University of Groningen

Renal Sympathetic Denervation

Hoogerwaard, Annemiek F.

DOI:
[10.33612/diss.157272672](https://doi.org/10.33612/diss.157272672)

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:
2021

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

Citation for published version (APA):

Hoogerwaard, A. F. (2021). *Renal Sympathetic Denervation: From acute renal nerve stimulation induced hemodynamic changes to long-term clinical perspectives*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen. <https://doi.org/10.33612/diss.157272672>

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.

RENAL SYMPATHETIC DENERVATION

From acute renal nerve stimulation induced
hemodynamic changes to long-term clinical perspectives

Annemiek Hoogerwaard

Colofon

Annemiek Hoogerwaard

Cover illustration

Koby Feldmos

Cover lay-out

Optima Grafische Communicatie

Lay-out and printing

Optima Grafische Communicatie

ISBN:

978-94-6361-511-2

Financial support by the Dutch Heart Foundation for the publication of this thesis is gratefully acknowledged.

rijksuniversiteit
 groningen

Renal sympathetic denervation

From acute renal nerve stimulation induced hemodynamic
 changes to long-term clinical perspectives

Proefschrift

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

De openbare verdediging zal plaatsvinden op
 woensdag 17 februari 2021 om 14.30 uur

door

Anna Francina Hoogerwaard

geboren op 28 mei 1991
 te Putten

Promotores

Prof. dr. M. Rienstra

Prof. dr. I.C. van Gelder

Copromotor

Dr. A. Elvan

Beoordelingscommissie

Prof. dr. R.A. de Boer

Prof. dr. S.E. Kjeldsen

Prof. dr. R.T. Gansevoort

TABLE OF CONTENTS

CHAPTER 1	General introduction and outline of the thesis	7
Part I: Renal nerve stimulation induced cardiovascular effects underlying renal sympathetic denervation		
CHAPTER 2	Changes in arterial pressure hemodynamics in response to renal nerve stimulation both before and after renal denervation <i>Clin Res Cardiol. 2018 Dec; 107(12):1131-1138</i>	25
CHAPTER 3	Renal sympathetic denervation induces changes in heart rate variability and is associated with a lower sympathetic tone <i>Clin Res Cardiol. 2019 Jan; 108(1):22-30</i>	41
Part II: Blood pressure lowering effects of renal sympathetic denervation		
CHAPTER 4	Renal Nerve Stimulation: complete versus incomplete renal sympathetic denervation <i>Submitted</i>	59
CHAPTER 5	Renal vascular calcification and response to renal nerve denervation in resistant hypertension <i>Medicine. 2017 Apr; 96(17):e6611</i>	77
Part III: Future perspectives of renal sympathetic denervation in cardiovascular disease		
CHAPTER 6	Is renal denervation still a treatment option in cardiovascular disease? <i>Trends Cardiovasc Med. 2020 May; 30(4):189-195</i>	91
CHAPTER 7	Treatment of atrial fibrillation in patients with enhanced sympathetic tone by pulmonary vein isolation or pulmonary vein isolation and renal artery denervation: clinical background and study design: The ASAF Trial: Ablation of Sympathetic Atrial Fibrillation <i>Clin Res Cardiol. 2018 July;107(7):539-547.</i>	111
CHAPTER 8	Summary, general discussion, future perspectives, and conclusion	129
CHAPTER 9	Nederlandse samenvatting	141
APPENDIX		149
	List of publications	151
	Acknowledgments	155
	Curriculum Vitae	161