University of Groningen

Lung cancer assessment in CT scans: results from a Chinese dedicated cancer hospital

Cui, Xiaonan

DOI:
[10.33612/diss.178578428](https://doi.org/10.33612/diss.178578428)

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:
2021

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

Citation for published version (APA):
Cui, X. (2021). *Lung cancer assessment in CT scans: results from a Chinese dedicated cancer hospital*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.
<https://doi.org/10.33612/diss.178578428>

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).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

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.

**LUNG CANCER ASSESSMENT IN CT SCANS: RESULTS
FROM A CHINESE DEDICATED CANCER HOSPITAL**

Xiaonan Cui

COLOFON

Lung cancer assessment in CT scans: results from a Chinese dedicated cancer hospital, Xiaonan Cui

ISBN/EAN: 978-94-6419-251-3

Copyright © 2021 Xiaonan Cui

All rights reserved. No part of this thesis may be reproduced, stored or transmitted in any way or by any means without the prior permission of the author, or when applicable, of the publishers of the scientific papers.

Layout and cover design by Anna Bleeker, persoonlijkproefschrift.nl

Printing: Gildeprint Enschede, gildeprint.nl

Cover image: freepik.com

university of
 groningen

Lung cancer assessment in CT scans: results from a Chinese dedicated cancer hospital

PhD thesis

to obtain the degree of PhD at the
 University of Groningen
 on the authority of the
 Rector Magnificus Prof. C. Wijmenga
 and in accordance with
 the decision by the College of Deans.

This thesis will be defended in public on

Wednesday 29 September 2021 at 9.00 hours

by

Xiaonan Cui

born on 7 March 1988
 in Shanxi, China

Supervisors

Prof. R. Vliegenthart
Prof. M. Oudkerk
Prof. G.H. de Bock

Co-supervisor

Dr M.A. Heuvelmans

Assessment Committee

Prof. W. Timens
Prof. W.P.T.H.M. Mali
Prof. J. Aerts

TABLE OF CONTENTS

Introduction

1.	General Introduction and outline of the thesis	8

Part I –Lung cancer in the Chinese population

2.	Clinical characteristics and work-up of small-to-intermediate sized pulmonary nodules in a Chinese tertiary cancer hospital	16
3.	Lung cancers occurrence attributable to passive smoking among non-smokers in China: a systematic review	30
4.	Comparison of Veterans Affairs, Mayo, Brock classification models and radiologist diagnosis for classifying the malignancy of pulmonary nodules in Chinese clinical population	66

Part II –Optimization of lung nodule detection and classification

5.	A Sub-solid Nodules Imaging Reporting System (SSN-IRS) for classifying three subtypes of pulmonary adenocarcinoma	84
6.	A new CT window setting to diagnose the invasiveness of lung adenocarcinoma manifesting as a sub-solid nodule	108
7.	A contrast-enhanced-CT-based classification tree model for classifying malignancy of solid lung tumors in a Chinese clinical population	122
8.	Performance of a deep learning-based lung nodule detection system as an alternative reader in a Chinese lung cancer screening program	138

Part III – Discussion & Summary

9.	General discussion	158
10.	English summary	172
11.	Nederlandse samenvatting	176

Part IV – Appendix

12.	Acknowledgements	182
13.	Author affiliations	186
14.	Publications	190
15.	Curriculum Vitae	194