Academic Curriculum Vitae

Shinya SAKAGUCHI

Date of Birth:	August 11, 1976
Place of Birth:	Wakayama, Japan
Nationality:	Japanese
Acad. Degree:	MSc.Dr. (Ph.D), Associate Professor
Current Position:	Associate Professor
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Main Research Interests/Previous Research Achievements

$CD8^+$ T cells play a central role during immune responses against virus, intracellular bacteria and protozoan parasites and also key regulators of anti-tumor immunity. The main research topic of my group is to understand the molecular mechanisms controlling thymic development as well as peripheral differentiation of $CD8^+$ T cells, particularly focusing on transcriptional and epigenetic regulations. Our previous studies demonstrated that the zinc-finger protein MAZR/PATZ1 is part of transcription factor network controlling the CD4/CD8 lineage decision of double-positive (DP) thymocytes (Ref. 1 in the publication list below) and that it promotes $CD8^+$ T cell development in synergy with Runx proteins (Ref. 4). In addition, we found that MAZR/PATZ1 interacts with Runx3 to establish the transcriptional programs of effector and memory $CD8^+$ T cell differentiation (Ref. 9) and that it also regulates invariant natural killer (iNKT) cell development (Ref. 7). Beside these studies, we have elucidated *cis*- and *trans*-regulatory networks underlying developmental stage-, lineage- and subset-specific *Cd8* gene expression (Ref. 2,3 and 6) and identified/characterized a novel *Cd8* cis-regulatory element (Ref. 3 and 6). Finally, we recently revealed an essential role of histone deacetylases 1 (HDAC1) for the generation and maintenance of effector-like exhausted T cells (Ref. 10). The experimental strategies to address our research interests include multi-color flow-cytometry, viral infection, tumor model, CRISPR/Cas9-mediated genome editing, retroviral-mediated gene transduction into hematopoietic stem cells as well as primary T cells, next generation sequencing and mouse molecular genetics tools.

Scientific Education and Career History

1996 – 2000	Bachelor thesis at Department of Biological Sciences, Faculty of Science, University of Tokyo, Tokyo, Japan; with distinction
2000 – 2002	Master thesis at Department of Immunology, Graduate School of Medicine and Faculty of Medicine, University of Tokyo, Tokyo, Japan; with distinction
2002 – 2004	Ph.D thesis at Department of Immunology, Graduate School of Medicine and Faculty of Medicine, University of Tokyo, Tokyo, Japan
2004 – 2009	Ph.D. thesis at Faculty of Natural Sciences (Molecular Biology), University of Vienna, Vienna, Austria; with distinction
2009 – 2016	Postdoctoral fellow at Institute of Immunology, CePII, Medical University of Vienna, Vienna, Austria
(2009 – 2010)	***(7 months of Paternity leave)***
(2013)	***(6 months of Paternity leave)***
2016	Senior postdoctoral fellow (Assistant) at Institute of Immunology, CePII, Medical University of Vienna, Vienna, Austria
2016 – 2019	Assistant Professor at Institute of Immunology, CePII, Medical University of Vienna, Vienna, Austria
2019 – now	Associate Professor at Institute of Immunology, CePII, Medical University of Vienna, Vienna, Austria
2021	Degree of Habilitation (Immunology) at Medical University of Vienna

Supervision of Graduate Students and Postdoctoral Fellows

Since 2013	Supervisor of 5 PhD student (4 ongoing + 1 finished); 6 master students (6 finished); 1 bachelor student (finished)

Fellowships and prizes won by lab members

2020/12	L'Oreal fellowship for female PhD Student – women in Science – Austria (25 k€ for personnel employment)
2021/12	Best Dissertation Prize awarded by the Austrian Society of Allergology and Immunology

Teaching Activities

Since 2014	Lecturer at PhD Program Immunology and Undergraduate Program of Med Uni Vienna

Commission of Trust

2019 - now	Reviewer for Immunity, Frontiers in Immunology, Cellular & Molecular Immunology, Cell Death & Differentiation, FEBS Letters and Communications Biology.

10 Most Important Publications

I have published 29 scientific papers. Based on Google Scholar, the publications received 3,000 citations with a current life-time Hirsch *h*-index of 18.

