



## Acute effects of lateral thigh foam rolling exercises on arterial tissue perfusion determined by spectral Doppler and power Doppler ultrasound

**Poster No.:** P-0038  
**Congress:** ESSR 2016  
**Type:** Scientific Poster  
**Authors:** T. Hotfiel, B. Swoboda, M. Uder, R. Heiß; Erlangen/DE  
**DOI:** 10.1594/essr2016/P-0038

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method ist strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

[www.myESR.org](http://www.myESR.org)

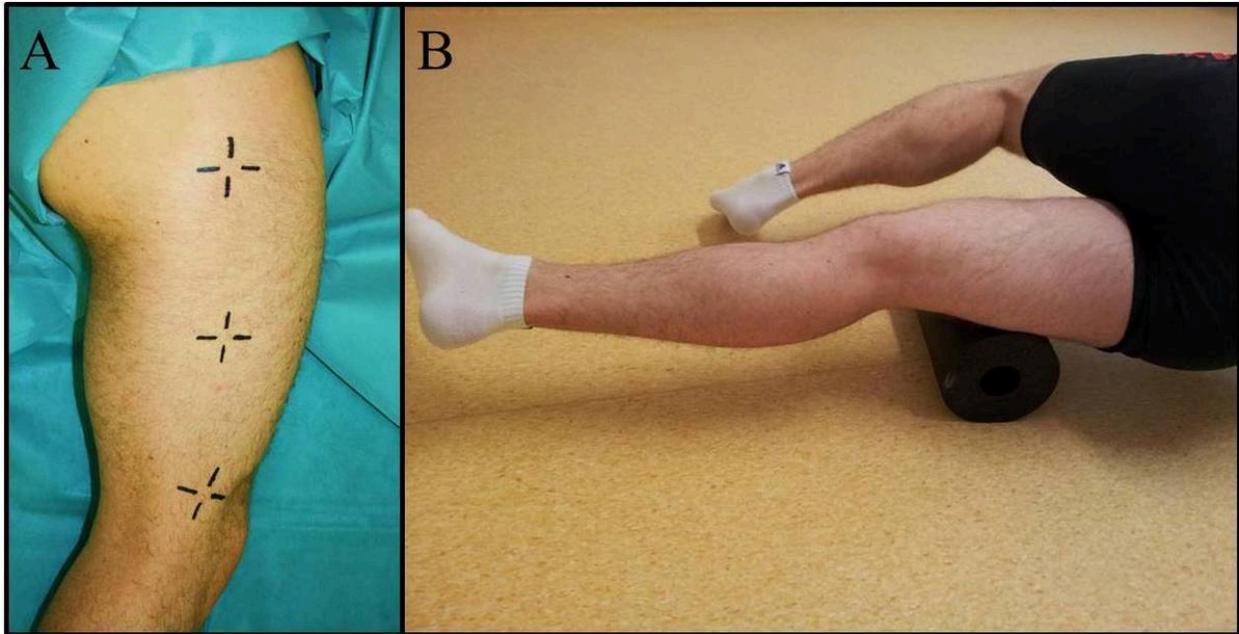
## Purpose

Foam rolling has been developed to a popular intervention and has been established in training and rehabilitation. Despite the growing application of foam rolling, there is a lack of studies that observed its effects on cellular and physiological level. Thus the aim of the present study was to assess the impact of foam rolling on arterial blood flow of the lateral thigh.

