Metabolic control of aging in C. elegans

Gao, W.

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APPENDIX

Abbreviations
Authors’ Contributions and affiliations
List of publications
PhD Portfolio
Curriculum Vitae
Acknowledgement
Abbreviations

(In the order of appearance)

IGF-1: insulin/insulin-like growth factor 1 receptor
QTL: quantitative trait loci
G x E: gene by environment
IIS: insulin/IGF-1 signaling
PI3K: phosphatidylinositol-3-kinase
IGFR: insulin/IGF-1 receptor
FOXO: class O of forkhead box transcription factors
SNPs: single nucleotide polymorphisms
CR: caloric restriction
AMP: adenosine monophosphate
AAK-2/AMPK: AMP-activated protein kinase
mTOR: mammalian target of rapamycin kinase
NAD: nicotinamide adenine dinucleotide
SKN-1: transcription factor skinhead-1
Nrf: nuclear respiratory factor
PHA-4/FoxA: FoxA subfamily of forkhead box
DNA: deoxyribonucleic acid
NAM: nicotinamide
NR: nicotinamide riboside
ADP: adenosine diphosphate
PARP: poly(ADP-ribose) polymerase
ATP: adenosine triphosphate
PGC-1α: peroxisome proliferator-activated receptor-γ coactivator
SIRT1: NAD-dependent deacetylase sirtuin-1
T2DM: type II diabetes
THF: tetrahydrofolate
TAME: targeting aging with metformin
ITP: intervention testing program
UPR\textsuperscript{mt}: mitochondrial unfolded protein response
ER: endoplasmic reticulum
ROS: reactive oxygen species
OXPHOS: oxidative phosphorylation
HIF-1: hypoxia-inducible factor 1
G/LOF: gain or loss of function
GWAS: genome-wide association studies
GRPs: genetic reference populations
BXD: mouse GRP generated by crossing C57BL/6J and DBA/2J strains
RIIL: recombinant inbred lines
RIAILs: recombinant inbred advanced intercross lines
ILs: introgression lines
GxG: gene and gene
NILs: nearly isogenic lines
PTEN: phosphatase and tensin homolog
PINK1: PTEN-induced putative kinase 1
IMCL: intramyocellular lipids
COX: cyclooxygenase
Opa1: optic atrophy 1
Mfn: mitofusin
Fis1: fission
Drp1: dynamin-related protein 1
PKA: protein kinase cAMP-dependent
cAMP: cyclic monophosphate
GTPase: guanosine triphosphate hydrolase
INS-1: insulinoma cell line
POMC: pro-opiomelanocortin
AgRP: agouti-related peptide
HFD: high fat diet
NCoR1: nuclear receptor corepressor 1
AA: amino acid
FA: fatty acid
RNAi: RNA interference
GC-MS: gas-chromatography-mass spectrometry
NMR: nuclear magnetic resonance
PL: phospholipid
MS: mass spectrometry
UPLC-MS/MS: ultra-performance liquid chromatography tandem mass spectrometry
HPLC-MS: high-performance liquid chromatography mass spectrometry
LOD: limit of detection
LOQ: limit of quantification
SD: standard deviation
PUFA: polyunsaturated fatty acid
BCAA: branched-chain amino acid
LPE: lysophosphatidylethanolamine
PCA: principal component analysis
PA: phosphatidic acid
PC: phosphatidylcholine
PE: phosphatidylethanolamine
GFP: green fluorescent protein
FAO: fatty acid oxidation
PHX: perhexiline
CPT: carnitine palmitoyltransferase
Authors’ Contributions

Chapter 1: Forward and reverse genetics approaches to uncover metabolic aging pathways in *Caenorhabditis elegans*.

AWG wrote the original manuscript with contributions from all the co-authors. All authors read and approved the final manuscript. AWG and RHH revised the manuscript.

Chapter 2: Mitochondrial response to nutrient availability and its role in metabolic disease.

