Florian A. Bach

Immunology of early life · Vaccine responsiveness · Immune memory · Systems immunology

Division of Infectious Diseases and Geographic Medicine, Stanford University School of Medicine
fbach@stanford.edu · Google Scholar · ORCID

RESEARCH PROGRAM

My work asks how the earliest pathogen exposures and the developing microbiome set the trajectory of immune maturation and why vaccines so often underperform in the settings that need them most. I combine systems biology tools like plasma proteomics, single-cell transcriptomics, metagenomics, and longitudinal modeling across birth cohorts, and I founded the **Early Life Immunity in Africa (ELIA)** consortium to integrate longitudinal cohort data across African research sites.

APPOINTMENTS

Postdoctoral Scholar *2022–present*
Stanford University School of Medicine, Division of Infectious Diseases. Advisor: Prasanna Jagannathan
Acquired immunity to infection, vaccination, and infant immune development

Postdoctoral Research Associate *2021–2022*
University of Edinburgh, Institute of Immunology and Infection Research. Advisor: Philip J. Spence
Host and parasite transcriptional dynamics during *Plasmodium* reinfection

EDUCATION

Ph.D., Infection and Immunity *2017–2021*
University of Edinburgh, United Kingdom
Wellcome Trust Programme in Hosts, Pathogens and Global Health. Advisor: Philip J. Spence
Deep Profiling of the Human Immune Response to (Re)Infection with Plasmodium falciparum and P. vivax

M.Res., Biomedical Sciences (with Merit) *2016–2017*
University of Edinburgh, United Kingdom
Wellcome Trust Programme in Hosts, Pathogens and Global Health

B.Sc. (Hons.), Virology (First Class) *2012–2016*
University of Glasgow, United Kingdom

GRANTS AND FELLOWSHIPS

Active

K99/R00 Pathway to Independence Award *2026–2030*
NIAID, National Institutes of Health. **Principal Investigator**

Infrastructure and Opportunity Fund Award *2026–2027*
NIAID Human Immunology Project Consortium (HIPC). Co-Investigator $105,850

Seed Grant *2026*
Stanford King Center on Global Development and Stanford Center for Innovation in Global Health.
Co-Investigator. $20,000

Completed

Walter V. and Idun Berry Postdoctoral Fellowship *2023–2026*
The Berry Foundation. $240,000 over three years

Ph.D. Studentship *2016–2020*
Wellcome Trust. $155,338 over 3.5 years

Biomedical Vacation Scholarship *2015*
Wellcome Trust. $2,500

HONORS AND AWARDS

Travel Fellowship, Keystone Symposium on Malaria *2025*

Travel Fellowship, 7th International Conference on *Plasmodium vivax* Research *2019*

e-fellows.net Scholarship *2012*

"SoSein" Prize for contribution to the school community, Elisabeth von Thadden Schule *2012*

PUBLICATIONS

† denotes equal contribution.

Preprints

a. Jiang, Y.†, **Bach, F.A.**†, Houck, J., Carlson, M., Mahamar, A., Santara, G., Attaher, O., Morrison, R., Kumar, S., Armistead, B., Zaidi, I., Kappe, S., Dicko, A., Duffy, P., Fried, M., Pepper, M., Harrington, W.E. Prenatal immune priming to *P. falciparum* is characterized by multi-lineage T cell responses that are influenced by maternal microchimerism and predict malaria outcomes. *bioRxiv* (2026).

b. **Bach, F.A.**, Sigal, G., Wohlstadter, J., Brown, R., Dunn, G., Ngo, T., Ngo, B., Demos, C., Musinguzi, K., Nankya, F., Kakuru, A., Sbarra, A., Dorsey, G., Kamya, M.R., Takahashi, S., Jagannathan, P. Exposure to *P. falciparum* and common cold viruses shape vaccine responses in early life. *bioRxiv* (in revision at *npj Vaccines*) (2026).

c. Nankya, F.†, **Bach, F.A.**†, Press, K.D., Odorizzi, P., Musinguzi, K., Naluwu, K., Ssewanyana, I., Kakuru, A., Kamya, M.R., Dorsey, G., Feeney, M.E., Jagannathan, P. Maternal malaria and early-life infections shape humoral immunity to *P. falciparum* in infants. *bioRxiv* (in revision at *Malaria Journal*) (2026).

