



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

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

License: <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

Appendices

Curriculum vitae

Maik Kok was born on 18 November 1994 in Rotterdam, the Netherlands. He completed secondary school at Penta Scala Molenwatering in 2013 and went on to study Bio-Pharmaceutical Sciences at Leiden University, earning his bachelor's degree in 2016. He then pursued the master's in Bio-Pharmaceutical Sciences at Leiden University.

His master's program began with a nine-month internship in the Division of Analytical Biosciences, now the Metabolomics and Analytics Center (MAC), at the Leiden Academic Centre for Drug Research (LACDR), supervised by Dr. Amy Harms and Dr. Cornelius Willacey. During this project, he developed a sensitive analytical method to quantify dopamine and related neurotransmitters in *in vitro* neuronal cells. He next completed a six-month internship at the Algemeen Klinisch Laboratorium of the Netherlands Cancer Institute in Amsterdam, supervised by Dr. Huub van Rossum and Dr. Lennart van Winden. There, he established a robust analytical method for estrogens that has since been implemented in clinical practice for the diagnosis and prognosis of HR-positive breast cancer. Maik graduated cum laude with his master's degree at the end of 2018.

In 2019, he started his PhD as part of a multidisciplinary project between the Division of Systems Pharmacology and Pharmacy and the Metabolomics and Analytics Center at LACDR, supervised by Prof. Dr. Coen van Hasselt and Prof. Dr. Thomas Hankemeier. His research focused on how nutrient environments shape the antibiotic pharmacodynamics of *Pseudomonas aeruginosa*. Alongside his research, his contributions to teaching and mentoring led to the award of the University Teaching Qualification during his PhD.

Maik currently works at ZonMw in The Hague as a program secretary, facilitating funding for research and innovation in health, healthcare, and well-being.

List of publications

Publications related to this thesis

Nutrients drive the antibiotic-specific evolution of resistance in *Pseudomonas aeruginosa*

Maik Kok, Laura Zwep, Thomas Hankemeier, J.G. Coen van Hasselt
Research in Microbiology, 2025, available ahead of print:104323

Prolonged anoxic exposure impacts antibiotic sensitivity profiles of *Pseudomonas aeruginosa*

Maik Kok, Wisse van Os, Thomas Hankemeier, J.G. Coen van Hasselt
FEMS Microbiology Letters, 2025, 372, fnaf066

Unraveling antimicrobial resistance using metabolomics

Maik Kok, Loes Maton, Marielle van der Peet, Thomas Hankemeier, J.G. Coen van Hasselt
Drug Discovery Today, 2022, 27(6), 1774-83

Nutrient conditions affect antimicrobial pharmacodynamics in *Pseudomonas aeruginosa*

Maik Kok, Thomas Hankemeier, J.G. Coen van Hasselt
Microbiology Spectrum, 2024, e01409-24

Nutrient-driven metabolic modulation of antibiotic efficacy in *Pseudomonas aeruginosa*

Maik Kok, Suruchi Nepal, J.G. Coen van Hasselt
In submission

Publications not relevant to this thesis

Simultaneous analysis of E1 and E2 by LC-MS/MS in healthy volunteers: estimation of reference intervals and comparison with a conventional E2 immunoassay

Lennart J. van Winden, **Maik Kok**, Manon Acda, Vincent Dezentje, Sabine Linn, Run-Zhang Shi, Huub H. van Rossum
Journal of Chromatography B, 2021, 1178, 122563

Posters and presentations

ECSMID Global – oral presentation

Barcelona, Spain

LACDR spring symposium 2024 – poster presentation

Leiden, The Netherlands

LACDR spring symposium 2023 – poster presentation

Leiden, The Netherlands

LACDR spring symposium 2022 – poster presentation

Leiden, The Netherlands

LACDR spring symposium 2021 – poster presentation

Online

Metabolomics 2019 – poster presentation

The Hague, The Netherlands

LACDR spring symposium 2019 – poster presentation

Leiden, The Netherlands

Acknowledgements

This thesis concludes a six-year journey during which I had the privilege to meet and work with many colleagues, collaborators, and friends. I enjoyed this time together and learned a great deal from everyone I crossed paths with. The energy everyone brought mattered more to me than you might think. Even if I come across as calm and down-to-earth, I'm very responsive to the atmosphere around me. Therefore, even if your name does not appear below, please know I truly appreciated every kind of support, whether during work or in an easy, uplifting conversation.