1. **Sakaguchi S**, Hombauer M, Bilic I, Naoe Y, Schebesta A, Taniuchi I. and Ellmeier W (2010) The zinc-finger protein MAZR is part of the transcription factor network that controls the CD4-versus-CD8 lineage fate of double-positive thymocytes. ***Nat. Immunol.*** 11(5):442-8. doi: 10.1038/ni.1860.
2. Hassan H*, **Sakaguchi S***, Tenno M, Kopf A, Egawa T, Taniuchi T. and Ellmeier W (2011) Runx factors and *Cd8* enhancer $E8_I$ are required for a transcriptional program regulating CD8α expression in activated $CD8^+$ T cells ***Proc. Natl. Acad. Sci. U S A*** 108(45):18330-5. doi: 10.1073/pnas.1105835108. (*equal contribution)
3. **Sakaguchi S**, Hombauer M, Hassan H, Tanaka H, Naoe Y, Bilic I, Mayer H, Bergthaler A, Taniuchi I and Ellmeier W (2015) A novel *Cd8-cis*-regulatory element directs expression in $CD44^+CD62L^+$ $CD8^+$ T cells and in $CD8\alpha\alpha^+$ dendritic cells. ***J Leukoc Biol.*** 97(4):635-44. doi: 10.1189/jlb.1HI1113-597RR.
4. **Sakaguchi S***, Hainberger D, Tizian C, Tanaka H, Okuda T, Groner Y, Taniuchi I and Ellmeier W* (2015). MAZR and Runx Factors Synergistically Repress ThPOK during CD8+ T Cell Lineage Development. ***J Immunol.*** 195(6):2879-87. doi: 10.4049/jimmunol.1500387. (*shared corresponding authors)
5. Newman DM, **Sakaguchi S**, Lun A, Preston S, Pellegrini M, Khamina K, Bergthaler A, Nutt SL, Smyth GK, Voss AK, Thomas T, Ellmeier W, Belz GT and Allan RS (2016). Acetylation of the Cd8 Locus by KAT6A Determines Memory T Cell Diversity. ***Cell Rep.*** 16(12):3311-3321. doi: 10.1016/j.celrep.2016.08.056.
6. Gülich AF, Preglej T, Hamminger P, Alteneder M, Tizian C, Orola MJ, Muroi S, Taniuchi I, Ellmeier W* and **Sakaguchi S*** (2019). Differential Requirement of Cd8 Enhancers E8I and E8VI in Cytotoxic Lineage T Cells and in Intestinal Intraepithelial Lymphocytes. ***Front Immunol.*** 10:409. doi: 10.3389/fimmu.2019.00409. eCollection 2019. (*shared corresponding authors)
7. Orola MJ, Tizian C, Zhu C, Andersen L, Gülich AF, Alteneder M, Stojakovic T, Wiedermann U, Trauner M, Ellmeier W and **Sakaguchi S** (2019). The zinc-finger transcription factor MAZR regulates iNKT cell subset differentiation. ***Cell Mol Life Sci.*** 76(21):4391-4404. doi: 10.1007/s00018-019-03119-z.
8. Andersen L, Gülich AF, Alteneder M, Preglej T, Orola MJ, Dhele N, Stolz V, Schebesta A, Hamminger P, Hladik A, Floess S, Krausgruber T, Faux T, Andrabi SBA, Huehn J, Knapp S, Sparwasser T, Bock C, Laiho A, Elo LL, Rasool O, Lahesmaa R, **Sakaguchi S** and Ellmeier W (2019). The Transcription Factor MAZR/PATZ1 Regulates the Development of FOXP3+ Regulatory T Cells. ***Cell Rep.*** 29(13):4447-4459.e6. doi: 10.1016/j.celrep.2019.11.089
9. Gülich AF, Rica R, Tizian C, Viczenczova C, Khamina K, Faux T, Hainberger D, Penz T, Bosselut R, Bock C, Laiho A, Elo LL, Bergthaler A, Ellmeier W and **Sakaguchi S** (2021). Complex Interplay Between MAZR and Runx3 Regulates the Generation of Cytotoxic T Lymphocyte and Memory T Cells. ***Front Immunol.*** 17;12:535039. doi: 10.3389/fimmu.2021.535039.
10. Rica R, Waldherr M, Miyakoda E, Kutschat AP, Schülein M, Zhang J, Orbegozo-Medina RA, Sandner L, Stolz V, Waltenberger D, Krausgruber T, Bock C, Boucheron N, Seruggia D, Ellmeier W*, **Sakaguchi S*** (2025) HDAC1 controls the generation and maintenance of effector-like CD8+ T cells during chronic viral infection. ***J Exp Med.*** 222(8):e20240829. doi: 10.1084/jem.20240829 (*shared corresponding authors)

Additional Scientific/Scholary Research Achievements (10 selected)

Awards & Prizes

- 12/2010 Karl Landsteiner-Prize awarded by the Austrian Society of Allergology and Immunology
- 06/2011 "Researcher of the Month" selected by Medical University of Vienna
- 11/2011 Sanofi-aventis Prize awarded by Sanofi-aventis GmbH Österreich

Invited presentations to conferences and/or international advanced schools (selected)

- 12/2023 Invited talk at the Institute for Genetic Medicine, Hokkaido University, Sapporo, Japan

Research Funding

- 02/2012 – 11/2016 FWF (Austrian Science Fund) stand-alone project (P23669): "Transcriptional control of cytotoxic T cell differentiation by MAZR", amount: 300 k€
- 07/2015 – 01/2021 FWF (Austrian Science Fund) stand-alone project (P27747): "The role of the MAZR/Runx3 complex in effector CD8+ T cells", amount: 350 k€
- 01/2020 – 12/2020 1st IRC Seed Funding (ISF) Call: "The Role of nuclear receptor co-repressor 1 (NCoR1) for effector/memory CD8+ T cell differentiation", amount: 15 k€
- 04/2022 – ongoing FWF (Austrian Science Fund) stand-alone project (P35436): "Role of HDAC1 in T cell exhaustion during chronic infection", amount: 400 k€
- 04/2022 – 03/2024 Kanazawa University "Sakigake" Project: "Formation of international research center for immunological memory study", amount dedicated to my group: approx. 7 k€
- 08/2024-ongoing FWF (Austrian Science Fund) doc.funds (DOC188): "Securing Host Immunity: Elimination versus Destruction (SHIELD)", amount for my group: approx. 200 k€
- 03/2025-ongoing FWF (Austrian Science Fund) Principal Investigator Projects (PAT 3366823): "Role of PATZ1 for memory CD8+ T cell differentiation", amount: 700 k€