

University of Groningen

Correlative microscopy reveals abnormalities in type 1 diabetes

de Boer, Pascal

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):

de Boer, P. (2018). Correlative microscopy reveals abnormalities in type 1 diabetes [Groningen]: 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.

Correlative microscopy reveals abnormalities in type 1 diabetes

Pascal de Boer

2018

The research in this thesis was performed at the department of cell biology of the University Medical Center Groningen.

This PhD project was financially supported by *Stichting Techniek en Wetenschappen* (STW) as part of the Microscopy Valley project (12718)



Correlative microscopy reveals abnormalities in type 1 diabetes

Pascal de Boer

ISBN: 978-94-6295-875-3

Printing of this thesis was generously supported by:
Graduate School of Medical Sciences (GSMS) at the University of Groningen
University Medical Center Groningen
University of Groningen



Printed and published by: ProefschriftMaken || www.proefschriftmaken.nl

Cover design: ProefschriftMaken || www.proefschriftmaken.nl

Cover: "Birth of an insulin granule"

Lay-out: Pascal de Boer



rijksuniversiteit
groningen

Correlative microscopy reveals abnormalities in type 1 diabetes

Proefschrift

ter verkrijging van de graad aan de
Rijksuniversiteit Groningen
op gezag van de
rector magnificus prof. dr. E. Sterken
en volgens besluit van het College voor Promoties

De openbare verdediging zal plaatsvinden op

woensdag 4 april 2018 om 16:15 uur

door

Pascal de Boer

geboren op 28 december 1988
te Leeuwarden

Promotor

Prof. dr. O.C.M. Sibon

Copromotor

Dr. B.N.G. Giepmans

Beoordelingscommissie

Prof. dr. H.C. Gerritsen

Prof. dr. J.L. Hillebrands

Prof. dr. E.A.J. Reits

Contents

Chapter 1

General introduction and thesis outline	9
---	---

Chapter 2

Correlated light and electron microscopy: ultrastructure lights up!	15
---	----

Pascal de Boer, Jacob P. Hoogenboom, Ben N.G. Giepmans

Nature Methods (2015) 12(6): 503-513

Chapter 3

Scanning EM of non-heavy metal stained biosamples: large-field of view, high contrast and highly efficient immunolabeling	43
---	----

Pascal de Boer[#], Jeroen Kuipers[#], Ben N.G. Giepmans - # equal authorship

Experimental Cell Research (2015) 337(2): 202-207

Chapter 4 - Electron beam induced colorEM	55
--	----

Chapter 4a

Nanodiamonds as multi-purpose labels for microscopy	55
---	----

P. de Boer[#], S.R. Hemelaar[#], M. Chipaux, W. Zuidema, T. Hamoh, F. Perona Martinez, A. Nagl, J.P. Hoogenboom, B.N.G. Giepmans and R. Schirhagl - # equal authorship

Scientific Reports (2017) 7(1): 720-729

Chapter 4b

Multi-color electron microscopy by element-guided identification of cells, organelles and molecules	71
---	----

Marijke Scotuzzi[#], Jeroen Kuipers[#], Dasha I. Wensveen[#], Pascal de Boer, Kees (C.)W. Hagen, Jacob P. Hoogenboom[#] and Ben N.G. Giepmans[#] - # equal authorship

Scientific Reports (2017) 7;7:45970. doi: 10.1038/srep45970

Chapter 5 - Advanced microscopy implementation in type 1 diabetes research	93
Chapter 5a	
Large-scale digital electron microscopy resource for human type 1 diabetes	93
Pascal de Boer [#] , Nicole M. Pirozzi [#] , Anouk H.G. Wolters, Jeroen Kuipers, Irina Kusmartseva, Martha Campbell-Thompson and Ben N.G. Giepmans - # equal contribution	
<i>Manuscript submitted</i>	
Chapter 5b	
Exocrine pancreas cell lysates specifically evoke beta cell stress	115
Pascal de Boer, B.H. Peter Duinkerken, Marlinda Everaars and Ben N.G. Giepmans	
<i>Work in progress</i>	
Chapter 6	
Summary, general discussion and perspectives	125
Appendix	
Nederlandse samenvatting	133
Dankwoord	139
About the author	140

