

University of Groningen

Viral neuroinvasion

Sips, George

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:
2014

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

Citation for published version (APA):

Sips, G. (2014). *Viral neuroinvasion: causes, mechanisms and potential consequences*. 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).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

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.

Viral Neuroinvasion

Causes, Mechanisms and Potential Consequences

Gregorius Johannes Sips

The work described in this thesis was conducted at the University Medical Center Groningen, Mount Sinai Medical Center and Mount Sinai School of Medicine (New York, NY, USA), and the Johns Hopkins Bloomberg School of Public Health and Johns Hopkins University School of Medicine (Baltimore, MD, USA).

The work was supported by the Junior Scientific Masterclass, the Graduate School of Medical Sciences, the Research School of Behavioural and Cognitive Neurosciences, and the Groningen University Institute for Drug Exploration of the University of Groningen and the University Medical Center Groningen. It was also supported by the Marco Polo Fund, the Groningen University Fund, and the Jan Kornelis de Cock Foundation

The printing of this thesis was supported by the University of Groningen, Graduate School of Medical Sciences of the University of Groningen and University Medical Center Groningen, GlaxoSmithKline, Mymetics BV, Sanofi Pasteur MSD, and Teva Nederland BV.



Artwork on the cover and preceding the thesis sections: Marijke Jansen,
www.marijkejansenphotoart.nl

Lay-out: Ton van der Marck,
www.tonvdmarck.nl

Printed by: NetzoDruk Groningen B.V.

ISBN: 978-90-367-7094-1 (printed version)
978-90-367-7093-4 (electronic version)

Copyright © 2014 Gregorius Johannes Sips

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/or, when appropriate, the artist responsible for the artwork or publisher holding the copyrights of the published articles.



rijksuniversiteit
groningen

Viral neuroinvasion

Causes, mechanisms and potential consequences

Proefschrift

ter verkrijging van de graad van doctor 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 2 juli 2014 om 14.30 uur

door

Gregorius Johannes Sips

geboren op 30 december 1981
te Rotterdam

Promotor

Prof. dr. J.C. Wilschut

Beoordelingscommissie

Prof. dr. H.W.G.M. Boddeke

Prof. dr. J.M.D. Galama

Prof. dr. A.D.M.E. Osterhaus

Paranimfen

Robert-Jan Sips

Júlia Maria da Silva Voorham

DE WATERLELIE

Ik heb de witte water-lelie lief,
daar die zoo blank is en zoo stil haar kroon
uitplooit in 't licht.

Rijzend uit donker-koelen vijvergrond,
heeft zij het licht gevonden en ontsloot
toen blij het gouden hart.

Nu rust zij peinzend op het watervlak
En wenscht niet meer....

Frederik van Eeden

*Uit: Van de Passielooze Lelie.
Verzen door Frederik van Eeden,
waarbij zijn opgenomen de
“Enkele Verzen”.*

Amsterdam, W. Versluys, 1901

To my family and friends

Table of Contents

CHAPTER 1	13
<i>Introduction</i>	
CHAPTER 2	41
<i>Involvement of morbilliviruses in the pathogenesis of demyelinating disease</i>	
<i>Sips GJ, Chesik D, Glazenburg L, Wilschut J, De Keyser J, Wilczak N</i>	
<i>Reviews in Medical Virology 2007;17:223-244</i>	
CHAPTER 3	79
<i>Neuroinvasive flavivirus infections</i>	
<i>Sips GJ, Wilschut J, Smit JM</i>	
<i>Reviews in Medical Virology 2012;22:69-87</i>	
CHAPTER 4	113
<i>Central nervous system complications of highly prevalent respiratory viruses</i>	
<i>Sips GJ, Klein HC, Griffin DE, Wilschut J</i>	
<i>Manuscript in preparation</i>	
CHAPTER 5	151
<i>Interaction of influenza A/H1N1pdm virus with human neuronal and ocular cells</i>	
<i>Sips GJ, Pekosz A, Huckriede A, Griffin DE, Wilschut JC</i>	
<i>Virology & Mycology 2013;S2:001 DOI: 10.4172/2161-0517.S2-001</i>	
CHAPTER 6	171
<i>Interaction of influenza A/H1N1pdm virus with human nasal mucosa tissue explants</i>	
<i>Sips GJ, Ishizuka K, Pekosz A, Klein HC, Griffin DE, Sawa A, Wilschut J</i>	
<i>Manuscript in preparation</i>	
CHAPTER 7	189
<i>Inflammatory pseudotumor associated with HIV, JCV, and immune reconstitution syndrome</i>	
<i>Gonzalez-Duarte A, Sullivan S, Sips GJ, Naidich T, Kleinman G, Murray J,</i>	
<i>Morgello S, Germano I, Mullen M, Simpson D</i>	
<i>Neurology 2009;72:289-290</i>	
CHAPTER 8	199
<i>Intravascular lymphomatosis of the brain in a patient with myelodysplastic syndrome</i>	
<i>Sips GJ, Amory CF, Delman BN, Kleinman GM, Lipsey LR, Tuhrim S</i>	
<i>Nature Reviews Neurology 2009;5:288-292</i>	
CHAPTER 9	215
<i>General Discussion</i>	
ANNEX	235
<i>Summary</i>	235
<i>Samenvatting</i>	241
<i>Acknowledgements</i>	247
<i>Curriculum Vitae</i>	251