AWG, CC and RHH wrote the original manuscript. RHH and CC revised the manuscript.

Chapter 3: A sensitive mass spectrometry platform identifies metabolic changes of life history traits in *C. elegans*.

AWG, IAC, and RHH conceived and designed the project. AWG, IAC, RK, YJL and RS performed experiments and interpreted data, HvL, AvC, MATV and FMV coordinated and interpreted mass spectrometry experiments, KH, ACL, MLPR and AvK performed bioinformatics. AWG, IAC and RHH wrote the manuscript, with contributions from all other authors. AWG, IAC and RHH revised the manuscript.

Chapter 4: Natural genetic variation in *C. elegans* reveals genomic loci controlling metabolite levels.

AWG, MGS, JEk, and RHH conceived and designed the project. AWG, JB, RK, LBS, and MGS performed experiments and interpreted data, JB and MGS performed bioinformatics. JvC and MGS constructed CB4856 genetic background ILs. AWG, MGS, JB, JEk, and RHH wrote the manuscript, with contributions from all other authors.

Chapter 5: Identification of key pathways and metabolic fingerprints of longevity in *C. elegans*.

AWG, RLS, and RHH conceived and designed the project. AWG, RLS, RK and MvW performed experiments and interpreted data. AWG, RLS and MvW performed bioinformatics. AWG, RLS and RHH wrote the manuscript, with contributions from all other authors.

Chapter 6: Reduced *ech-6* expression attenuates fat-induced premature aging in *C. elegans*
AWG, YJL, RLS, and RHH conceived and designed the project. AWG, YJL, RLS, RK, and DP performed the experiments. AWG, YJL, AWM, and RHH wrote the manuscript, with contributions from all other coauthors.
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Katharina Herzog, PhD
Henk van Lenthe
Martin A.T. Vervaart
Arno van Cruchten
Michel van Weeghel, PhD
Reuben L. Smith, PhD
Alyson W. MacInnes, PhD
Georges E. Janssens, PhD
Frédéric M. Vaz, PhD
Riekelt H. Houtkooper, PhD

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Jan E. Kammenga, PhD

**Nestlé Institute of Health Sciences, 1015 Lausanne, Switzerland**

Carles Canto, PhD
List of publications


**Manuscripts published on pre-print server**

### General courses

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### Conferences, workshops and master classes

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ACM/MDL meeting, Lunteren, The Netherlands (Poster presentation) 2014 0.5
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Curriculum Vitae

Arwen (Wen) Gao was born on 29th of November 1988 in Jinan, Shandong, China. In 2007 she completed her senior high school education at Jigang High School in Jinan. In the same year, she moved to the Netherlands and started her Bachelor education at the Life Science Institute of the Hogeschool Arnhem en Nijmegen (HAN University) in Nijmegen. At the end of the first year of her Bachelor, she won a scholarship from the HAN University Life Science for academic excellence. During the last year of her Bachelor studies, she went to the United States and performed her first internship at the medical school of University of Pennsylvania in Philadelphia under supervision of Prof. Allan Pack in Philadelphia. After this internship, she went back to the Netherlands and obtained the opportunity to do her final BSc internship with Prof. Steven Pals in the Pathology department of the AMC in Amsterdam. This particular experience motivated her to pursue a MSc in Biomedical Sciences at the University of Amsterdam (UvA), specializing in the biochemistry and metabolic diseases track. In 2011, she did her first MSc internship on a project that linked basic science to industry, studying Bacillus subtilis with Prof. Stanley Brul at Science park of UvA, to broaden her scientific horizon. In the fall of 2012, she contacted Prof. Ronald Wanders from the Laboratory Genetic Metabolic Diseases to discuss the possibilities for her final MSc internship because she intended to continue her academic career in the field of metabolic disease. Following the discussion, she attended a talk by one of the group leaders in his group, Dr. Riekelt Houtkooper, on the link between metabolism and aging. This internship resulted in the opportunity to pursue the research as a four-year PhD project, and therefore Arwen seized this opportunity and applied an AMC PhD scholarship in 2014 after she obtained her M.Sc degree. During this time, Arwen worked full time as a PhD student under supervision of Prof. Ronald Wanders and Dr. Riekelt Houtkooper. She developed a targeted-metabolomics platform for worm studies and investigated the metabolic control of aging in worms. The findings are therefore presented in this PhD thesis. In 2018, Arwen will continue her scientific career in academia, and apply for postdoctoral fellowships to support her research in Prof. Johan Auwerx’s lab at EPFL, Lausanne, Switzerland.
Acknowledgements | 馀谢