Peer-reviewed articles

1. Musinguzi, K., Sbarra, A.N., **Bach, F.A.**, Nankya, F., Achom, K.B., Mwubaha, C., Nayebare, P., Nansubuga, E., Kakuru, A., Kizza, J., Maato, Z., Arinaitwe, E., Press, K.D., Bagaya, B.S., Tukwasibwe, S., Ssewanyana, I., Nankabirwa, J.I., Kamya, M.R., Dorsey, G., Takahashi, S., Jagannathan, P. Low birthweight and prematurity, but not malaria chemoprevention, are associated with reduced pneumococcal vaccine immunogenicity in Ugandan infants. *Journal of Infectious Diseases* (2026).
2. Sbarra, A.N., Stone, W., Tetteh, K., Ssewanyana, I., Musinguzi, K., Rodríguez-Barraquer, I., Jagannathan, P., **Bach, F.A.**, Drakeley, C., Takahashi, S. Assessing the effect of malaria exposure history on tetanus antibody waning rates among children in Jinja and Tororo districts, Uganda. *Journal of Infectious Diseases* (2026).
3. Press, K.D., **Bach, F.A.**, Sola, E., Camanag, K., Dooley, N.L., Ivanawati, A., Oyong, D., Nalubega, M., Kakuru, A., Matsiko, S., Namirimu, N.F., Musinguzi, K., Nalwoga, A., Nansubuga, E., Ategeka, J., Charles, E., Bakar, O., Kashiwagi, C., Ji, X., Miranda, M., Tachiwa-Appiah, J., Sandhu, K., Kamalyan, L., van der Ploeg, K., Boyle, M., Wagar, L.E., Davis, M., Jagannathan, P. Cytotoxic Vδ2$^+$ T cell subsets expand in response to malaria in human tonsil and spleen organoids. *PLOS Pathogens* 22(4):e1013565 (2026).

