The endothelium in sepsis
Rafat, Neysan

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2009

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):

Copyright
Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

Take-down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): http://www.rug.nl/research/portal. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.
THE ENDOTHELium IN SEPSIS:

inflammatory response and progenitor cell involvement

Neysan Rafat
The research described in this dissertation was financially supported by a grant of the Deutsche Forschungsgemeinschaft (DFG) to the European Graduate College “Vascular Medicine” (GRK880) and by the Groningen University Institute for Drug Exploration (GUIDE).

The author gratefully acknowledges the financial support for printing of this dissertation, given by:
University of Groningen
Groningen University Institute for Drug Exploration (GUIDE)
Faculty of Medical Sciences, University of Groningen
European Graduate College “Vascular Medicine” (GRK880)
Medical Faculty Mannheim of the University of Heidelberg

Publisher: The Rijkuniversiteit Groningen
Co-publisher: Studio Graphito, ul. Dworcowa 52, 55-120 Oborniki Śląskie, Poland, edition 300 copies (egz.) (graphito@poczta.wp.pl)

© 2009 by Neysan Rafat
All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without permission of the author.

ISBN: 83-89898-45-4

Cover design and layout: the author
Cover picture: logo of the German Sepsis Association: www.sepsis-gesellschaft.de
THE ENDOTHELium IN SEPSIS:
inflammatory response and progenitor cell involvement

Proefschrift
ter verkrijging van het doctoraat in de
Medische Wetenschappen
aan de Rijksuniversiteit Groningen
op gezag van de
Rector Magnificus, dr. F. Zwarts,
in het openbaar te verdedigen op
maandag 23 februari 2009
om 16.15 uur

door

Neysan Rafat
geboren op 8 april 1979
te Ankara, Turkije
Promotores:  
Prof. Dr. G. Molema  
Prof. Dr. G. Ch. Beck  
Prof. Dr. B. A. Yard

Beoordelingscommissie:  
Prof. Dr. L. P. Aarts  
Prof. Dr. M. Goebeler  
Prof. Dr. H.-P. Hammes
This dissertation is dedicated to the Bahá’í youth in Iran.

Members of the Bahá’í-Faith in the Islamic Republic of Iran are denied access to higher education due to their religion, regardless of the fact that education is a fundamental human right according to Article 26, paragraph 1 of the Universal Declaration of Human Rights (UDHR), which also Iran adopted in 1948. As such, no Bahá’í youth in Iran would be permitted to conduct such a dissertation. Therefore, this dissertation should be considered on their behalf.
Paranimfen: Shamim Rafat
Dr. Anis Towfigh
CONTENTS

CHAPTER 1.1 General introduction 9

CHAPTER 1.2 Aim of the thesis 42


CHAPTER 3 CO releasing molecules inhibit TNF-α mediated expression of VCAM-1 and E-selectin independently of heme oxygenase 1. (Accepted for publication in British Journal of Pharmacology) 83

CHAPTER 4 Molecular mechanisms involved in the CO mediated down-regulation of VCAM-1 on endothelial cells identified by gene expression profiling. (Work in progress) 107

CHAPTER 5 Increased circulating endothelial progenitor cells in septic patients: correlation with survival. Crit Care Med. 2007;35(7):1677-84. 131

CHAPTER 6 Summary, general discussion and future perspectives 149

CHAPTER 7 Samenvatting 163

APPENDIX Acknowledgements 167
Publication list & Awards 171
Curriculum vitae 173
Color figures 174