



Universiteit
Leiden

The Netherlands

Unraveling the genetic architecture of migraine: exploring the vascular components

Boer, I. de

Citation

Boer, I. de. (2025, June 12). *Unraveling the genetic architecture of migraine: exploring the vascular components*. Retrieved from <https://hdl.handle.net/1887/4248759>

Version: Publisher's Version

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

Downloaded from: <https://hdl.handle.net/1887/4248759>

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

Unraveling the genetic architecture of migraine: exploring the vascular components

Irene de Boer

Unraveling the genetic architecture of migraine: exploring the vascular components

PhD thesis, Leiden University, Leiden, The Netherlands, 2025

© Irene de Boer, 2025

ISBN: 978-94-6473-780-6

Cover design: Irene de Boer

Layout: Douwe Oppewal

Printing: Ipskamp Printing, Enschede

Copyright of published material in chapters 1, 2, 3, 4, 6, 7, 8, 9, 10, 13 and 14 lies with the publisher of the journal listed at the beginning of each chapter. No part of this thesis may be reproduced in any form, by print, photocopy, digital file, internet or any other means without prior written permission of the copyright holder.

The research presented in this thesis was supported by grants of the Dutch Heart Foundation (2020T065), Stichting Dioraphte (20010407), the International Retinal Research Foundation and the Clayco Foundation. The funding agencies had no role in the design or conduct of the studies.

Financial support for publication of this thesis has been provided by the Dutch Headache Society and was gratefully accepted.

Unraveling the genetic architecture of migraine: exploring the vascular components

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr.ir. H. Bijl,
volgens besluit van het college voor promoties
te verdedigen op donderdag 12 juni 2025
klokke 11:30 uur

door

Irene de Boer

Promotores

Prof. dr. G.M. Terwindt
Prof. dr. A.M.J.M. van den Maagdenberg

Copromotor

Dr. I.C. Notting

Promotiecommissie

Prof. dr. S.M. van der Maarel	
Prof. dr. C.J.F. Boon	<i>Universiteit van Amsterdam</i>
Prof. dr. C.J.M. Klijn	<i>Radboud Universiteit</i>
Prof. dr. R.H. Jensen	<i>University of Copenhagen</i>

Contents

Chapter 1.	General introduction	9
 Part I: Migraine – insights into genetics, epigenetics, comorbidities, and monogenic factors		
Chapter 2.	Genetics of migraine aura: an update <i>J Headache Pain 2020;21:64.</i>	41
Chapter 3.	Alterations in DNA methylation associate with reduced 1 migraine and headache days after medication withdrawal treatment in chronic migraine patients: a longitudinal study <i>Clin Epigenetics 2023;15:190.</i>	63
Chapter 4.	Neurological and psychiatric comorbidities of migraine: Concepts and future perspectives <i>Cephalalgia 2023;43:3331024231180564.</i>	85
Chapter 5.	Effectiveness of acute and preventive migraine treatment in rare migraine syndromes. <i>Submitted</i>	111
 Part II: Monogenic small vessel diseases – understanding vascular migraine models		
Chapter 6.	The potential danger of blocking CGRP for treating migraine in CADASIL patients <i>Cephalalgia. 2020;40:1676-1678.</i>	133
Chapter 7.	RVCL-S and CADASIL display distinct impaired vascular function <i>Neurology. 2018 Sep 4;91(10):e956-e963.</i>	139
Chapter 8.	Optical coherence tomography detects retinal changes in hereditary cerebral amyloid angiopathy <i>Eur J Neurol. 2020;27:2635-2640.</i>	155

Chapter 9.	Spectral Domain Optical Coherence Tomography in Retinal Vasculopathy With Cerebral Leukoencephalopathy and Systemic Manifestations: A Monogenic Small Vessel Disease <i>J Neuroophthalmol 2022;42:e130-e136.</i>	167
Chapter 10.	Optical coherence tomography angiography biomarkers of microvascular alterations in RVCL-S <i>Front Neurol. 2022;13:989536.</i>	181
Chapter 11.	Retinal oxygen saturation in patients with Retinal Vasculopathy with Cerebral Leukoencephalopathy and Systemic manifestations. <i>Submitted</i>	195
Chapter 12.	Neuropsychiatric and MRI findings in TREX1 mutation carriers: lessons from a small vessel disease. <i>Manuscript in preparation</i>	211
Part III:	Equality in headache research – tackling career barriers and harassment	
Chapter 13.	Perceived barriers to career progression in the headache field: A global web-based cross-sectional survey <i>Cephalalgia 2022;42:1498-1509.</i>	233
Chapter 14.	Harassment in the headache field: a global web-based cross-sectional survey <i>Cephalalgia 2023;43:3331024231193099.</i>	265
Chapter 15.	General discussion	285
Addendum	Summary	318
	Nederlandse samenvatting	325
	List of abbreviations	332
	List of publications	336
	Curriculum vitae	340
	Dankwoord	341