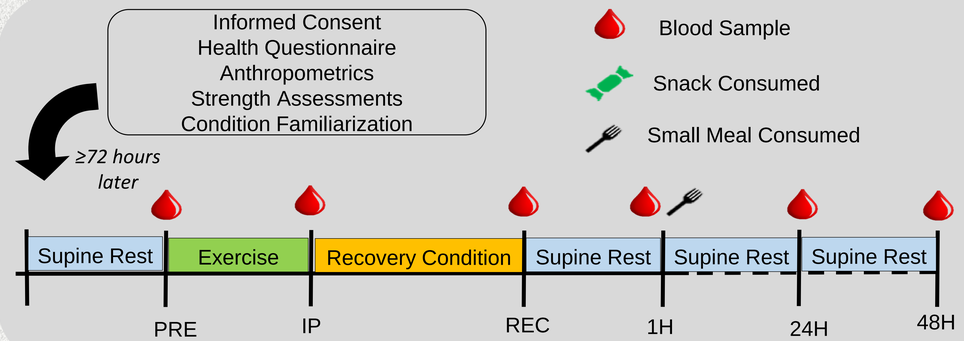

Figure 1. Study Design
Participants visited the laboratory on four separate occasions. One which consisted of providing a written informed consent and completing strength assessments in the back squat, deadlift and split squat exercises. At least 72-hours later, individuals returned to complete the experimental trial which consisted of providing blood samples prior to exercise (PRE), post a heavy bout of resistance exercise (IP), post completion of the assigned recovery condition (REC) and one-hour post the recovery condition (1H). Individuals then returned 24-(24H) and 48-Hours (48H) post exercise to provide follow up blood samples.

Measures:

- White Blood Cells (WBC)
- Lymphocytes (LY)
- Monocytes (MO)
- Granulocytes (GR)

Statistics:

- Four separate two-way ANOVAs to observe changes from prior to exercise (PRE) to:
  - Immediately Post Exercise (IP)
  - Post Recovery Condition (REC)
  - One-hour Post Recovery Condition (1H)
  - 24- (24H) and 48-hours (48H) Post Exercise

RESULTS

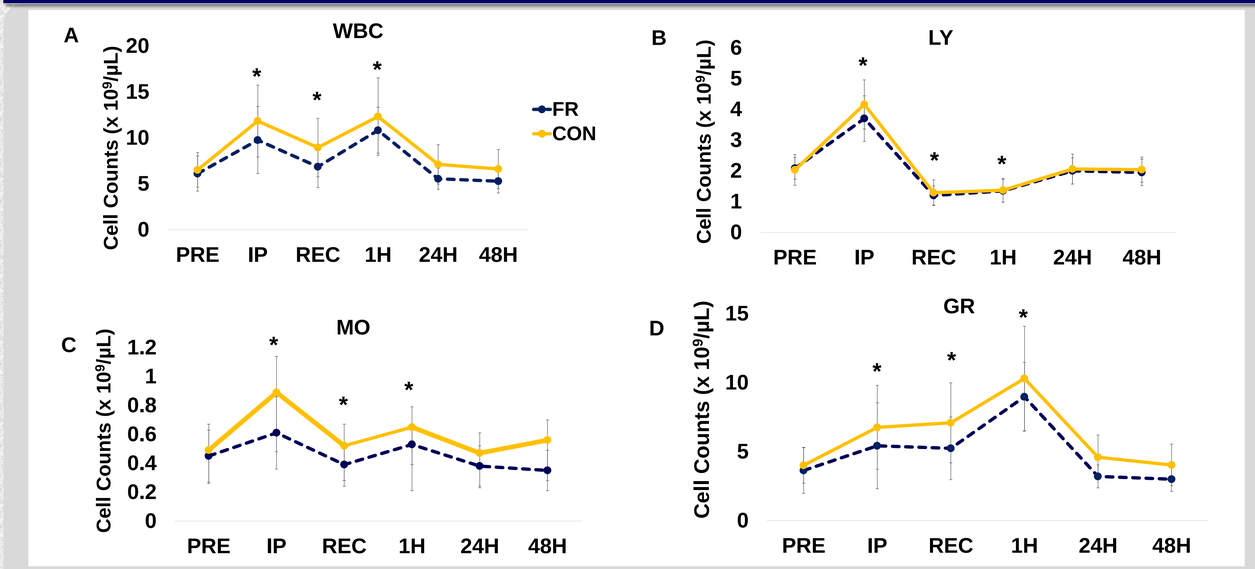

Figure 2. Leukocyte Response Following a Heavy Bout of Exercise and a Recovery Condition
Blood samples were assessed for total counts of leukocytes prior to exercise (PRE), immediately post a bout of heavy resistance exercise (IP), post recovery condition (REC), one hour (1H) post the recovery condition, 24- (24H) and 48-hours (48H) post exercise. **(A)** White Blood Cell (WBC) counts over the time course of the investigation. **(B)** Lymphocyte (LY) cell counts over the time course of the investigation. **(C)** Monocyte (MO) cell counts over the time course of the investigation. **(D)** Granulocyte (GR) cell counts over the time course of the investigation. FR= Foam Rolling condition; CON= Sham muscle ultrasound condition; *= Significantly different from PRE (p<0.001). Data are presented as Mean ±Standard Deviation.

METHODS (CONT.)

Table 1. Resistance Exercise Protocol

Exercise	Set	Intensity	Rest
Back Squat	6x10	80% 1RM	2 Minutes
Deadlift	4x10	70% 1RM	2 Minutes
Barbell Spilt Squat	4x10	70% (predicted) 1RM	2 Minutes
Warm-up: 5min Cycling, 10 Body Weight Squat, 10 Single Leg Lunges			

Table 2. Recovery Condition Protocols

Recovery Conditions	
Foam Rolling	Lower limbs for 30s each muscle at 45 strokes per minute
Sham Ultrasound	Lay supine during sham ultrasound of the lower limbs
Condition Assignment: Randomized; **Condition Time**: 15-miuntes	

CONCLUSIONS

- Foam rolling seemed to be no different than a control in altering leukocyte counts
- Resistance exercise altered the leukocyte response for all cells
- For all leukocytes, counts were elevated at IP
- Interestingly, LY counts were suppressed at REC and 1H
- Counts for all cells had returned to resting levels by 24 hours and remained leveled at 48 hours post exercise

ACKNOWLEDGEMENTS

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