4. Nideffer, J.F., **Bach, F.A.**, Strubbe, S., Lopez, L., Zedi, M., Nankya, F., Briggs, J., van der Ploeg, K., Musinguzi, K., Kim, S., Garcia Romero, A., Keya, A., Camanag, K., Lewis, S.N., Abdelbasset, M., Wang, B., Boss, A., Nansubuga, E., Nankabirwa, J.I., Arinaitwe, E., Takahashi, S., Dorsey, G., Greenhouse, B., Rodriguez-Barraquer, I., Kamya, M.R., Bacchetta, R., Ssewanyana, I., Haque, A., Roncarolo, M.G., Jagannathan, P. $CXCR6^{+}CD127^{-}$ Tr1 cells balance immunity and persistence in *Plasmodium falciparum* infection. *Journal of Clinical Investigation* (2026).
5. Nideffer, J.F., **Bach, F.A.**, Nankya, F., Musinguzi, K., Borna, S., Mantilla, M., Zedi, M., Garcia Romero, A., Gerungan, C., Yang, N., Kim, S., van der Ploeg, K., Camanag, K., Lopez, L., Nansubuga, E., Nankabirwa, J., Arinaitwe, E., Boonrat, P., Strubbe, S., Cepika, A., Takahashi, S., Dorsey, G., Greenhouse, B., Rodriguez-Barraquer, I., Kamya, M., Bacchetta, R., Ssewanyana, I., Haque, A., Roncarolo, M.G., Jagannathan, P. Clone tracking through repeated malaria identifies high-fidelity memory $CD4^{+}$ T cell responses. *Science Immunology* 10(106):eads2957 (2025).
6. Muñoz Sandoval, D.†, **Bach, F.A.**†, Ivens, A., Harding, A.C., Smith, N.L., Mazurczyk, M., Themistocleous, Y., Edwards, N.J., Silk, S.E., Barrett, J.R., Cowan, G.J.M., Napolitani, G., Savill, N.J., Draper, S.J., Minassian, A.M., Nahrendorf, W., Spence, P.J. *Plasmodium falciparum* induces T cell tolerance that is associated with decreased disease severity upon reinfection. *Journal of Experimental Medicine* 222(7):e20241667 (2025).
7. Hou, M.M., Harding, A.C., Barber, N.M., Kundu, P., **Bach, F.A.**, Salkeld, J., Themistocleous, Y., Greenwood, N.M., Cho, J.S., Barrett, J.R., Nugent, F.L., Rawlinson, T.A., Hodgson, S.H., Khozoee, B., MacLochlainn, D.J., Cowan, R.E., Poulton, I.D., Baker, M., Kingham, L., Mitton, C.H., Platt, A., Ramon, R.L., Ramos Lopez, F., Thomas, M., Skinner, K., Quinkert, D., Pipini, D., Lias, A.M., Bardelli, M., Edwards, N.J., Donnellan, F.R., Biswas, S., Rayner, J.C., Nielsen, C.M., Silk, S.E., Draper, S.J., Nahrendorf, W., Spence, P.J., Minassian, A. Development of clinical immunity to *Plasmodium vivax* following repeat controlled human malaria infection. *Nature Communications* (2025).
8. Spence, P.J., Nahrendorf, W., **Bach, F.A.**. Moving beyond discovery science to a mechanistic understanding of human malaria. *Current Opinion in Microbiology* (2025). [Invited review]
9. Tukwasibwe, S., Lewis, S.N., Taremwa, Y., van der Ploeg, K., Press, K.D., Ty, M., Namirimu Nankya, F., Musinguzi, K., Nansubuga, E., **Bach, F.A.**, Chamai, M., Okitwi, M., Tumusiime, G., Nakimuli, A., Colucci, F., Kamya, M.R., Nankabirwa, J.I., Arinaitwe, E., Greenhouse, B., Dorsey, G., Rosenthal, P.J., Ssewanyana, I., Jagannathan, P. Natural killer cell antibody-dependent cellular cytotoxicity to *Plasmodium falciparum* is impacted by cellular phenotypes, erythrocyte polymorphisms, parasite diversity and intensity of transmission. *Clinical & Translational Immunology* 13(11):e70005 (2024).
10. **Bach, F.A.**, Muñoz Sandoval, D., Mazurczyk, M., Themistocleous, Y., Rawlinson, T.A., Kemp, A., Silk, S.E., Barrett, J.R., Edwards, N.J., Ivens, A., Rayner, J.C., Minassian, A.M., Napolitani, G., Draper, S.J., Spence, P.J. A systematic analysis of the human immune response to *Plasmodium vivax*. *Journal of Clinical Investigation* (2023).
11. Salkeld, J., Themistocleous, Y., Barrett, J.R., Mitton, C.H., Rawlinson, T.A., Payne, R.O., Hou, M.M., Khozoee, B., Edwards, N.J., Nielsen, C.M., Muñoz Sandoval, D., **Bach, F.A.**, Nahrendorf, W., Ramon, R.L., Baker, M., Ramos-Lopez, F., Folegatti, P.M., Quinkert, D., Ellis, K.J., Poulton, I.D., Lawrie, A.M., Cho, J.S., Nugent, F.L., Spence, P.J., Silk, S.E., Draper, S.J., Minassian, A.M. Repeat controlled human malaria infection of healthy UK adults with blood-stage *Plasmodium falciparum*: safety and parasite growth dynamics. *Frontiers in Immunology* (2022).
12. Minassian, A.M., Themistocleous, Y., Silk, S.E., Barrett, J.R., Kemp, A., Quinkert, D., Nielsen, C.M., Edwards, N.J., Rawlinson, T.A., Ramos Lopez, F., Roobsoong, W., Ellis, K.J., Cho, J.S., Aunin, E., Otto, T.D., Reid, A.J., **Bach, F.A.**, Labbé, G.M., Poulton, I.D., Marini, A., Zaric, M., Mulatier, M., Lopez Ramon, R., Baker, M., Mitton, C.H., Sousa, J.C., Rachaphaew, N., Kumpitak, C., Maneechai, N., Suansomjit, C., Piteekan, T., Hou, M.M., Khozoee, B., Roberts, D.J., Lawrie, A.M., Blagborough, A.M., Nugent, F.L., Taylor, I.J.,

Johnson, K.J., Spence, P.J., Sattabongkot, J., Biswas, S., Rayner, J.C., Draper, S.J. Controlled human malaria infection with a clone of *Plasmodium vivax* with high-quality genome assembly. *JCI Insight* (2021).

