

Immune modulation by helminths and the impact on the development of type 2 diabetes

Ruiter, K. de

Citation

Ruiter, K. de. (2019, March 26). *Immune modulation by helminths and the impact on the development of type 2 diabetes*. Retrieved from https://hdl.handle.net/1887/70477

Version: Not Applicable (or Unknown)

License: Leiden University Non-exclusive license

Downloaded from: https://hdl.handle.net/1887/70477

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

Cover Page



Universiteit Leiden



The handle http://hdl.handle.net/1887/70477 holds various files of this Leiden University dissertation.

Author: Ruiter, K. de

Title: Immune modulation by helminths and the impact on the development of type 2

diabetes

Issue Date: 2019-03-26

APPENDICES

8

ACKNOWLEDGEMENTS / DANKWOORD

I would like to thank all the people who, in one way or the other, have contributed to the work described in this thesis.

First I would like to thank my promotores and co-promotor. Maria, thank you so much for the opportunity to start this project, the trust you gave me, your energy and enthusiasm, and your continuous support – no matter the distance in between. I have learned a lot from you. Tania, without your fieldwork experience this project would not have succeeded. Thanks for your guidance and support, for composing a great team of fieldworkers and for taking care of the (always challenging) transport of samples, dry ice and liquid nitrogen. Bruno, thank you for the opportunity to be involved in the in vivo studies and your welcome advice whenever needed.

I would also like to thank Erliyani for sharing your fieldwork experience with Dicky and me, teaching us how to prepare and conduct a field study and always being there to answer our questions. I am also very grateful to Yvonne, you taught me how to work in the "Nangapanda lab" and to always think of creative solutions. Thank you Jan, for your advice and support throughout the project.

I would also like to thank my paranymphs. Dicky, my partner in crime, I have very much enjoyed working together with you for 4 years. Your social skills and commitment have been crucial for the successful completion of the field study. Thank you for being my guide into the Indonesian culture. Astrid, with the joint use of mass cytometry we started to team up and you have been a great support to me. In addition, I have enjoyed our non-CyTOF related conversations and laughter.

I would also like to thank many other people at the department of Parasitology for your help in- and outside the lab and doing fun things together such as the movie nights, paragliding, a mud masters obstacle run, lab outings and the diving weekends in Zeeland. In particular Koen and Yoanne (Thanks for the 'gezelligheid' in the office, the discussions and laughs), Sanne (Thanks for your FACS and CyTOF support and for always being helpful), Jacqueline (Thanks for your help sorting thousands of samples), Mikhael and Eddy (Thanks for your help in Nangapanda), Katja (Thanks for sharing the last-months-of-your-PhD-issues), Leonard, Beatrice and Marijke (Lab outing committee 2016!), Abena, Alice, Alwin, Angela, Arifa, Bart, Corrie, Dian, Eric, Eunice, Firdaus, Frank, Hermelijn, Jantien, Laudine, Leonie, Linda, Lisette, Łucja, Maria K., Marie-Astrid, Marije, Mathilde, Meta, Michelle, Noemí, Patrick, Ron, Simone and Suzanne. Furthermore, I would like to thank the CyTOF team including Vincent, Rene and Marjolijn for their advice and help. Jeanine and Ivonne, thank you for your statistical help. Leo, Edward, Bart and Selma, thank you for the nice collaboration regarding the granulocyte work.

My appreciation also goes to my Indonesian Parasitology colleagues. Terima kasih banyak Yenny, Pak Dirman, Yossi, Eka, Difa, Pita, Femmy, Elisa, Audi, Devy, Sovie, Budi, Pak Warto and Elton. You have all contributed greatly to the field study. I would also like to thank Dr. Helda Sihotang, Bapak Camat Berdadus Idu, all health workers from Nangapanda

Primary Healthy Centre, as well as the local health cadres, in particular Yuyun and Mufida. Thanks to all the study participants.

Lieve Linde, Nicoline, Sophie, Kim, Willemien, Anouk, Marian, Marga, Frederik, Anne en Marloes, bedankt voor jullie vriendschap, support en interesse in mijn onderzoek!

Tot slot wil ik mijn lieve ouders en zus bedanken. Jullie hebben me van advies, steun en afleiding voorzien wanneer nodig. Dank dat jullie altijd voor me klaar staan!

198

CURRICULUM VITAE

Karin de Ruiter was born on 20 September 1988 in Renkum, the Netherlands. After completing grammar school in Wageningen (scholengemeenschap Pantarijn) in 2006, she started to study Life Science and Technology, Major Biomedical Sciences, at the University of Groningen. She obtained her Bachelor's degree in 2009, and this was followed by a cum laude Master's degree in Medical Pharmaceutical Sciences in 2011. During her Master's, Karin first worked on an internship within the Endothelial Biomedicine & Vascular Drug Targeting Group at the University Medical Center Groningen, and did her final internship at the Department of Pharmacokinetics, Toxicology and Targeting at the University of Groningen. Thereafter, at the same department, she conducted research on the targeted delivery of IFNy to activated hepatic stellate cells in liver fibrosis. In 2013 she moved to Leiden to start a PhD project at the Department of Parasitology under the supervision of Prof. Dr. Maria Yazdanbakhsh. For this collaborative research project between the Faculty of Medicine, Universitas Indonesia (FKUI), Jakarta, Indonesia and Leiden University Medical Center (LUMC), she often travelled to Indonesia to work with a team and conduct a large immunoepidemiological field study on Flores island, East Indonesia, which culminated in the work presented in this thesis.

