

University of Groningen

The relevance of preanalytical factors in metabolomics and lipidomics research

Gil Quintero, Jorge Andres

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:

2018

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

Citation for published version (APA):

Gil Quintero, J. A. (2018). *The relevance of preanalytical factors in metabolomics and lipidomics research*. Rijksuniversiteit Groningen.

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 Relevance of Pre-Analytical Factors in Metabolomics and Lipidomics Research

Jorge Andres Gil Quintero

2018

Printing of this thesis has been generously supported by:



**university of
 groningen**

University of Groningen



Groningen University Institute
for Drug Exploration

The research reported in this thesis was carried out at the University of Groningen in the Analytical Biochemistry group, member of the Groningen Research Institute of Pharmacy. The PhD candidate was financially supported by the Science, Technology and Innovation Department from Colombia—COLCIENCIAS (Grant: 6171-71294025).

ISBN

978-94-034-0866-8 (Printed version)

978-94-034-0865-1 (Digital version)

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

Publisher: University of Groningen

Paranymphs: Frank Klont & Turan Gül

Cover and Layout design: Claudia Gonzalez

Printed by: ProefschriftMaken, Vianen, The Netherlands

Cover Picture: Antony Gormley Sculpture
BODIES IN SPACE I, 2001



rijksuniversiteit
 groningen

The Relevance of Pre-Analytical Factors in Metabolomics and Lipidomics Research

PhD Thesis

to obtain the degree of PhD at the
University of Groningen
on the authority of the
Rector Magnificus prof. dr. Elmer Sterken
and in accordance with
the decision by the College of Deans.

This thesis will be defended in public on
Friday 14 September 2018 at 9:00 hours

by

Jorge Andres Gil Quintero

born on 18 May 1985
in Medellin, Colombia

Supervisors

Prof. R.P.H. Bischoff

Prof. F.J. Dekker

Assessment Committee

Prof. C. Barbas

Prof. I.D. Wilson

Prof. D.J. Touw

Dedicated to my family!

You are and have always been my support throughout all difficult times.

Table of Contents

Chapter 1	Scope of the Thesis	9
Chapter 2	Stability of Energy Metabolites — an Often Overlooked Issue in Metabolomics Studies	13
Chapter 3	The Degradation of Nucleotide Triphosphates Extracted Under Boiling Ethanol Conditions is Prevented by the Yeast Cellular Matrix	39
Chapter 4	Omics Technology: Lipidomics and its Pitfalls During the Pre-analytical Stage	59
Chapter 5	One- vs Two-phase Extraction: Re-evaluation of Sample Preparation Procedures for Untargeted Lipidomics in plasma samples	85
Chapter 6	Accumulation of 5-Oxoproline in Myocardial Dysfunction and the Protective Effects of OPLAH	125
Chapter 7	LC-MS Analysis of Key Components of the γ -Glutamyl Cycle in Tissues and Body Fluids from Mice with Myocardial Infarction	175
Chapter 8	Summary and Future Perspectives, Nederlandse Samenvatting	193 199
Appendices	List of publications	206
	Acknowledgments	207

