

## Accepted Manuscript

Title: Modeling regulation of vascular tone following muscle contraction: model development, validation and global sensitivity analysis

Author: J.M.T. Keijsers C.A.D. Leguy A.J. Narracott J. Rittweger F.N. van de Vosse W. Huberts



PII: S1877-7503(17)30410-6  
DOI: <http://dx.doi.org/doi:10.1016/j.jocs.2017.04.007>  
Reference: JOCS 656

To appear in:

Received date: 23-12-2016  
Revised date: 17-3-2017  
Accepted date: 11-4-2017

Please cite this article as: J.M.T. Keijsers, C.A.D. Leguy, A.J. Narracott, J. Rittweger, F.N. van de Vosse, W. Huberts, Modeling regulation of vascular tone following muscle contraction: model development, validation and global sensitivity analysis, *Journal of Computational Science* (2017), <http://dx.doi.org/10.1016/j.jocs.2017.04.007>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Modeling regulation of vascular tone following muscle contraction: model development, validation and global sensitivity analysis

J.M.T. Keijsers<sup>a,b,\*</sup>, C.A.D. Leguy<sup>b</sup>, A.J. Narracott<sup>c,d</sup>, J. Rittweger<sup>b</sup>, F.N. van de Vosse<sup>a</sup>, W. Huberts<sup>a,e</sup>

<sup>a</sup>*Department of Biomedical Engineering, Eindhoven University of Technology, Eindhoven, the Netherlands*

<sup>b</sup>*Institute of Aerospace Medicine, German Aerospace Center, Cologne, Germany*

<sup>c</sup>*Medical Physics Group, Department of Cardiovascular Science, University of Sheffield, Sheffield, United Kingdom*

<sup>d</sup>*INSIGNEO Institute for in silico Medicine, University of Sheffield, Sheffield, United Kingdom*

<sup>e</sup>*Department of Biomedical Engineering, Maastricht University, Maastricht, the Netherlands*

---

## Abstract

In this study the regulation of vascular tone inducing the blood flow increase at the onset of exercise is examined. Therefore, our calf circulation model was extended with a regulation model to simulate changes in vascular tone depending on myogenic, metabolic and baroreflex regulation. The simulated blood flow corresponded to the in vivo response and it was concluded that metabolic activation caused the flow increase shortly after muscle contraction. Secondly, the change in baseline flow upon tilt was a result of myogenic and baroreflex activation. Based on a sensitivity analysis the myogenic gain was identified as most important parameter.

*Keywords:* regulation of vascular tone, metabolic regulation, myogenic

---

\*J.M.T. Keijsers, Department of Biomedical Engineering. Eindhoven University of Technology, PO Box 513, 5600 MB, Eindhoven. The Netherlands. Phone: +3140 247 5675. Email: j.m.t.keijsers@tue.nl

Download English Version:

<https://daneshyari.com/en/article/6874439>

Download Persian Version:

<https://daneshyari.com/article/6874439>

[Daneshyari.com](https://daneshyari.com)