Immunosuppression in breast cancer: a closer look at regulatory T cells

Kos, K.

CURRICULUM VITAE

Kevin Kos was born in Blaricum on the 12th of February, 1993. In 2011, he obtained his university preparatory education degree, majoring Nature & Health at Ergooiers College Huizen. The same year, he started the bachelor Biomedical Sciences at Vrije Universiteit Amsterdam. He graduated in 2014 with a research thesis describing the impact of a fungal-microbial interaction on caries development, performed in the laboratory of Dr. Bastiaan Krom, department of Preventive Dentistry, ACTA, Amsterdam. In 2014 he enrolled in the Oncology reseach Master's Programme, VUmc, Amsterdam, from which he graduated *cum laude* in 2016. During this track, he performed his minor research internship in the lab of Prof. Dr. Emile Voest, looking into mechanisms of fatty-acid mediated chemoresistance, under supervision of Dr. Julia Houthuijzen. Research for his master Thesis was performed in the laboratory of Prof. Dr. Mark Smyth in the QIMR Berghofer research institute, Brisbane, Australia. Under supervision of Dr. Eva Putz, he studied the importance of heparanase for the tumor invasion of NK cells. In preparation for his PhD research starting in 2016, he wrote a research proposal in collaboration with (the lab of) Prof. Dr. Karin de Visser, Department of Immunology and Tumor Biology, Netherlands Cancer Institute, Amsterdam, on the elusive role of regulatory T cells in breast cancer. The proposal was awarded with the NWO-OOA Diamond Grant, enabling him to fund and carry out his designed research proposal under supervision of Prof. Dr. Karin de Visser. The major findings of this project are described in this Thesis.

ACKNOWLEDGMENTS

Research is teamwork, and can only progress through discoveries that build on previous discoveries: metaphorically known as standing on the shoulders of giants. Throughout my PhD, I was very fortunate to stand on the shoulders of many such giants, who have been of critical importance in the making of this thesis, and to whom I would like to express my gratitude.

Karin, although T_{regs} may have been the odd one out in your lab at first, I could not have imagined a better mentor or environment, due to your endless support, enthusiasm and positivity. Your mentality of putting sound, thorough and relevant science above everything have shaped me as a scientist for which I am very grateful, and I will not forget: the data are the data.

Jannie, I feel honoured to have you as my co-promotor, and to have learnt from your inspiring views on immunology.

My paranymphs: Max, the spindoctor of immunology: good data is fantastic data, and bad data are opportunities. To say I enjoyed our (scientific) discussions is an understatement, but most importantly: thank you for the gentle nudges to actually put the ideas into practice. Danique: science is serious business but your bubbly presence makes it a lot more fun: I very much enjoyed working and laughing side by side to you in the lab. I'm looking forward to visit you in Limburg.

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PUBLICATIONS

Macrophages promote intratumoral conversion of conventional CD4⁺ T cells into regulatory T cells via PD-1 signalling.
Kevin Kos, Camilla Salvagno, Max D. Wellenstein, Denize A. Meijer, Cheei-Sing Hau, Kim Vrijland, Daphne Kaldenbach, Elisabeth A.M. Raeven, Martina Schmittnaegel, Carola Ries, Karin E. de Visser.
Oncoimmunology, Apr 2022, 11(1)

Tumor-educated T_{regs} drive organ-specific metastasis in breast cancer by impairing NK cells in the lymph node niche.
Kevin Kos, Muhammad Aslam, Rieneke van de Ven, Max D. Wellenstein, Wietske Pieters, Antoinette van Weverwijk, Danique E.M Duits, Kim van Pul, Cheei-Sing Hau, Kim Vrijland, Daphne Kaldenbach, Elisabeth A.M. Raeven, Sergio A. Quezada, Rudi Beyaert, Heinz Jacobs, Tanja D. de Gruijl, Karin E. de Visser.
Cell Reports 2022 Mar 1;38(9):110447

Pro-mutagenic Effects of the Gut Microbiota in a Lynch syndrome Mouse Model
Wietske Pieters, Floor Hugenholtz, Kevin Kos, Maxime Cammeraat, Teddy C. Moliej, Daphne Kaldenbach, Sjoerd Klarenbeek, Mark Davids, Lisa Drost, Charlotte de Konink, Elly Delzenne-Goette, Karin de Visser, Hein te Riele.
Gut Microbes, Jan-Dec 2022;14(1):2035660.

Neutrophils create a fertile soil for metastasis.
Kevin Kos, Karin E. de Visser.
Cancer Cell, 2021 Mar 8;39(3):301-303

The Multifaceted Role of Regulatory T Cells in Breast Cancer.
Kevin Kos**,** Karin E. de Visser.
Annual Review of Cancer Biology. 2021 Mar;5:291-310

Flow cytometry-based isolation of tumor-associated regulatory T cells and assessment of their suppressive potential.
Kevin Kos, Martijn van Baalen, Denize A. Meijer, Karin E. de Visser.
Methods in Enzymology. 2020;632:259-281.