13. Froy, H., Sparks, A.M., Watt, K., Sinclair, R., **Bach, F.A.**, Pilkington, J.G., Pemberton, J.M., McNeilly, T.N., Nussey, D.H. Senescence in immunity against helminth parasites predicts adult mortality in a wild mammal. *Science* 365(6459):1296–1298 (2019).

SELECTED PRESENTATIONS

Oral

Annual Scientific Advisory Board Meeting, Stanford Center for Human Systems Immunology. "The Early Life Immunity in Africa consortium: a discovery platform for improving child health in Africa" *2026*

Center for Malaria and Vector-Borne Diseases, San Francisco. "Malaria chemoprevention alters infant immune development." *2025*

Bay Area World Malaria Day Forum, San Francisco. "Learning immunity from population trends." *2025*

BioMalPar XXI, EMBL Heidelberg. "Infant malaria impacts immune system development in infants." *2025*

8th International Conference on *Plasmodium vivax* Research. "Controlled human infection reveals parasite-specific immune responses." *2022*

4th German Mass Cytometry User Forum, Berlin. "Deep profiling of the naïve immune response to *P. vivax*." *2021*

MultiViVax Annual Meeting. "Deep profiling of the naïve immune response to *P. vivax*." *2020*

7th International Conference on *Plasmodium vivax* Research, Paris. "Using systems immunology to understand clinical immunity." *2019*

MultiViVax Annual Meeting, Faro. "Patterns of T cell activation during *vivax* CHMI." *2019*

Poster

Keystone Symposium on Malaria, Santa Fe · British Society for Immunology Congress, Edinburgh · NextGen Immunology, Rehovot · *P. vivax* Research Conference, Paris · Edinburgh Infectious Disease Symposium · Wellcome Centre for Molecular Parasitology Retreat, Luss *2016–2025*

TEACHING AND MENTORSHIP

Research mentor to two doctoral candidates, Infectious Diseases Research Collaboration, Uganda >1 year each *2023–present*

Three rotation graduate students, Stanford University *2023–present*

One postbaccalaureate research scholar, Stanford University *2024–2025*

Instructor, Coding Club — R and reproducible research, University of Edinburgh *2018–2019*

Teaching assistant, undergraduate laboratory practicals, University of Edinburgh *2018–2019*

Science outreach with The University of Edinburgh's "Bugs and Bones Box" (educational activity aimed at 6-10 year olds) *2017-2018*

Science outreach with Lilach Sheiner's "Build a Parasite" (educational activity aimed at 3-8 year olds) *2015-2016*

SERVICE TO THE PROFESSION

Founder and coordinator, Early Life Immunity in Africa (ELIA) consortium: a multi-site consortium to leverage systems biology tools for studying immune development in African birth cohorts *2025–present*

I have peer reviewed articles for: *PLOS Pathogens*, *Journal of Infectious Diseases*, *Parasite Immunology*

TECHNICAL EXPERTISE

High-dimensional immunology single-cell RNA-seq and TCR repertoire analysis · mass cytometry (CyTOF) · spectral flow cytometry · bulk and whole-blood RNA-seq · shotgun metagenomics

Plasma and serological profiling NULISA · Luminex · Meso Scale Discovery · multiplexed antigen-specific serology

Human infection and clinical studies design and sample processing across eight controlled human malaria infection trials · longitudinal birth-cohort operations

Computation and statistics R (expert), Python, Bash · linear and generalized linear mixed models · survival and longitudinal incidence analysis · machine learning for immune signature discovery · Seurat, CATALYST, DESeq2, edgeR, openCyto, tidyverse · Slurm/SGE · Quarto/R Markdown

Languages German (native) · English (fluent) · French (intermediate) · Spanish (elementary)