

# **The long-term side effects of postoperative radiation therapy in pituitary adenoma patients**

**Margriet G.A. Sattler**

**Cover:** Schilderij "De Beslissing" (2003) - Linda Corine Meiners.

"Soms moeten in het leven beslissingen genomen worden die bijna niet te nemen zijn. Ondanks dat er zwaarwegende argumenten zijn, die op de korte steile kant van een asymmetrische schaal liggen, houden lichtwegende argumenten op het uiteinde van de lange kant, de schaal in evenwicht, waardoor er geen beslissing genomen kan worden".

**Layout and printed by:** Gildeprint - Enschede

**Financial support for printing of this dissertation was kindly provided by:**

Afdeling Radiotherapie Universitair Medisch Centrum Groningen, Goodlife Healthcare B.V., Elekta B.V., Ipsen Farmaceutica B.V., Pfizer B.V., Universitair Medisch Centrum Groningen, Graduate School of Medical Sciences, Rijksuniversiteit Groningen and ABN AMRO Bank N.V.

**ISBN:** 978-90-367-7697-4 (book)

**ISBN:** 978-90-367-7696-7 (e-book)

© 2015 Margriet G.A. Sattler, Groningen, The Netherlands

All rights reserved. No part of this dissertation may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without prior permission of the author, or when appropriate, of the publishers of the published articles.



rijksuniversiteit  
groningen

## The long-term side effects of postoperative radiation therapy in pituitary adenoma patients

### 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 27 mei 2015 om 12.45 uur

door

**Grietje Annette Sattler**  
geboren  
te Groningen

**Promotores**

Prof. dr. J.A. Langendijk  
Prof. dr. B.H.R. Wolffentbuttel

**Copromotores**

Dr. A.C.M. van den Bergh  
Dr. A.P. van Beek

**Beoordelingscommissie**

Prof. dr. A.M. Pereira  
Prof. dr. R.J.M. Groen  
Prof. dr. J.P. Pignol

## **CONTENTS**

<b>Chapter 1</b>	General introduction	7
<b>Chapter 2</b>	The incidence of second tumors and mortality in pituitary adenoma patients treated with postoperative radiotherapy versus surgery alone	31
<b>Chapter 3</b>	Incidence, causative mechanisms, and anatomic localization of stroke in pituitary adenoma patients treated with postoperative radiation therapy versus surgery alone	51
<b>Chapter 4</b>	Brain abnormalities on MRI in non-functioning pituitary adenoma patients treated with or without postoperative radiotherapy	69
<b>Chapter 5</b>	Cognitive performance after postoperative pituitary radiotherapy: a dosimetric study of the hippocampus and the prefrontal cortex	85
<b>Chapter 6</b>	Sexual functioning in pituitary adenoma patients treated with postoperative radiation therapy versus surgery alone	103
<b>Chapter 7</b>	Letter to the Editor The role of radiotherapy in the treatment of non-functioning pituitary adenomas	121
<b>Chapter 8</b>	General discussion	127
<b>Appendices</b>		
	Summary and conclusions	143
	Samenvatting en conclusies	149
	List of abbreviations	156
	Curriculum vitae	159
	Publications and presentations	161
	Dankwoord	163