



Universiteit
Leiden
The Netherlands

Ciliary regulation of endothelial response to shear stress : consequences for Tgf-beta signaling and endothelial-to-mesenchymal transition

Egorova, A.D.

Citation

Egorova, A. D. (2012, June 7). *Ciliary regulation of endothelial response to shear stress : consequences for Tgf-beta signaling and endothelial-to-mesenchymal transition*. Retrieved from <https://hdl.handle.net/1887/19061>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/19061>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/19061> holds various files of this Leiden University dissertation.

Author: Egorova, Anastasia Dmitrievna

Title: Ciliary regulation of endothelial response to shear stress : consequences for Tgf-beta signaling and endothelial-to-mesenchymal transition

Date: 2012-06-07

Ciliary Regulation of Endothelial Response to Shear Stress

Consequences for Tgf β Signaling and Endothelial-to-Mesenchymal Transition

Anastasia Dmitrievna Egorova

Colofon

Ciliary Regulation of Endothelial Response to Shear Stress

Consequences for Tgf β Signaling and Endothelial-to-Mesenchymal Transition

Anastasia Dmitrievna Egorova

This thesis was prepared at the Department of Anatomy & Embryology and Department of Molecular Cell Biology of the Leiden University Medical Center, Leiden, The Netherlands.

Cover: Impression of this thesis, matreshka design.

Design and lay-out by Kambiz Rajabzade and Edris Mahtab.

Copyright © 2012 Anastasia D. Egorova

All rights reserved. No part of this book may be reproduced or transmitted, in any form or by any means, without written permission of the author.

ISBN 978-90-818993-0-7

Printed by Gildeprint Drukkerijen - www.gildeprint.nl

Ciliary Regulation of Endothelial Response to Shear Stress
Consequences for Tgf β Signaling and Endothelial-to-Mesenchymal Transition

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus Prof. Mr. P.F. van der Heijden,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 7 juni 2012
klokke 15.00 uur

door

Anastasia Dmitrievna Egorova
geboren te Moskou, Sovjet-Unie
in 1987

Promotiecommissie

Promotores	Prof. Dr. R.E. Poelmann Prof. Dr. P. ten Dijke
Co-promotor	Dr. B.P. Hierck
Overige leden	Dr. R.H. Giles (<i>Universitair Medisch Centrum Utrecht</i>) Prof. Dr. A.J. van Zonneveld Prof. Dr. A.J.G. Horrevoets (<i>Vrije Universiteit Medisch Centrum</i>)

Financial support by the Dutch Heart Foundation and J.E. Jurriaanse Stichting for the publication of this thesis is gratefully acknowledged.

Publication of this thesis was further supported by Protein Labelling Innovation (PLI Technologies) and Medexnet.

Science is like a well-crafted matreshka - the more insight you seek, the more questions you discover.

Dedicated to my mother and grandparents

Contents

Chapter 1	General Introduction	8
Chapter 2	Role for Primary Cilia as Flow Detectors in the Cardiovascular System <i>International Review of Cell and Molecular Biology</i> , 290: 87-119 (2011)	24
Chapter 3	Endothelial Colony-Forming Cells Show a Mature Transcriptional Response to Shear Stress <i>In Vitro Cellular & Developmental Biology-Animal</i> , 48(1): 21-9 (2012)	56
Chapter 4	Tgf β /Alk5 Signaling is Required for Shear Stress Induced Klf2 Expression in Embryonic Endothelial Cells <i>Developmental Dynamics</i> , 240: 1670–1680 (2011)	76
Chapter 5	Lack of Primary Cilia Primes Shear-Induced Endothelial-to-Mesenchymal Transition <i>Circulation Research</i> , 108(9): 1093-1101 (2011)	102
Chapter 6	Tgf β Signaling in Endothelial-to-Mesenchymal Transition: The Role of Shear Stress and Primary Cilia <i>Science Signaling</i> , 21; 5(212): pt2 (2012)	130
Chapter 7	Primary Cilia as Biomechanical Sensors in Regulating Endothelial Function <i>Differentiation</i> , 83(2): S56-61 (2012)	146
Chapter 8	Shear Stress-Induced Endothelial-to-Mesenchymal Transition Depends on Cilium-Related Hedgehog and Tgf β 2 Signaling <i>Manuscript in preparation</i>	160
Chapter 9	General Discussion	184

Samenvatting / Резюме	206
List of Abbreviations	214
Dankwoord / Acknowledgements / Слова Благодарности	222
Curriculum Vitae	226