Nonlinear optical imaging as a diagnostic tool for cutaneous squamous cell carcinoma

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Citation for published version (APA):
Thomas, G. (2015). Nonlinear optical imaging as a diagnostic tool for cutaneous squamous cell carcinoma
INVITATION
To the public defense of
the PhD thesis
‘Nonlinear optical imaging as a diagnostic tool for cutaneous squamous cell carcinoma’
on Wednesday, January 14th 2015
at 13.00h
in the auditorium of
Aula - Gude Lutherse Kerk
Singel 411,
1012 XA Amsterdam,
The Netherlands
The reception afterwards will take place in the Tetterode Bibliotheek (Library) next to the auditorium
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Nonlinear optical imaging as a diagnostic tool for cutaneous squamous cell carcinoma

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This research was supported by the Dutch Technology Foundation STW, which is part of the Netherlands Organisation for Scientific Research (NWO) and partly funded by the Ministry of Economic Affairs (project: 10322)


Cover Illustration: Giju Thomas
The central image shows a transverse nonlinear optical scan taken from a skin tumour of 1 mm diameter in a hairless mouse. Laser beam background obtained freely from the online public domain www.wallpapers-xs.blogspot.com.

Layout: Legatron Electronic Publishing, Rotterdam

Printed by: Ipskamp Drukkers BV, Enschede

The publication of this thesis was further financially supported by the Dutch Technology Foundation STW and the department of Biomedical Engineering and Physics, Academic Medical Centre, Amsterdam

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ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnificus
prof. dr. D. C. van den Boom
ten overstaan van een door het College voor Promoties ingestelde commissie, in het openbaar te verdedigen in de Aula der Universiteit op woensdag 14 januari 2015, te 13.00 uur

door

Giju Thomas

geboren te Fujairah, Verenigde Arabische Emiraten
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Abbreviations used in this thesis

AK  actinic keratoses
AUC  area under curve
BSA  bovine serum albumin
cBCC  cutaneous basal cell carcinomas
cMM  cutaneous malignant melanomas
cSCC  cutaneous squamous cell carcinomas
CCD  charge coupled device
CHO  Chinese Hamster Ovary
cPJs  cyclobutane pyrimidine dimers
CSLM  confocal scanning laser microscopy
CT  computerised tomography
CW  continuous wave
DAB  3, 3’-dianomobenzidine
DAPI  4’, 6-diamidino-2-phenylindole
DMBA  7, 12-dimethylbenz(a)anthracene
dNA  deoxyribonucleic acid
DRS  diffuse reflectance spectroscopy
FAD  flavin adenine dinucleotide
EMCCD  electron multiplying charge coupled device
FPs  family practitioners
Fs  femtoscond
GPs  general practitioners
GW  gigawatt
H&E  haematoxylin and eosin
HFUS  high frequency ultrasound
HPV  human papilloma virus
LIFS  laser-induced fluorescence spectroscopy
MAF  multi-photon autofluorescence
MOPS  3-(N-morpholino) propanesulfonic acid
MPE  multi-photon excitation
MRI  magnetic resonance imaging
mW  milliwatt
NADH  nicotinamide adenine dinucleotide
NIR  near infrared
NLOI  nonlinear optical imaging
NLSI  nonlinear spectral imaging
nm  nanometre
NMSC  non-melanoma skin cancer
OCT  optical coherence tomography
PBS  phosphate buffered saline
PBS-T  phosphate buffered saline with 0.1% Tween.
PET  positron emission tomography
PHCCs  primary health care clinicians
PMT  photomultiplier tube
RGB  red, green and blue
SHG  second harmonic generation
THG  third harmonic generation
TPA  12-O-tetradecanoylphorbol-13-acetate
TPEF  two-photon excitation fluorescence
TW  terawatt
UV  ultraviolet
‘And God said, “Let there be light,” and there was light.

God saw that the light was good,
and He separated the light from the darkness.’

*Genesis 1: 3 – 4, The Holy Bible*

For my Mama and Papa
For Christ, my Saviour and Redeemer