About four years ago, I cannot imagine how the day would look like when I finished with writing this thesis. But now, while writing this chapter, I finally realized that it all comes together, and my PhD time is almost over. It was a fantastic journey of my life, being with all of you and learning from each of you. I know that this is probably the only section of this thesis that everyone would read, so I will make sure that you do not regret spending time on reading it. Honestly, it is the most difficult part of the thesis to write, not because I have nothing to say to everyone, but I have too much words to express and it’s hard to keep it brief.

Dear Ronald, I still remember the day when you invited me to come over, to talk about opportunities to do my Master internship in the lab. I was so impressed by your scientific enthusiasm and your amiable way of talking always reminds me of my grandpa. You are always so supportive to me (actually to all of us) and try your best to encourage us, inspire us, and help us in every way. Even though sometimes I almost gave up on the shitty data that I presented during the lab meetings, you were still being positive and gave me constructive suggestions to not let me give up easily. Every time I got two strong hits from you on my shoulder while hearing you said with resonant voice that “Well done, Arwen!”, those were the happiest moments that I enjoyed most and felt like I did something good. Thanks Ron, Thank you so much for being such a great supervisor, and I sincerely wish you all the best and enjoy your life fulfilled with love after your retirement.

Dear Riekelt, if Ron is my scientific opa, then you are for sure my scientific daddy. I felt so lucky that you happened to give a talk on the same day that Ron invited me to come over for discussing my master internship opportunities. So I could meet you, get a chance to listen to your talk and talk to you afterwards. I totally fell for the worms because of the cool project you presented on that day. From that moment on, I decided to do my internship with you, and also continued to do my PhD project with you. And because of this, I did all my projects with worms and was being called a “worm girl”. I must say that I would not even considering doing a PhD without you being my mentor, I probably ended up somewhere doing a technician job after finishing the Master program which was just to satisfy my parents. Thanks for being so patient with me, and tolerant of my stupid mistakes, my stubbornness, my craziness. Without your continuous optimism concerning this work, enthusiasm, encouragement, and support this thesis would hardly be completed. And also thank you for always being there when I need your support or your advice on my work and life problems. I will remember the laughter when you saw the broken autoclave in the ML1 lab, and when you heard that I missed my flight to Japan; the cheer up when I was upset with the experiments or ex-bf; and the support when you heard
about me doing a “secret project”. Thanks “daddy”, I learnt so much from you, and now it’s time for the grown up baby to leave home. Oh, one more thing, the cover of this thesis is a graduation project that I made after completing the AI course you gave, hope you will like it.

I felt so lucky that I could do my PhD in the Lab Genetic Metabolic Diseases. Every member of the lab is unique and indispensable, and I enjoyed every single moment of my work time here, with the gezellig environment that created by all of you. I still remember the warm welcome on the first day, meeting up with everyone in the lab and heard more than 60 names in one go. After all these years, I finally remembered everyone’s name, because of the lab days we went together, the games we played during the research retreats, the new year lunch we had on the first week of each year, and all of the borrels we had for different occasions, and the food everyone brought for Christmas, the cakes brought by birthday people, and BBQ after AMC hockey games, .etc, those are the moments that made me start getting to know each of you and felt like we are just like a big family.

