

University of Groningen

## Preclinical molecular imaging to study the biodistribution of antibody derivatives in oncology

Warnders, Jan Feije

**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:*

2018

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

*Citation for published version (APA):*

Warnders, J. F. (2018). *Preclinical molecular imaging to study the biodistribution of antibody derivatives in oncology*. Rijksuniversiteit Groningen.

### 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).

### 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.*

**Preclinical molecular imaging to study the  
biodistribution of antibody derivatives in oncology**

**Frank-Jan Warnders**

Warnders, F.J.

**Preclinical molecular imaging to study the biodistribution of antibody derivatives in oncology**

Thesis, University of Groningen, Groningen, The Netherlands

© Frank-Jan Warnders, 2018

Copyright of the published articles is with the corresponding journal or otherwise with the author. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission in writing from the author or the copyright-owning journal.

**Cover** Remco Wetzels

**Layout** Maroesja Swart-Nijhuis | Puur\*M

**Printed by** Gildeprint

The research in this thesis is financially supported by European Research Council (ERC) Advanced grant OnQview, Dutch Cancer Society grant (RUG 2010 4739), Center for Translational Molecular Medicine grant (MAMMOTH), Amgen and Merck Biopharma.

Publication of this thesis was financially supported by the department of Clinical Pharmacy and Pharmacologie of the University Medical Center Groningen, Ziekenhuisgroep Twente, University of Groningen, Graduate School of Medical Sciences and the University Medical Center Groningen.



rijksuniversiteit  
groningen

# **Preclinical molecular imaging to study the biodistribution of antibody derivatives in oncology**

## **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 04 juli 2018 om 14.30 uur

door

**Jan Feije Warnders**

geboren op 27 maart 1985  
te Assen

**Promotores**

Prof. dr. J.G.W. Kosterink

Prof. dr. E.G.E. de Vries

**Copromotor**

Dr. M.N. Lub – de Hooge

**Beoordelingscommissie**

Prof. dr. N.H. Hendrikse

Prof. dr. P.H. Elsinga

Prof. dr. J.A. Gietema





# Contents

<b>Chapter 1</b>	<b>9</b>
General introduction	
<b>Chapter 2</b>	<b>19</b>
Influence of protein properties and protein modification on biodistribution and tumor uptake of anticancer antibodies, antibody derivatives and non-Ig scaffolds. <i>Med Res Rev. 2018 [Epub ahead of print]</i>	
<b>Chapter 3</b>	<b>71</b>
Rapid optical imaging of human breast tumour xenografts using anti-HER2 VHHs site-directly conjugated to IRDye 800CW for image-guided surgery. <i>Eur J Nucl Med Mol Imaging. 2013;40(11):1718-29</i>	
<b>Chapter 4</b>	<b>99</b>
HER3-specific tumor uptake and biodistribution of <sup>89</sup> Zr-MSB0010853 visualized by real-time and non-invasive PET imaging. <i>J Nucl Med. 2017;58(8):1210-1215</i>	
<b>Chapter 5</b>	<b>117</b>
Biodistribution and PET imaging of labeled bispecific T cell-engaging antibody targeting EpCAM. <i>J Nucl Med. 2016;57(5):812-7.</i>	
<b>Chapter 6</b>	<b>143</b>
Molecular imaging of radiolabeled bispecific T-cell engager <sup>89</sup> Zr-AMG211 targeting CEA-positive tumors. <i>Submitted</i>	
<b>Chapter 7</b>	<b>167</b>
General discussion and future perspectives	
<b>Chapter 8</b>	<b>173</b>
Summary	
<b>Chapter 9</b>	<b>179</b>
Nederlandse samenvatting	
Dankwoord	<b>186</b>
About the author	<b>190</b>