## Methods and Materials

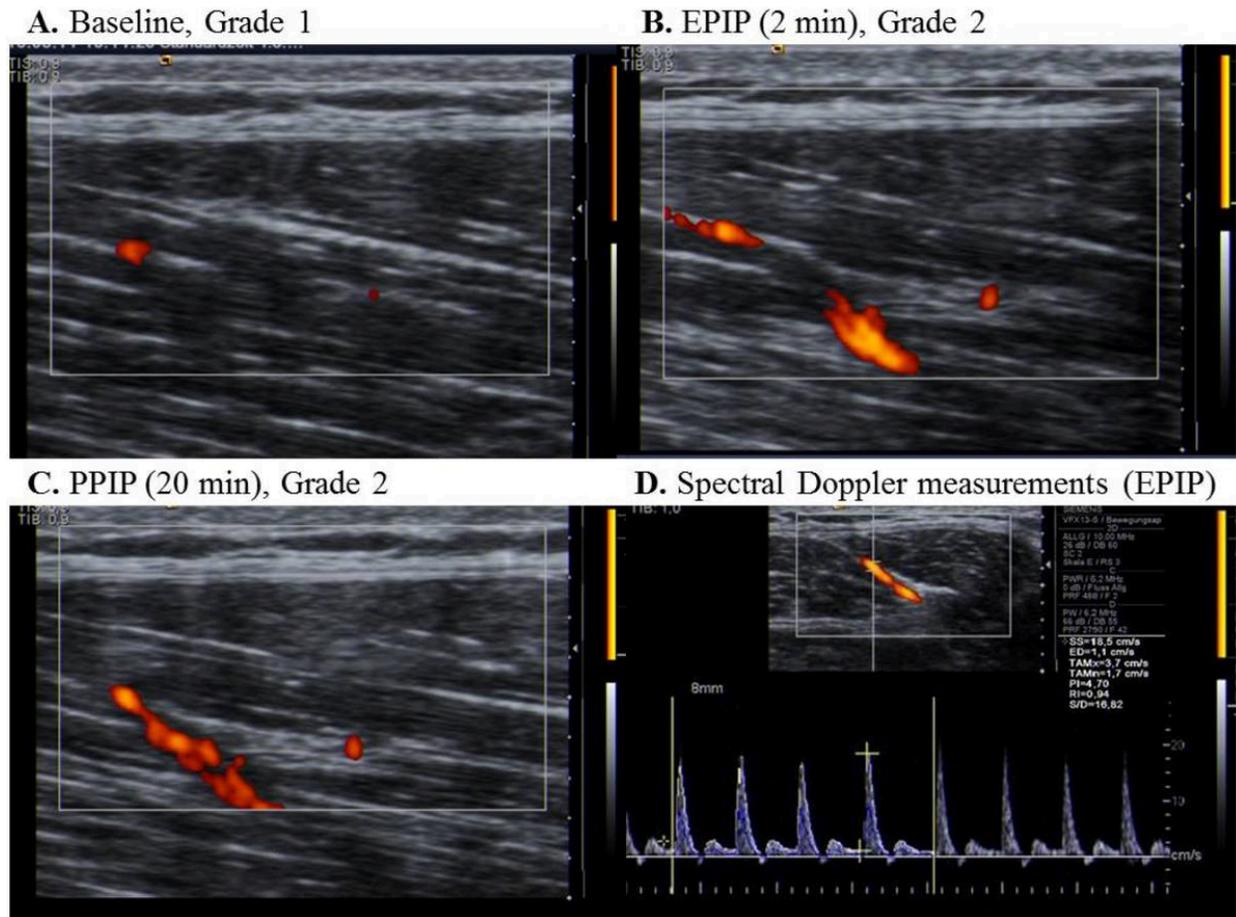
In total, 21 healthy participants (age  $25 \pm (2)$  years, height  $177 \pm (9)$  cm, body weight  $74 \pm (9)$  kg) were recruited from the medical and sports faculty. Arterial tissue perfusion was determined by terms of spectral Doppler and power Doppler ultrasound, represented as Peak Flow (Vmax), Time Average Velocity Maximum (TAMx), Time Average Velocity Mean (TAMn) and Resistance Index (RI), as well as with a semiquantitative grading which has been assessed by four blind-folded investigators. Measurement values were assessed under resting conditions (baseline) and twice after prescribed foam rolling exercises of the lateral thigh (0 min and 30 min post intervention). The trochanteric region, mid portion and distal tibial insertion of the lateral thigh were representative for data analysis.

Images for this section:



**Fig. 1:** A illustrates the defined probe positions on the lateral thigh, B demonstrates foam rolling of the lateral thigh.

© University Hospital Erlangen - Erlangen/DE



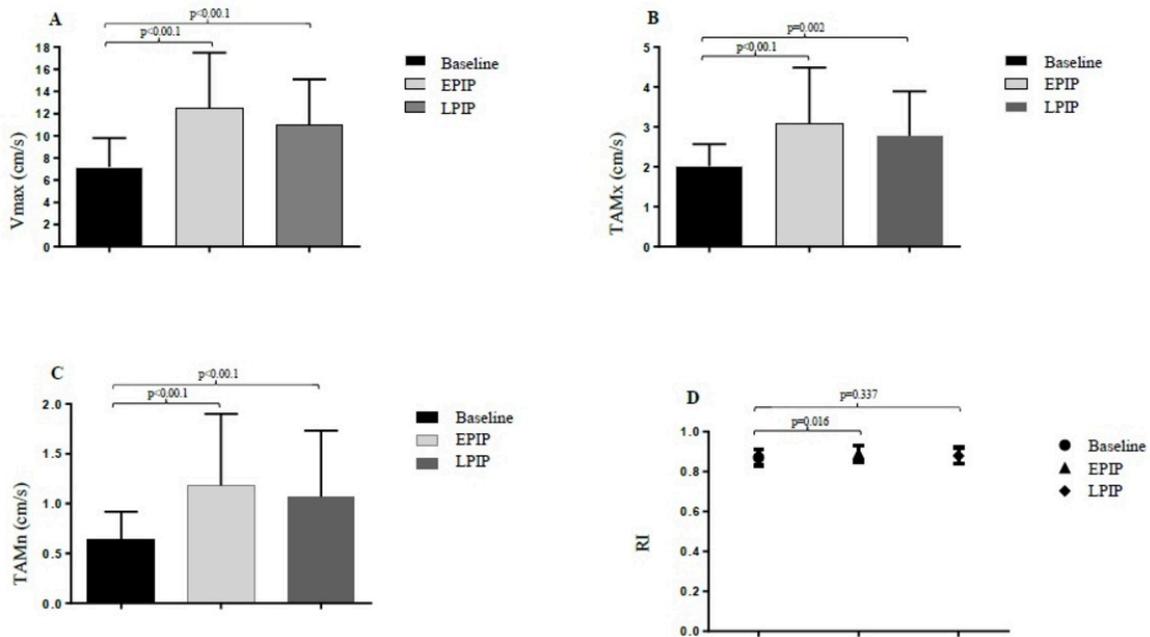
**Fig. 2:** Lateral longitudinal scan in power Doppler ultrasound modus of the mid section: Figures A-C demonstrate hyperperfusion scored by PD US: A, grade 0, B, grade II, C grade II. Figure D demonstrates spectral Doppler measurement at the distal section