I would like to give the big thanks to all the members of our Mito group and Riekelt’s group for your scientific contributions and supports on my projects. Also, thanks for all the supports and valuable advice on a presentation I have to do on a conference, or an interview I had for a grant application.

Foremost, I would like to express my sincere gratitude to Lodewijk, the only person that I love and hate at the same time. When I was an intern, the only time that I got to talk to you was during the mito meetings, I felt so happy that luckily I just have to face your questions and criticism once a week. But after I moved to the same office as you do, I started to get to know you and explored a totally different Lodewijk that I had in mind. You are so funny and friendly to talk with and have so many stories about culturing turtles and bird watching. Additionally, because of sitting in the same office, I could always find you and bother you with the questions I got on small details of my projects, experiments and study designs. Thank you for the critical and constructive suggestions on my projects, I will miss all of these and also the jokes and stories you made on me (and others).

My sincere thanks also goes to Simone, without your great supervision during my internship, I cannot be so prepared before starting the PhD project. I really appreciate for all the help you provided on my projects and the valuable advice you gave for all the questions that I brought to the meetings. Although sometimes you remind me of a strict mother, I will remember the discussions we had on fashion brands, work outs and the laughter when you drive us back from the retreats.
Dear Iliana, we started our work in the lab GMZ around a similar time, the difference was that I started as an intern and you already started with your PhD. I was so happy that we did the worm metabolomics paper together and it was indeed amazing. I learnt a lot from you during that time and felt so lucky that we had each other for facing the stress and for being supportive to each other all the time. Thanks for the warm company during the long days and working evenings, and I wish you all the best for your current postdoc position and future careers.

Dear Rashmi, I guess you would agree with me that our journey started with a bit bitter beginning. Although I know you have already forgave me for that, I still felt so sorry to be that inpatient when I was the mentor for your internship. Your great attitude, endurance, heard-working, persistence truly changed my impression of you after all, and I am so glad that you stayed and continued working in our group. We shared so much fun together and I knew that I could always count on you when I needed a hand for the crazy experiments that I supposed to deserve by myself. Thanks for the great company during the evenings and weekends, I wish you all the best for being such a lovely person.

Dear Ntsiki, I still remembered that the first time we met, you refused my “zongzi” (the steamed rice pudding wrapped in bamboo leaves and stuffed with pork) because of having a special diet. Well, you already knew that I completely forgave you and I like you so much. You are so good at selling stuffs or convincing people to use the stuffs that you recently found to be handy/convenient/good for work or life. So I joined you for the 250 squat challenge, running with Nike+ app, started using Asana to manage my projects, and buying cups of coffee from Nespresso and tried the cookies at Starbucks you loved so much. Thanks for being a sunny girl and having a great attitude for both work and life, and also thanks for buying me the “gefeliciteerd” cookie after my first paper got accepted, I learnt a lot from you and enjoyed so much to have you around.

Dear Jeannette, you showed me how does a day in the life of a medical student look like and totally proofed what I heard before are true about medical student. You are the best example that I can find for working hard and partying hard at the same time. Thanks for organizing all the fun activities, amazing parties and lovely dinners, and help me a lot with the Dutch translations of the Course 5B book and letters I received from different Dutch organizations. I will also miss our Ajax run together with Ntsiki, it is still my record for 10KM.

Dear Eileen, you are a very sweet girl and it was always nice talking to you about work and also shopping. Thanks for all the motivating words and good advice on my presentations, it's
really helping me a lot by knowing these tips from you. And I really like your presentation slides that you prepared no matter it’s for just a group meeting or big conferences. Also thanks a lot for helping me with the Dutch translation of my thesis discussion, you are very good at telling scientific stories to the non-expert audiences.

Dear Suzan, I guess it’s not the first time that I said I admire your perfect body shape. Of course that’s not the only thing that I like about you (lol). I know that it was not an easy start for you with your PhD project, but you showed a very good attitude and kept up with great work. Besides, you survived from the supervision of L&C combi during your internship, so I am sure that you will have a super good thesis. I will miss your typical Dutch sense of humor and adorable hard-to-stop laughter. Thanks for the fun company in the AIO office and also, good luck with your Pokemon chasing.