First, my sincere thanks to my promotor and daily supervisor, **Coen**. Your calm, steady guidance and open-door policy made a real difference. I felt that everything you did for me came from the heart. You inspired me scientifically by showing me the value of modelling, while at the same time you have been personal inspiration as a dedicated parent balancing a demanding job. I also thank my other promotor, **Thomas**, for the opportunity to broaden my scientific horizons. Our conversations kept me looking ahead and reinforced that pursuing a clear vision is how real progress is made. To both of you, thank you for giving me the room to explore so many facets of this field and to set the direction of my own work.

I want to extend my gratitude to my colleagues in the divisions I worked in during this period. Your help was invaluable and beyond words. You are all caring people with a real passion for science. Among many I could name, I thank my former office mate **Laura** for your calm and clear explanations, even when I was just starting to code and interrupting you with the simplest questions while you were finishing your PhD. I am especially grateful to **Anh Duc** for opening the door to modelling and for broadening my world with an impressive range of exotic snacks. My deep thanks also go to **Sebastian** for your clear-eyed, practical guidance in both modelling and the wet lab. Your perseverance and work ethic were truly inspirational, even at those moments when we literally started to flip incubators. Speaking of lab hardware, **Jorn**, I cannot overstate how much I appreciate your dedication to fixing malfunctioning machines and, of course, also your hands-on help in the experiments. For helping me get started with microbiological cell culture, I'm grateful to **Angie**, whose large-scale, hands-on experiment setups were inspiring. I'm thankful to **Mathew** for staying beside me through so many starts, failures, and eventual successes. Beyond the work itself, this journey was shaped by countless walks to coffee machines, interesting lunch conversations, and the fun of drinks and lab outings. Thank you **Cathi, Yuchen, Helle, Marinda**, and all the master interns for helping me grow both scientifically and personally. I count myself fortunate that **Marije** joined me in the office toward the end of my PhD with her sharp, realistic perspective, and that the new division lineup also brought more good vibes with **Laurens, Laura, and Vasilii**.

When I thank my colleagues, I cannot skip my two incredible paranymphs. It has truly been a privilege to share my PhD journey with two scientists of such strength and character. **Annika**, we started our first big experiment at the same time, and we faced our share of setbacks along the way. Through every practical step, analysis and writing, your insight and persistence pulled me through. Your perseverance showed again that morning when we helped you through pregnancy nausea in the apartment in Barcelona, and a few hours later you gave an impressive presentation. As for my other paranymph, **Laura**. I have already thanked two and half Laura's, but everyone knows I mean you when I thank someone for the banter, brightness, and drinks during and after work. Your warm openness to everyone brought me closer to colleagues and made me look forward to coming to the lab. Although we did not work together directly, you inspired me with your enthusiasm for your topic and your clear working plan. You also showed me how to turn this reflection and vision into everyday practice. Even though we met only a few years ago, that helped me get to know myself better. Most of all, I will for always remember the three of us grabbing late-night snacks at the station after drinks, and I'm sure I won't find colleagues as inspiring and fun as you two again.

Dat dit proefschrift de eindstreep heeft gehaald, is vooral te danken aan thuis. Niets is fijner dan elke dag terug te komen in een rustige en liefdevolle omgeving. Dankzij jou kon ik de stress van mislukte experimenten en eindeloze feedbackrondes moeiteloos achter me laten. Daarnaast ben je een rolmodel in hard werken en doorzetten totdat het doel is bereikt. **Ilse**, met jouw liefde en steun heb ik mijn proefschrift kunnen afronden. En natuurlijk ook **Mats**, omdat je altijd een glimlach op mijn gezicht kan toveren. Ik mag ook van geluk spreken dat Mats de beste grootouders heeft. **Pa** en **Ma**, ik kan niet onder woorden brengen hoe dankbaar ik ben dat jullie wekelijks op Mats wilden passen zodat ik mijn PhD kon afronden. Jullie geduld en behulpzaamheid hebben onbeschrijfelijk veel voor mij betekend. Jullie zijn de reden dat het jongetje dat elke dinsdag "ziek" was omdat hij niet naar school wilde, uiteindelijk twaalf jaar aan de universiteit heeft geleerd. En **Eric** en **Monique**, jullie ook bedankt voor al die oppasdagen en, misschien nog wel belangrijker, de interessante en leerzame gesprekken tijdens het natafelen.

Als allerlaatste: mijn allerliefste vrienden. Jullie waren in deze periode onmisbaar om op tijd mijn hoofd leeg te maken. De kleedkamerhumor, de limoncello-avonden, festival-bezoeken, de reizen naar Bonaire, andere gezamenlijke vakanties, het aanhoren van mijn geklaag en de klushulp waren van onschabare waarde.

Jullie maken het verschil!

“komt goed” – Maik Kok