



Universiteit
Leiden
The Netherlands

Advancements of interventional oncology treatments for early stage hepatocellular carcinoma

Hendriks, P.

Citation

Hendriks, P. (2024, September 5). *Advancements of interventional oncology treatments for early stage hepatocellular carcinoma*. Retrieved from <https://hdl.handle.net/1887/4082216>

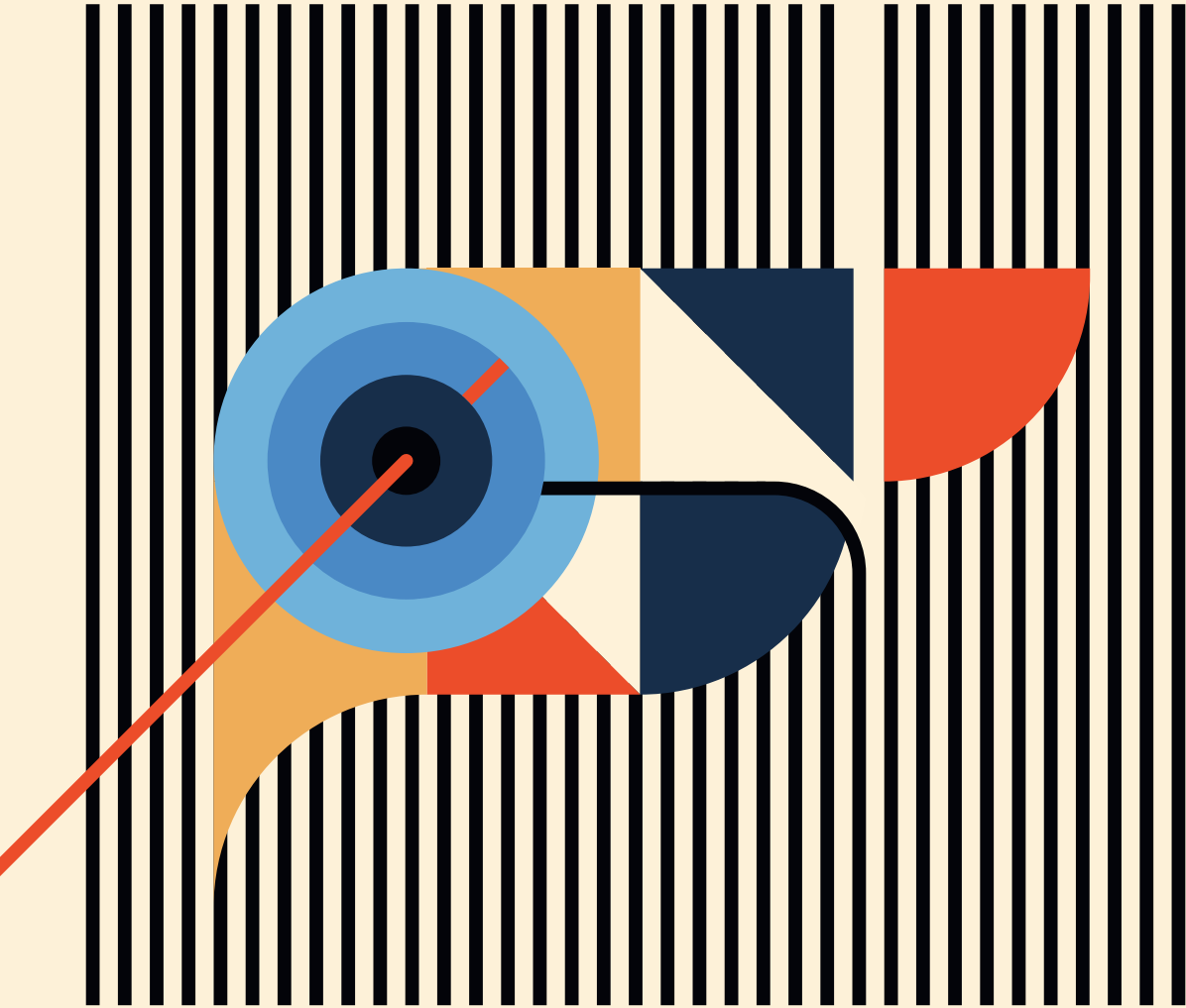
Version: Publisher's Version

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

Downloaded from: <https://hdl.handle.net/1887/4082216>

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

ADVANCEMENTS OF INTERVENTIONAL ONCOLOGY TREATMENTS FOR EARLY STAGE HEPATOCELLULAR CARCINOMA



Pim Hendriks

ADVANCEMENTS OF INTERVENTIONAL ONCOLOGY TREATMENTS FOR EARLY STAGE HEPATOCELLULAR CARCINOMA

Pim Hendriks

The clinical studies presented in this thesis were performed at the department of Radiology of the Leiden University Medical Center, Leiden, The Netherlands and financially supported by Health-Holland, Maag-Lever-Darm Stichting (MLDS), Quirem Medical B.V. and Medtronic, Inc.

Publication of this thesis was financially supported by the Dutch Society of Interventional Radiology (NVIR) and Philips.

Copyright © 2024 Pim Hendriks

All rights reserved. No part of this book may be reproduced in any form by any means, without prior permission of the author.

Cover design by: Stefan Prodanovic

Layout and design: Katie McGonigal | www.persoonlijkproefschrift.nl

Printing: Provided by thesis specialist Ridderprint | www.ridderprint.nl

ISBN: 978-94-6506-161-0

Advancements of interventional oncology treatments for early stage hepatocellular carcinoma

Proefschrift

ter verkrijging van

de graad van doctor aan de Universiteit Leiden,

op gezag van de rector magnificus prof.dr.ir. H. Bijl,

volgens besluit van het college voor promoties

te verdedigen op donderdag 5 september 2024

klokke 14.30 uur

door

Pim Hendriks

geboren te Vianen

in 1994

Promotores

Prof.dr. L.F. de Geus-Oei

Prof.dr. M.J. Coenraad

Co-promotor