Therapeutic targeting of macrophages enhances chemotherapy efficacy by unleashing type I interferon response.
Camilla Salvagno, Metamia Ciampricotti, Sander Tuit, Cheei-Sing Hau, Antoinette van Weverwijk, Seth Coffelt, Kelly Kersten, Kim Vrijland, Kevin Kos, Thomas Ulas, Ji-Ying Song, Chia-Huey Ooi, Dominik Rüttinger, Philippe A. Cassier, Jos Jonkers, Joachim L. Schultze, Carola Ries, Karin E. de Visser.
Nature Cell Biology. 2019 Apr;21(4):511-521.

NK cell heparanase controls tumor invasion and immune surveillance.
Eva M. Putz, Alyce J. Mayfosh, Kevin Kos, Deborah S. Barkauskas, Kyohei Nakamura, Liam Town, Katharine J. Goodall, Dean Y. Yee, Ivan K. Poon, Nikola Baschuk, Fernando Souza-Fonseca-Guimaraes, Mark D. Hulett, Mark J. Smyth.
Journal of Clinical Investigation. 2017 Jun 30;127(7):2777-2788.

Targeting cytokine signaling checkpoint CIS activates NK cells to protect from tumor initiation and metastasis.
Eva M. Putz, Camille Guillerey, Kevin Kos, Kimberley Stannard, Kim Miles, Rebecca B. Delconte, Kazuyoshi Takeda, Sandra E. Nicholson, Nicholas D. Huntington, Mark J. Smyth
Oncoimmunology. 2017 Feb 7;6(2):e1267892.

***Candida albicans* in oral biofilms could prevent caries.**
Hubertine M. Willems*, Kevin Kos*, Mary Ann Jabra-Rizk, Bastiaan P. Krom.
*These authors contributed equally
Pathogens and Disease, 2016, 74.

PHD PORTFOLIO

Courses and Workshops

2016 Basic Course on R, Erasmus MC, Rotterdam, The Netherlands

2017 Ethics and Integrity in Science, NKI, The Netherlands

2018 How to be(come) a successful grant applicant, VUmc, Amsterdam, The Netherlands

2019 Clinical Internship, NKI, Amsterdam, The Netherlands

2019 Qlucore hands on training, VUmc Amsterdam, The Netherlands

2021 Digital Career Event workshops Amsterdam UMC
- The science of job searching
- Welcome to the outside world

2021 BCF Career Event Workshops
- How to Present Your Best Self for Interviews or Promotions
- Job application tips
- CV building

Conferences attended

2016 'The complexity of tumor-host immune interactions', LUMC TIMMC symposium, Leiden, The Netherlands

2017 Understanding Tumour Immunology', **Poster**, Beatson Institute, Glasgow, Scotland

2017 'New Horizons in Cancer Research', CGC annual meeting KIT, Amsterdam, The Netherlands

2018 Oncode Institute Launch, Amsterdam, The Netherlands

2018 International PhD Student Cancer Conference, **Poster,** Francis Crick Institute, London, UK

2018 25th Biennial Congress of the EACR, **Poster**, Amsterdam, The Netherlands

2018 'Horizons of Cancer Biology', **Poster**, ISREC-SCCL Symposium, Lausanne, Switzerland

2019 Oncode Annual Scientific meeting, Amsterdam, The Netherlands

2019 'Uncovering Mechanisms of Immune-Based Therapy in Cancer and Autoimmunity', **Poster**,
Keystone Symposium, Breckenridge, USA

2019 International PhD Student Cancer Conference, **Chair,** NKI Amsterdam, The Netherlands

2020 Oncode Tumour microenvironment and Immunology meeting, **Speaker**, Veenendaal, The Netherlands

2021 'Defense is the best Attack: EACR Immuno-Oncology Breakthroughs', **Speaker**, online event

2021 Oncode-CGC Annual Scientific Meeting, Speaker, Utrecht, The Netherlands

Retreat participation

2017-2018 Annual OOA graduate student retreat, **Poster/Speaker/Chair**, Renesse, The Netherlands

2016-2019 C2 department Retreat, **Poster/Speaker**, Egmond, The Netherlands

2018 KDV Lab retreat, **Speaker**, Middelburg, The Netherlands

Organising Committee

2019 International PhD Student Cancer Conference, NKI Amsterdam, The Netherlands

2017-2022 B3 'Happiness' Committee

Supervision of Students

2019 Supervision 2nd year master student Biomedical Sciences UvA, Denize A. Meijer