



**Universiteit
Leiden**
The Netherlands

Biological evaluations of nanocarriers to improve the effectiveness of colorectal cancer treatment

Cabral De Sã Leitão Oliveira, A.L.

Citation

Cabral De Sã Leitão Oliveira, A. L. (2022, March 24). *Biological evaluations of nanocarriers to improve the effectiveness of colorectal cancer treatment*. Retrieved from <https://hdl.handle.net/1887/3280009>

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/1887/3280009>

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

BIOLOGICAL EVALUATIONS OF
NANOCARRIERS TO IMPROVE
THE EFFECTIVENESS OF
COLORECTAL CANCER TREATMENT

Ana Luiza Cabral de Sá Leitão Oliveira

Biological evaluations of nanocarriers to improve the effectiveness of colorectal cancer treatment

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr.ir. H. Bijl,
volgens besluit van het college voor promoties
te verdedigen op donderdag 24 maart 2022
klokke 16.15 uur

door
Ana Luiza Cabral de Sá L. Oliveira
Geboren te Natal, Brazilië
in 1989

PROMOTOR

Prof. Dr. LF de Geus-Oei

CO-PROMOTORES

Dr. LJ Cruz Ricondo

Dr. RF de Araújo Júnior, Federal University of Rio Grande do
Norte, Brazil

PROMOTIECOMMISSIE

Prof. Dr. FA Ossendorp

Dr. LH da Silva Gasparotto, Federal University of Rio Grande
do Norte, Brazil.

Dr. RF de Carvalho Leitão, Federal University of Ceara, Brazil.

Prof. Dr. P Di Martino, , University of Camerino, Italy

Dr. EL Kaijzel

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system of any nature, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, including a complete or partial transcription, without the prior written permission of the copyright owner.

ISBN: 978-94-6419-452-4

LAYOUT BY: Menora Tse

PRINTED BY: Gildeprint

COVER BY: Stefano van Bovene

This thesis was financially supported by: Chipsoft B.V., Percuros B.V., Leiden University Library.

TABLE OF CONTENTS

CHAPTER I	06
Introduction	
CHAPTER II	56
Cholesterol-functionalized carvedilol-loaded PLGA nanoparticles: anti-inflammatory, antioxidant, and antitumor effects	
CHAPTER III	90
Effect of Oxaliplatin-Loaded Poly (d,L-Lactide-co-Glycolic Acid) (PLGA) Nanoparticles Combined with Retinoic Acid and Cholesterol on Apoptosis, Drug Resistance, and Metastasis Factors of Colorectal Cancer	
CHAPTER IV	132
Maximizing the potency of oXaliplatin coated nanoparticles with folic acid for modulating tumor progression in colorectal cancer	
CHAPTER V	164
Summary, General discussion and Future Perspectives	
APPENDICES	184
Nederlandse samenvatting	
Portuguese Summary	
List of Abbreviations	
List of Publications	
Curriculum vitae	
Acknowledgements	