dr. M.C. Burgmans

Leden promotiecommissie

Prof.dr. S. Osanto

Prof.dr. M.G.E.H. Lam University Medical Center Utrecht

Prof.dr. R. Bale Medical University of Innsbruck (A)

dr. C.G. Overduin Radboud University Medical Center, Nijmegen

Prof.dr. B. van Hoek

TABLE OF CONTENTS

Chapter 1	General introduction and outline of thesis	7
Part 1:	Thermal ablation: reproducibility and ablation margins	13
Chapter 2	Performance of the Emprint and Amica microwave ablation systems in ex-vivo porcine livers: sphericity and reproducibility versus size	15
Chapter 3	Ablation margin quantification after thermal ablation of malignant liver tumors: how to optimize the procedure? A systematic review of the available evidence.	29
Chapter 4	Quantitative volumetric assessment of ablative margins in hepatocellular carcinoma: Predicting local tumor progression using non-rigid registration software	61
Chapter 5	Intraprocedural assessment of ablation margins using computed tomography co-registration in hepatocellular carcinoma treatment with percutaneous ablation: IAMCOMPLETE study	77
Part 2:	Combined treatment regimens for early stage HCC	99
Chapter 6	Thermal ablation combined with transarterial chemoembolization for hepatocellular carcinoma: what is the right treatment sequence?	101
Chapter 7	Study protocol: Adjuvant holmium-166 radioembolization after radiofrequency ablation in early-stage hepatocellular carcinoma patients: a dose-finding study (HORA EST HCC trial)	121
Chapter 8	Adjuvant holmium-166 radioembolization after radiofrequency ablation in early-stage hepatocellular carcinoma patients: a dose-finding study (HORA EST HCC trial)	135
Part 3:	Radioembolization beyond early stage HCC	157
Chapter 9	Liver Decompensation as Late Complication in HCC Patients with Long-Term Response following Selective Internal Radiation Therapy	159
Chapter 10	Summary, general discussion and future perspectives	179
	Appendices:	193
	Nederlandstalige samenvatting	194
	Curriculum vitae	200
	List of publications	201
	Dankwoord	204

