



Universiteit
Leiden
The Netherlands

Near-infrared image guidance in cancer surgery

Schaafsma, B.E.

Citation

Schaafsma, B. E. (2017, April 19). *Near-infrared image guidance in cancer surgery*. Retrieved from <https://hdl.handle.net/1887/48097>

Version: Not Applicable (or Unknown)

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

Downloaded from: <https://hdl.handle.net/1887/48097>

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

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/48097> holds various files of this Leiden University dissertation.

Author: Schaafsma , B.E.

Title: Near-infrared image guidance in cancer surgery

Issue Date: 2017-04-19

Near-Infrared Image Guidance in Cancer Surgery

B.E. Schaafsma

© B.E. Schaafsma 2017
ISBN/EAN: 978-94-6332-163-1

Printed by: GVO drukkers & vormgevers B.V. | Ponsen & Looijen, Ede

The research described in this thesis was financially supported by the Dutch Cancer Society (UL 2010-4732), the Center for Translational Molecular Medicine (CTMM, DeCoDe and MUSIS projects).

Financial support by Karl Storz, ChipSoft, Guerbet, Zeiss, Applied Medical, ERBE, TEVA farmachemie, ARA, Olympus, Bontius stichting, Pfizer, Sysmex, Nederlandse Vereniging voor Gastroenterologie for the printing of this thesis is gratefully acknowledged.

Near-Infrared Image Guidance in Cancer Surgery

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden
op gezag van de Rector Magnificus prof. mr C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op woensdag 19 april 2017
klokke 16.15 uur

door

Boudewijn Ewout Schaafsma

geboren te Leiden in 1985

Promotor: Prof. dr. C.J.H. van de Velde
Co-promotor: Dr. A.L. Vahrmeijer

Leden promotiecommissie:

Prof. dr. ir. B.P.F. Lelieveldt
Prof. dr. C.W.G.M. Löwik (Erasmus Universiteit)
Prof. dr. G.L. Beets (Antoni van Leeuwenhoek)
Prof. dr. V.T.H.B.M. Smit
Prof. dr. L.F. de Geus-Oei

Contents

Chapter 1.	The clinical use of near-infrared fluorescence imaging for image-guided oncologic procedure or treatment evaluation	7
------------	---	---

Part I: Clinical translation of image-guided surgery in sentinel lymph node mapping

Chapter 2.	Near-infrared fluorescence sentinel lymph node biopsy in vulvar cancer: a randomized comparison of lymphatic tracers	27
Chapter 3.	Randomized comparison of near-infrared fluorescence lymphatic tracers for sentinel lymph node mapping of cervical cancer	39
Chapter 4.	Combined radio- and fluorescence-guided sentinel lymph node biopsy in breast cancer	51
Chapter 5.	Ex vivo sentinel node mapping in colon cancer combining blue dye staining and fluorescence imaging	65

Part II: Clinical translation of optical tumor imaging

Chapter 6.	Optical mammography using diffuse optical spectroscopy for monitoring tumor response to neoadjuvant chemotherapy in women with locally advanced breast cancer	79
Chapter 7.	Near-infrared fluorescence-guided resection of otherwise undetectable colorectal cancer metastases in liver	97

Summary

Chapter 8.	Summary and future perspectives	111
	Nederlandse samenvatting	119
	List of publications	125
	Curriculum vitae	129
	Dankwoord	131