Dear Jia, Dear 师妹, thanks for coming to do your PhD in this group, I am so happy to have you around to work, talk, share, gossip, laugh, shopping, and have fun together. You are extremely smart and have a very mature set of theory and experience for science, and I’m sure that you will have a big success on all the projects that you work on. Thanks for all the good advice on my projects and giving me afterwards lessons when we did the statistical course together, and also, thanks for sharing the tips on lipsticks, motives, fashion brands for clothing, shoes and bags. Thanks for saving me on many experiments, I could always count on you when I need your help with worm problems. I will remember the late-night talks during our AIO trip in Lisbon, I will remember our screaming on top of the sky swing, I will remember those 900 NGM plates we carried for the crazy experiments, I will remember the girl that can have a lot drinks without a problem. 亲爱的师妹，这段时间谢谢有你的陪伴，看着你的每一步成长，很开心陪你走过了最艰难的开始。接下来的日子师姐不在你身边了，你一定要继续坚持下去哦，不开心一定要说出来千万别憋着，我相信你一定可以做出很棒很棒的科研成果，成为一个很厉害的科学家！到时候记得把大腿伸出来给你师姐抱哈，爱你么么哒！

Dear Marte, you are so sweet and funny, and I find very nice to have you around to hear the jokes you made about the worms in the VMT. I’m also happy that we could have a short-term collaboration before my contract ended, you were very cool and easy to work with and also flexible with arranging time. Also, thanks for all the good questions and comments on my worm projects and also thanks for bringing a lot of fun topics during the after-work chatting. You are also very good at cooking, and I still remembered the tasty and beautiful quiche you made during the sinterklass party we had at Iedan’s place. I am so happy for you that your projects are going really well and I’m sure that you will have a very nice thesis, success!
Dear Marco L., it was such a nice surprise to meet you again in our lab after the last time we met at your defense. Back to six years ago, I was really happy to get to know you when I was doing my internship at Science Park, and also, you helped me a lot when I need to collect worms fed with *B. subtilis* for my first paper during the PhD time. I really enjoyed every single talk we had and you always gave me a lot of valuable advice on my work and personal life. Thanks for making all those hilarious jokes and the great company, which made my day fulfilled with laughter.

Dear Michel, dear Mimi, you were about to finish your PhD when I started to do my internship with Riekelt, and we had very little contact because you were mostly doing the writing work behind your PC and have already slowly started with your new job in Leiden. It was also nice to see you’re back to the lab and have you to be a member of our group. Sometimes it’s hard to find you or make an appointment with you for work discussion, but your high quality contributions can always solve my problems efficiently and make the progress move further. You are one of the colleagues that always try your best to have the conversation with me in Dutch, and I really cannot stop laughing when you make a joke about something. Sometime I admire you on your pressure handling skill, and I cannot imagine myself to manage more than 50 projects at the same time. Success man!

Dear Alyson, your joining brought the balance back a little bit and I think everyone feels happy to have you in the group for the nice ideas on our projects you consistently provided. Thank you for your great involvement in the last chapter of my thesis, and I really appreciate the valuable contributions from you on the storyline of the story and the manuscript when I need important input and Riekelt is not available.

Dear Georges, about three years ago, I complained to Riekelt that we were missing an bioinformatics expert in our group that can help us dealing with big datasets. So you could have imagined how happy I was when I know that you were going to join our group. Thanks a lot for helping me when I had the problem with GEO, and also thank you for checking those gramma mistakes I had in the manuscript for the long-lived mutant story, such a great help from you in time at the last minute. Thanks for sharing all those nice and handy websites with big dataset collection on different models. Hope one day we could finally meet your cutie twins, how lovely!

