Metabolomics in community-acquired pneumonia: exploring metabolomics-based biomarkers for diagnosis and treatment response monitoring of community-acquired pneumonia

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List of Abbreviations

ADP	Adenosine diphosphate
AHR	Aryl-hydrocarbon receptor
aLEA	Alpha-linolenoyl ethanolamide
AMR	Antimicrobial resistance
ANOVA	Analysis of variance
API	Application programming interface
ATP	Adenosine triphosphate
AUC	Area under the curve
BER	Balanced error rate
BH4	Tetrahydrobiopterin
BMI	Body mass index
BP	Blood pressure
BUN	Blood urea nitrogen
C. burnetii	*Coxiella burnetii*
C. psittaci	*Chlamydophila psittaci*
CAP	Community-acquired pneumonia
ChEBI	Chemical Entities of Biological Interest database
CNS	Central nervous system
COPD	Chronic obstructive pulmonary disease
cor	Correlation
COX	Cyclooxygenase
CRP	C-reactive protein

CURB	Confusion, uremia, respiratory rate, blood pressure
CV	Cross validation
DEA	Docosatetraenoyl ethanolamide
DGLEA	Dihomo-gamma-linolenoyl ethanolamide
EA	Ethanolamine
EBI	European Bioinformatics Institute
EM-PCA	Expectation maximization - principal component analysis
EN	Elastic net regression
FA	Fatty acids
FAIR	Findable, accessible, interoperable, reusable
FC	Fold change
FDR	False discovery rate
FN	False negative
FP	False positive
Gln	Glutamine
Glu	Glutamic acid
GO	Gene Ontology
HMDB	Human Metabolome Database
HPA axis	Hypothalamic–pituitary–adrenal axis
HSV	Herpes simplex virus
ICU	Intensive care unit
ID	Identifier
IDO	Indoleamine-2,3-dioxygenase
IMA	Immunometabolic Atlas
L. pneumophilia	*Legionella pneumophilia*
LCAC	Long-chain acylcarnitine
LOS	Length of stay
LOX	Lipoxygenase
LPC	Lysophosphatidylcholine
LPE	Lysophosphatidylethanolamine
LPI	Lysophosphatidylinositol
LPS	Lysophosphatidylserine
LR	Logistic regression
M. pneumoniae	*Mycoplasma pneumoniae*
Max	Maximum
MCAC	Medium-chain acylcarnitine
Min	Minimum
MS	Mass spectrometry
n	Number
NMDA	N-methyl-D-aspartate
NMR	Nuclear magnetic resonance
NOS	Nitric oxide synthase
NSAID	Non-steroidal anti-inflammatory drugs
p-value	Probability value
PC	Phosphatidylcholine

PCA	Principal component analysis
PCR	Polymerase chain reaction
PCT	Procalcitonin
PE	Phosphatidylethanolamine
PGE2	Prostaglandin E2
PGF2a	Prostaglandin F2 alpha
Phe	Phenylalanine
PLA2	Phospholipase A2
PMID	PubMed identifier
POEA	Palmitoleoyl ethanolamide
PSI	Pneumonia Severity Index
PUFA	Polyunsaturated fatty acids
q	P-adjusted significance
RheaDB	Rhea-Annotated reactions database
ROC	receiver operating characteristic
ROS	Reactive Oxygen Species
RR	Respiratory rate
RSV / RS virus	Respiratory syncytial virus
S. pneumoniae	*Streptococcus pneumoniae*
SCAC	Short-chain acylcarnitine
SD	Standard deviation
SDMA	Symmetric dimethylarginine
SM	Sphingomyelin
STRING	Search Tool for the Retrieval of Interacting Genes/Proteins database
S1PR	Sphingosine-1-phosphate receptor
TB	Tuberculosis
TDO	Tryptophan-2,3-dioxygenase
TG	Triglyceride
TN	True negative
TP	True positive
TriHOME	9,10,13-TriHOME
Trp	Tryptophan
TXB2	Thromboxane B2
Tyr	Tyrosine
VIP	Variable importance in prediction

List of Publications

Ilona den Hartog*, Laura B. Zwep*, Thomas Hankemeier, Jacqueline J. Meulman, Ewoudt M.W. van de Garde, J.G. Coen van Hasselt. Longitudinal metabolomic profiling of Streptococcus pneumoniae-associated community-acquired pneumonia. *Metabolomics* (2024). (* Shared first authors)

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Dankwoord

Dit proefschrift is het resultaat van de samenwerking tussen vele mensen. Aan de start van dit onderzoek stonden mijn promotoren en co-promotor. De metabolomics analyse van de patiëntsamples is mogelijk gemaakt door medewerkers van het St. Antonius Ziekenhuis te Nieuwegein en het Biomedical Metabolomics Facility te Leiden. Ander experimenteel werk en de data analyse is gedaan in samenwerking met studenten en medewerkers van de afdeling Systems Pharmacology & Pharmacy van het LACDR aan de Universiteit Leiden, in het bijzonder met de Van Hasselt groep. De gepubliceerde wetenschappelijke artikelen zijn tot stand gekomen in samenwerking met collega's van verschillende universiteiten en medisch centra.

Op meer informele wijze waren mijn familie, schoonfamilie en vrienden, met in het bijzonder mijn partner Stefan, zeer belangrijk bij het tot stand komen van dit proefschrift.

Curriculum Vitae

Ilona den Hartog was born in Montfoort, the Netherlands, in 1992. She attended high school at the Kalsbeek College Woerden and received her VWO diploma in 2010. She obtained her propaedeutic diploma in Human Movement Sciences at the VU Amsterdam in 2011. She received her Bachelor's and Master's degree in Biomedical Engineering at the Eindhoven University of Technology, graduating in 2017.

During her Bachelor's internship, Ilona studied the detection of antibodies in blood plasma using bioluminescent sensor proteins for point-of-care diagnostics. In her Master's, she specialized in Protein Engineering in the group of Maarten Merkx. Her thesis focused on DNA-based antibody detection using rolling circle amplification to reach single molecule sensitivity. During her Master's she visited Harvard University, Boston, USA for a four month research externship at the Wyss Institute for Biologically Inspired Engineering in the group of Neel Joshi. During her externship she worked on improving genetically engineered bacteria that incorporate non-standard amino acids in the extracellular matrix of biofilms, marking specific environments and facilitating drug targeting to disease.

In 2017, Ilona started her PhD research on metabolomics in community-acquired pneumonia at the Leiden Academic Centre for Drug Research (LACDR) under supervision of Coen van Hasselt, Thomas Hankemeier, and Ewoudt van de Garde. Since October 2022, Ilona works as a technical author at Etteplan in Amersfoort.