



Universiteit
Leiden
The Netherlands

Investigating metabolic disease in human induced pluripotent stem cells : apidocyte size, insulin signaling and hepatic lipids

Friesen, M.

Citation

Friesen, M. (2018, September 5). *Investigating metabolic disease in human induced pluripotent stem cells : apidocyte size, insulin signaling and hepatic lipids*. Retrieved from <https://hdl.handle.net/1887/64936>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/64936>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/64936> holds various files of this Leiden University dissertation.

Author: Friesen, M.

Title: Investigating metabolic disease in human induced pluripotent stem cells : apidocyte size, insulin signaling and hepatic lipids

Issue Date: 2018-09-05

INVESTIGATING METABOLIC DISEASE IN HUMAN INDUCED PLURIPOTENT STEM CELLS

ADIPOCYTE SIZE, INSULIN SIGNALING AND HEPATIC LIPIDS

Max Friesen

Max Friesen

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

ISBN: 978-90-9031124-1

INVESTIGATING METABOLIC DISEASE IN HUMAN INDUCED PLURIPOTENT STEM CELLS

ADIPOCYTE SIZE, INSULIN SIGNALING AND HEPATIC LIPIDS

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 5 september 2018
klokke 16:15 uur

door

Max Friesen
geboren te Wessem in 1988

Promotores:

Prof dr. C.L. Mummery
Prof dr. C. Cowan (Harvard Stem Cell Institute Cambridge, USA)

Promotiecommissie:

Prof dr. R.C. Hoeben
Prof dr. P. Slagboom
Prof dr. E.J.P de Koning
Prof dr. B. van de Water
Prof dr. D.F.E. Huylebroeck (Erasmus MC Rotterdam)

Contents

Chapter I

Introduction

4

Chapter II

FPLD2 *LMNA* mutation R482W dysregulates iPSC-derived adipocyte function and metabolism

Published 2018 in Biochemical and Biophysical Research Communications

Max Friesen, Chad A. Cowan

22

Chapter III

Adipocyte insulin receptor activity maintains adipose tissue mass and lifespan

Published 2016 in Biochemical and Biophysical Research Communications

Max Friesen, Carolyn S. Hudak, Curtis R. Warren, Fang Xia, Chad A. Cowan

30

Chapter IV

Activation of IRF1 in human adipocytes leads to phenotypes associated with metabolic disease

Published 2017 in Stem Cell Reports

Max Friesen*, Raymond Camahort*, Youn-Kyoung Lee*, Fang Xia, Robert E. Gerszten, Eugene P. Rhee, Rahul C. Deo, Chad A. Cowan

*These authors contributed equally to this work

37

Chapter V

Asialoglycoprotein receptor 1 is a specific cell-surface marker for isolating hepatocytes derived from human pluripotent stem cells

Published 2016 in Development

Derek T. Peters*, Christopher A. Henderson*, Curtis R. Warren*, Max Friesen, Fang Xia, Caroline E. Becker, Kiran Musunuru, Chad A. Cowan

*These authors contributed equally to this work

54

Chapter VI

Induced pluripotent stem cell differentiation enables functional validation of GWAS variants in metabolic disease

Published 2017 in Cell Stem Cell

Curtis R. Warren, John F. O'Sullivan, Max Friesen, Caroline E. Becker, Xiaoling Zhang, Poching Liu, Yoshiyuki Wakabayashi, Jordan E. Morningstar, Xu Shi, Jihoon Choi, Fang Xia, Derek T. Peters, Mary H.C. Florido, Alexander M. Tsankov, Eilene Duberow, Lauren Comisar, Jennifer Shay, Xin Jiang, Alexander Meissner, Kiran Musunuru, Sekar Kathiresan, Laurence Daheron, Jun Zhu, Robert E. Gerszten, Rahul C. Deo, Ramachandran S. Vasan, Christopher J. O'Donnell, Chad A. Cowan

71

Chapter VII

Discussion

109