Dear Rob W., thank you for your active contributions during all the lab meetings and always provide nice and good advice on everyone’s projects. I really like the design of your new place
and felt really funny to know that you and Riekelt are neighbors in Weesp. Although sadly I recently heard that you are leaving the lab, but I'm also happy to hear that you found a new job at the AMC. Congratulations! Wish you all the best with your new job!

Dear Ruben, welcome back! It’s was a very good news to know that you got a grant and came back to our group to do your postdoc. A special thanks to you for the sweet and wish-do-come-true witch you gave me, she really brought me love and I am really appreciated for this. Maybe you should also buy one for yourself, I’m sure you will find a very nice girl to fall in love with!

I would also like to give my special thanks to all the former members of the group, dear Marco M., thanks for being my former desk-neighbor in the AIO office, teaching me how to integrate amino acid peaks, and providing lovely company when we AIO tripped at Lisbon; dear Reuben, thanks for the great support and unlimited advice on worm experiments and English corrections of all my papers, also, the long-lived mutant paper cannot go this far without your valuable contributions, even after you left the group; dear Sander, Vincent, Arthur, Olga P., Anita, thank you all for the supply of good advice on my projects in the early and middle time, especially those to help me with the interview of AMC scholarship application. Dear Hyung and Andy, thanks for bringing a lot of fun to the group and hope you guys will keep up with the good work and enjoy! And Kelly, wish you all the best for your PhD!

Now I would like to switch the focus to the AIOs, which meant a lot to me and always being a big support during the whole time of my PhD. Thanks a lot, dear sisters and brothers, I’m so happy to get to know you all in this lab and being supportive to each other when we were feeling down about something work- or life-related. I will remember all the happy moments during our unforgettable AIO trips, dinners, lunches, cake competitions, Sinterklass parties.

Dear Iedan, it’s really hard for me to keep my thank words to you in brief, I just felt really lucky to have you as my desk-neighbor. You are so smart and thoughtful of others, and luckily because we sit so close to each other, I happened to be the person that you are taking care of mostly. I guess you already knew that my bf is extremely jealous of you, because he cannot stand the fact that there is another guy in the world knowing/taking care of me better than he does (except my daddy), even though I told him tons of times that you have a very sweet bf. Thanks for having constant interest of all my worm projects and always giving me great advice and being the trouble shooting expert of my problems on experiments and writing. Thank you for ..everything, and I cannot name all the good things you did to me in only half a page. I am so happy for you that you could continue to do an exciting European study in the final year of your PhD and I’m sure that you could handle it pretty well. I know that no one in our lab has
been promoted with “cum laude”, but frankly speaking, after seeing how you performed and managed the projects during these years, you are the best candidate in my mind that I can vote for having this honor. Good luck with the rest of your PhD, and you know how to find me when you need me.

Dear *Kim*, thanks for baking all the nice cookies and cakes to the lab sharing with us, and always bringing some funny stories when you came to get coffee in our office. I really love all those nice cookies you made and I actually don't eat cookies that much before you started to bring these happy sweets to the office. It's a nice pleasure to have you around although sometimes you pretended to be a paparazzi and took many awkward photos of us and laugh at them. Thanks for always share the happiness with us and I wish you all the best in Belgium, maybe one day you wake up and find us sleeping in a tent at your backyard, who knows!

Dear *Femke*, I know your favorite Asian food is “xiao long bao”, your favorite tea is “oolong tea”, and in the mean time you love to travel to Taiwan to have them at “Ding tai feng”, but sadly you are allergic to nuts. I still remember that you asked me for advice on food when you planned to go to Taiwan to visit your family and you brought many funny stories and showed us pictures of many food with weird Chinese names. I really enjoyed these stories and cannot stop laughing with you. Thank you for being supportive when you found someone was mean to me and thanks for always standing on my side and bringing me confident when I spoke up my opinions.