LIST OF PUBLICATIONS

de Ruiter K, Tahapary DL*, Stam KA*, van Unen V, Höllt T, Lelieveldt BPF, Koning F, Sartono E, Smit JWA, Supali T, Yazdanbakhsh M. Mass cytometry reveals heterogeneity of type 2 and regulatory cells driven by helminth infections. Submitted.

Jochems SP*, de Ruiter K*, Solorzano C*, Voskamp A*, Mitsi E, Nikolaou E, Carniel BF, Pojar S, German EL, Reine J, Schanoski A, Hill H, Robinson R, Weight C, Durrenberger PF, Heyderman RS, Gordon S, Smits HH, Urban B, Rylance J, Collins A, Wilkie M, Lazarova L, Leong S, Yazdanbakhsh M, Ferreira DM. *Defining mucosal immunity using mass cytometry following experimental human pneumococcal challenge*. Submitted.

van der Zande HJP*, Hussaarts L*, Pelgrom LR, Garcia-Tardon N, Hoving L, **de Ruiter** K, Otto F, van der Zon G, Embgenbroich M, Katiraei S, Willems van Dijk K, Everts B, Yazdanbakhsh M, van Harmelen V, Burgdorf S, Guigas B. *Mannose receptor deficiency protects against high-fat diet-induced insulin resistance by reducing pro-inflammatory activation of macrophages.* Submitted.

de Ruiter K, Tahapary DL, Sartono E, Nutman TB, Smit JWA, Koenderman L, Yazdanbakhsh M. The effect of helminths on granulocyte activation: a cluster-randomized placebocontrolled trial in Indonesia. J Infect Dis. 2018 Nov 17 [Epub ahead of print].

van Staveren S, Ten Haag T, Klöpping M, Hilvering B, Tinnevelt GH, de Ruiter K, Piacentini MF, Roelands B, Meeusen R, de Koning JJ, Jansen JJ, Vrisekoop N, Koenderman L. *Multi-dimensional flow cytometry analysis reveals increasing changes in the systemic neutrophil compartment during seven consecutive days of endurance exercise*. Plos One. 2018 Oct 30;13(10):e0206175.

Tahapary DL*, **de Ruiter K***, Kurniawan F*, Djuardi Y, Wang Y, Nurdin SME, Iskandar E, Minggu D, Yunir E, Guigas B, Supali T, Rensen PCN, Sartono E, Soewondo P, Harbuwono DS, Smit JWA, Yazdanbakhsh M. *Impact of rural-urban environment on metabolic profile and response to a 5-day high-fat diet*. Sci Rep. 2018 May 25;8(1):8149.

de Ruiter K, van Staveren S, Hilvering B, Knol E, Vrisekoop N, Koenderman L, Yazdanbakhsh M. A field-applicable method for flow cytometric analysis of granulocyte activation: Cryopreservation of fixed granulocytes. Cytometry A. 2018 May;93(5)540-547.

Tahapary DL, de Ruiter K, Martin I, Brienen EAT, van Lieshout L, Djuardi Y, Djimandjaja CC, Houwing-Duistermaat JJ, Soewondo P, Sartono E, Supali T, Smit JW, Yazdanbakhsh M. Effect of anthelmintic treatment on leptin, adiponectin, and leptin to adiponectin ratio: a randomized controlled trial. Nutr Diabetes. 2017 Oct 16;7(10):e289.

Tahapary DL*, de Ruiter K*, Martin I, Brienen EAT, van Lieshout L, Cobbaert CM, Soewondo P, Djuardi Y, Wiria AE, Houwing-Duistermaat JJ, Sartono E, Smit JW, Yazdanbakhsh M, Supali T. Effect of Anthelmintic Treatment on Insulin Resistance: A Cluster-Randomized Placebo-Controlled Trial in Indonesia. Clin Infect Dis. 2017 Sep 1;65(5):764-771.

de Ruiter K*, Tahapary DL*, Wammes LJ, Wiria AE, Hamid F, van Lieshout L, Smit JWA, Houwing-Duistermaat JJ, Sartono E, Supali T, Yazdanbakhsh M. The effect of three-monthly albendazole treatment on Th2 responses: Differential effects on IgE and IL-5. Parasite Immunol. 2017 Jun;39(6).

de Ruiter K*, Tahapary DL*, Sartono E, Soewondo P, Supali T, Smit JWA, Yazdanbakhsh M. Helminths, hygiene hypothesis and type 2 diabetes. Parasite Immunol. 2017 May;39(5).

Tahapary DL*, de Ruiter K*, Martin I, van Lieshout L, Guigas B, Soewondo P, Djuardi Y, Wiria AE, Mayboroda OA, Houwing-Duistermaat JJ, Tasman H, Sartono E, Yazdanbakhsh M, Smit JW, Supali T. Helminth infections and type 2 diabetes: a cluster-randomized placebo controlled SUGARSPIN trial in Nangapanda, Flores, Indonesia. BMC Infect Dis. 2015 Mar 18;15:133.

^{*}Equal contribution