



Universiteit
Leiden

The Netherlands

How nutrients shape antibiotic sensitivity of *Pseudomonas aeruginosa*: food for thought

Kok, M.

Citation

Kok, M. (2026, January 20). *How nutrients shape antibiotic sensitivity of Pseudomonas aeruginosa: food for thought*. Retrieved from <https://hdl.handle.net/1887/4287725>

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/1887/4287725>

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

How nutrients shape antibiotic sensitivity in *Pseudomonas aeruginosa*

Food for thought

Cover design: Maik Kok

Thesis lay-out: Maik Kok

Printing: ProefschriftMaken

© Copyright, Maik Kok, 2026

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

How nutrients shape antibiotic sensitivity in *Pseudomonas aeruginosa*

Food for thought

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof. dr. S. de Rijcke,
volgens besluit van het college voor promoties
te verdedigen op dinsdag 20 januari 2026
klokke 16:15 uur

door

Maik Kok
geboren te Rotterdam, Nederland
in 1994

Promotores: Prof. dr. J.G.C. van Hasselt
Prof. dr. T. Hankemeier

Promotiecommissie: Prof. dr. M. van Eck
Prof. dr. E.C.M. de Lange
Prof. dr. C.A.J. Knibbe
Prof. dr. N.I. Martin
Prof. dr. O. Ciofu (University of Copenhagen)
Dr. R.S. Jansen (Radboud Universiteit)

The research described in this thesis was performed at the division Systems Pharmacology and Pharmacy of the Leiden Academic Centre for Drug Research (LACDR), Leiden University (Leiden, The Netherlands).

Table of contents

Section I	Introduction	
Chapter 1	General introduction and scope	10
Chapter 2	Nutrient-driven metabolic modulation of antibiotic efficacy in <i>Pseudomonas aeruginosa</i>	24
Section II	Nutrients shape antibiotic sensitivity	
Chapter 3	Nutrient conditions affect antimicrobial pharmacodynamics in <i>Pseudomonas aeruginosa</i>	54
Chapter 4	Prolonged anoxic exposure impacts antibiotic sensitivity profiles of <i>Pseudomonas aeruginosa</i>	84
Section III	Nutrients shape antibiotic resistance evolution	
Chapter 5	Unraveling antimicrobial resistance using metabolomics	106
Chapter 6	Nutrients drive the antibiotic-specific evolution of resistance in <i>Pseudomonas aeruginosa</i>	132
Section IV	Discussion and summary	
Chapter 7	General discussion, future perspectives, and overall conclusion	162
Chapter 8	Nederlandse samenvatting	182
Appendices		
	Curriculum vitae	206
	List of publications	207
	Acknowledgements	210