Huge thanks to the former AIOs who have already left the lab for a longer time, dear *Sandra*, thank you for sharing good stories and especially the experience about your karate training during our pleasant morning chats; dear *Olga M.*, thanks for the good company in the AIO office, and I will remember the combination of your healthy salad lunch and the late afternoon popcorn/chips snack; dear *Kathi*, thanks for helping us with generating the heatmap of our first paper, really happy to have someone like you around to ask for help with this kind of questions; dear *Kevin, Eveline, Martin S., Catherine, Eugene, and Max*, thank you all for bringing a lot of fun at work and I wish you all the best with your current and future work. Dear *Sanne*, it was nice to have you in our AIO office, I will remember the funny worm story you made during the lab day, and good luck with your PhD projects!

I would like to express my sincere gratitude to the *MS team*, who helped me a lot in the beginning of my PhD and opened up new chances for me that I could develop them into mature projects for my thesis. I really enjoyed the time when I was an intern and sitting in the MS office. Dear *Henk*, I was a bit scared of you in the beginning because you remind me of the strict
chemistry teacher in my high school. But after knowing you personally, I ignored most of your annoyingness and kept bothering you a lot with all kinds of questions. I really liked you a lot, and felt like you are a pretty good teacher who taught me a lot about MS. Thank you for the great help and being so patient with me, I really learnt a lot from you. Dear Arno, thank you for helping me with all the amino acid measurements and integrating the amino acid peaks. I know that you would say it’s your job, but I still appreciate so much for the great help from you on my crazy sample lists. Dear Femke, Martin V., Karen and Albert, thank you for helping me with all the small troubles in the lab and occasionally helping me with the measurements. Dear Nico and Wim, thank you for the warm greetings when I met you guys on the hallway, and also provided me important suggestions on specific MS questions that the reviewer asked. Dear Fred, thank you for all the valuable inputs of my work and you always inspired me with excellent questions during the lab meetings and causal talks. I will remember the funny sounds you made when I ran into you on the hallway or the happy face you made when you passed by our office. And thanks for being the mentor for Riekelt when he was a PhD student, he passed all the good skills you taught him to us and we benefited a lot from them, which I believe those will last a lifetime. Dear Sacha, and Suzan G., thanks for the warm greetings on the hallway and shared a lot of experience and knowledge regarding trainings on clinical biochemist, thanks! Dear Merel, thank you for the great contributions when I was preparing the interview for the AMC scholarship application, your remarks were truly helpful and valuable. Thank you!

Dear Hans, Andre, and Stef, thank you all for the stimulating discussions and helpful suggestions for my studies when I present them during the lab meetings. Thanks for having a brave heart to try all those Chinese snacks, cookies and cakes that I brought back from China, really appreciated for that. Dear Naomi, except for all above-mentioned, I really enjoyed the moment when Iedan and I went out to the gym nearby AMC for the Pokemon battles, and found you and Riekelt were there as well.

I would also like to thank all the students that I supervised during my PhD, who have witnessed every step of my growth, including Roxanna, Daan, Rashmi, Jelmi, Ai Lan, and Rebecca. Thank you all for the great work you have done and things you taught me. Wish you all the best for your studies and careers.

To the office/VMT roomie, my Dear Carlo, I am so happy to have you sitting on other side of my desk and sharing fun stories about your work and life with me. I cannot remember how many times that we had discussions on crazy experiments you or me was planning to do, but I can always remember your eyes glittered with enthusiasm about science. Thanks for the fun
company in the VMT and the office, I really enjoyed working next to you while hearing the funny stories and exchanging ideas.

Dear Rob O., except Ron and Riekelt, you are the other person that I am so grateful for all your help. My projects didn’t go well in the beginning of my PhD, especially for the those involved the development of acylcarnitine measurement in worms. After you heard about this problem from Riekelt, you were so motivated and helped us to give the first try to measure worm fatty acids as the alternative of the focus that we had on beta-oxidation. And from that moment on, it all worked out very nicely. You really saved me and brought me hope on my projects. Thank you so much.

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-Yours,
Arwen
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