© University Hospital Erlangen - Erlangen/DE

## Results

Our results indicate that arterial blood flow of the lateral thigh increases significantly following foam rolling exercises in comparison to baseline conditions ( $p < 0.05$ ). We could detect a relative raise for Vmax of 73.6% (0 min) and 52.7 % (30 min) ( $p < 0.001$ ), for TAMx of 53.2% ( $p < 0.001$ ) and 38.3 % ( $p = 0.002$ ) and for TAMn of 84.4% ( $p < 0.001$ ) and 68.2 % ( $p < 0.001$ ). In addition semiquantitative Power Doppler scores at all portions revealed an increased average grading of 1.96 directly after intervention and 2.04 after 30 min compared to 0.75 at baseline.

Images for this section:



**Fig. 3:** Mean peak flow (Vmax), TAMx, TAMm and RI (absolute value  $\pm$  SD) for 21 subjects for following settings: resting conditions (baseline) , early post-Intervention (EPIP) and late post-Intervention (LPIP).

© University Hospital Erlangen - Erlangen/DE

Semiquantitative Perfusion (Grade 0-III)	Proximal Portion			Mid Portion			Distal Portion		
	Baseline	EPIP	LIPI	Baseline	EPIP	LIPI	Baseline	EPIP	LIPI
<b>Total</b>	n=168 (100%)	n=168	n=168	n=168	n=168	n=168	n=168	n=168	n=168
<b>Grade 0</b>	76 (45.2%)	0	0	52 (31.0%)	0	0	16 (9.5%)	0	0
<b>Grade I</b>	90 (53.6%)	61 (36.3%)	59 (35.1%)	112 (66.7%)	23 (13.7%)	10 (6.0%)	140 (83.3%)	16 (9.5%)	9 (5.4%)
<b>Grade II</b>	2 (1.2%)	102 (60.7%)	98 (58.3%)	4 (2.4%)	113 (67.3%)	122 (72.6%)	12 (7.1%)	110 (65.5%)	104 (61.9%)
<b>Grade III</b>	0	5 (3.0%)	11 (6.6%)	0	32 (19.1%)	36 (21.4%)	0	42 (25.0%)	55 (32.7%)
<b>Average</b>	0.56	1.67	1.71	0.71	2.05	2.15	0.98	2.15	2.27

**Fig. 4:** Figure 4 provides an overview of the semiquantitative scoring. The number of 168 assessments corresponds to 21 subjects, 2 probe orientations and 4 blinded observers

© University Hospital Erlangen - Erlangen/DE

## Conclusion

An increase of arterial blood flow suggests a role for the acute phase after foam rolling. Our data may contribute to the understanding of local physiological reactions of self-myofascial release. The advantages of enhanced blood flow might be important for warm-up and recovery and our data support the implementation of foam rolling in sports if tissue circulation is required.

## References

Bushell JE, Dawson SM, and Webster MM. Clinical Relevance of Foam Rolling on Hip Extension Angle in a Functional Lunge Position. *Journal of strength and conditioning research / National Strength & Conditioning Association* 29: 2397-2403, 2015.

Mohr AR, Long BC, and Goad CL. Effect of foam rolling and static stretching on passive hip-flexion range of motion. *Journal of sport rehabilitation* 23: 296-299, 2014.

Okamoto T, Masuhara M, and Ikuta K. Acute effects of self-myofascial release using a foam roller on arterial function. *Journal of strength and conditioning research / National Strength & Conditioning Association* 28: 69-73, 2014.

## Personal Information

Dr. med. Thilo Hotfiel and Prof. Dr. med. Bernd Swoboda,

Division of Orthopedic Rheumatology, Department of Orthopedic Surgery, Friedrich-Alexander- University of Erlangen-Nuremberg, Germany

Dr. med. Rafael Heiß and Prof. Dr. med. Michael Uder,

Department of Radiology, University Hospital Erlangen, Germany