The handle http://hdl.handle.net/1887/20998 holds various files of this Leiden University dissertation.

**Author:** Smeden, Jeroen van  
**Title:** A breached barrier: analysis of stratum corneum lipids and their role in eczematous patients  
**Issue Date:** 2013-06-20
A BREACHED BARRIER
Analysis of stratum corneum lipids and their role in eczematous patients

Jeroen van Smeden
The investigations described in this thesis were performed at the Division of Drug Delivery Technology of the Leiden Academic Centre for Drug Research, Leiden University, Leiden, The Netherlands. This research is supported by the Dutch Technology Foundation STW, which is part of the Netherlands Organisation for Scientific Research (NWO), and which is partly funded by the Ministry of Economic Affairs. In addition, the following companies provided substantial financial support to this research project: Astellas Pharma Inc., Evonik Industries AG, RiverD International b.v., and Unilever n.v.

© 2013, Jeroen van Smeden. All rights reserved. No part of this thesis may be reproduced or transmitted in any form or by any means without written permission of the author.

About the cover: The Great Wall of China is the largest man-made barrier in the world. With a total length of over 20,000 km, it was built as protection against invaders. Although it is clearly the most impressive barrier on earth made by men, its function as a barrier is nothing compared to the barrier function of humans largest organ, the skin. Although it is only about 0.00002 meter thick, it protects the body against continuous attacks from the environment. For example the number of bacteria that continuously try to breach the skin barrier, is estimated at 1,000,000,000,000 on an average human being, not taking into account other pathogens that may penetrate the skin. The skin barrier is located at the outermost layer of the skin, the horny layer (stratum corneum) and just like the Great Wall it is composed of a brick and mortar-like structure. In atopic eczema however, the skin barrier is impaired, and pathogens may penetrate the skin and cause an allergic reaction, often accompanied by red, dry, and itchy skin. This thesis describes several studies in which the skin barrier in eczematous patients is investigated.

Cover and part image: Photographs were legally purchased from iStockphoto and Janinja Olivier

Cover and thesis design by Melina Durinck
Printed by Gildeprint Drukkerijen (Enschede, The Netherlands)
A BREACHED BARRIER
Analysis of stratum corneum lipids and their role in eczematous patients

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof. mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties

te verdedigen op donderdag 20 juni 2013
klokke 15:00 uur

door

Jeroen van Smeden
geboren te Leidschendam
in 1984
Promotiecommissie

Promotor: Prof. Dr. J. A. Bouwstra
Copromotor: Dr. R. J. Vreeken
Overige leden: Prof. Dr. M. Danhof
                      Prof. Dr. W. Jiskoot
                      Prof. Dr. J. van der Greef
                      Prof. Dr. J. M. Brandner
                      Dr. A. El Ghalbzouri
To my loved ones,
Bianca, Lucas en Matthijs
9 PART I

35 PART II: METHOD DEVELOPMENT FOR DETAILED STRATUM CORNEUM LIPID ANALYSIS

85 PART III: STRATUM CORNEUM LIPID COMPOSITION IN ATOPIC ECZEMA AND ITS ROLE IN THE SKIN BARRIER FUNCTION

155 PART IV: STUDIES ON STRATUM CORNEUM LIPIDS FROM OTHER SKIN SOURCES SHOWING A BARRIER DYSFUNCTION

199 PART V: SUMMARY AND APPENDICES