

University of Groningen

## Essential fatty acid deficiency and the small intestine

Lukovac, Sabina

**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:*

2010

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Lukovac, S. (2010). Essential fatty acid deficiency and the small intestine Groningen: s.n.

**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.

# **Essential Fatty Acid Deficiency and the Small Intestine**

**Sabina Lukovac**

The research described in this thesis was carried out at the Department of Pediatrics, Beatrix Children's Hospital, Center for Liver, Digestive and Metabolic Diseases, University of Groningen, University Medical Center Groningen and was financially supported by the Dutch Digestive Foundation grant (MW 04-38).

The author gratefully acknowledges the financial support for printing of this thesis by:

*Dutch Digestive Foundation*



*Unilever Nederland*



*Graduate school for drug exploration*



*University Medical Center Groningen*



**umcg**

*University of Groningen*



**rijksuniversiteit  
 groningen**

*Dutch society for gastroenterology (NVGE) and Section Experimental Gastroenterology*

**©2010 Sabina Lukovac**

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 and the publisher holding the copyrights of the articles.

Cover design: Marc Daalmans en Sabina Lukovac

Layout design: Susanne Kooistra en Sabina Lukovac

Printed by: Ipskamp Drukkers B.V.



rijksuniversiteit  
 groningen

## **Essential fatty acid deficiency and the small intestine**

### **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  
 woensdag 24 maart 2010  
 om 13.15 uur

door

**Sabina Lukovac**

geboren op 28 augustus 1980  
 te Doboj, Bosnië en Herzegovina

Promotores:

Prof. dr. H.J. Verkade  
Prof. dr. E.H.H.M. Rings

Beoordelingscommissie:

Prof. dr. A.F. Bos  
Prof. dr. A.K. Groen  
Prof. dr. E. Heineman

**ISBN**

978-90-367-4226-9 (printed)

978-90-367-4227-6 (digital)

*This tree has two million and seventy-five thousand leaves. Perhaps I missed a leaf or two but I do feel triumphant at having persisted in counting by hand branch by branch and marked down on paper with pencil each total. Adding them up was a pleasure I could understand; I did something on my own that was not dependent on others, and to count leaves is not less meaningful than to count the stars, as astronomers are always doing. They want the facts to be sure they have them all. It would help them to know whether the world is finite.*

*by David Ignatow*

Paranimfen:

Irma Kuipers  
Hilde Herrema

## **CONTENTS**

<b>CHAPTER 1</b>	9
Introduction to the thesis	
<b>CHAPTER 2</b>	29
Essential fatty acid deficiency in mice impairs lactose digestion	
<b>CHAPTER 3</b>	47
Essential fatty acid deficiency in mice alters jejunal cholesterol metabolism	
<b>CHAPTER 4</b>	69
Effects of essential fatty acid deficiency on enterohepatic circulation of bile salts in mice	
<b>CHAPTER 5</b>	93
Functional characterization of the <i>in vitro</i> model of EFA deficiency	
<b>CHAPTER 6</b>	111
Gelucire <sup>®</sup> 44/14 improves fat absorption in rats with impaired lipolysis	
<b>CHAPTER 7</b>	129
Summary and future perspectives	
<b>APPENDICES</b>	
Nederlandse samenvatting	140
Dankwoord	145
Biography	148
List of publications	149



