

# Sudhir Kumar

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## CURRENT POSITION

Assistant Professor; Department of Biomedical Sciences, Iowa State University, Ames, IA, USA.  
Assistant Professor; (courtesy appointment); Roy J. Carver Department of Biochemistry, Biophysics and Molecular Biology, Iowa State University, Ames, IA, USA.

## EDUCATION

2017 **Ph.D., National Institute of Immunology (NII)/ Jawaharlal Nehru University**, New Delhi, India.  
Malaria: Cell Biology, Signaling, Biochemistry  
2011 **M.Sc., University of Delhi**, New Delhi, India.  
Plant Molecular Biology and Biotechnology  
2008 **B.Sc. (Honors), Sri Venkateswara College, University of Delhi**, New Delhi, India.  
Zoology

## RESEARCH EXPERIENCE

2023-present **Assistant Professor**; Iowa State University, Ames, IA, USA.  
2023-2023 **Senior Research Scientist**. Mentor: Prof. Stefan H.I. Kappe, Ph.D; Seattle Children's Research Institute, Seattle, WA, USA.  
2022-2023 **Research Scientist IV**. Mentor: Prof. Stefan H.I. Kappe, Ph.D; Seattle Children's Research Institute, Seattle, WA, USA.  
2021-2022 **Research Scientist III**. Mentor: Prof. Stefan H.I. Kappe, Ph.D; Seattle Children's Research Institute, Seattle, WA, USA.  
2017-2021 **Postdoctoral Scientist**. Mentor: Prof. Stefan H.I. Kappe, Ph.D; Seattle Children's Research Institute, Seattle, WA, USA.

Project 1. Refining Mendelian genetics of malaria parasites (NIH P01 project with University of Notre Dame and Texas Biomed Research Institute).

Project 2. Identification and characterization of *Plasmodium* gamete fusogens.

Project 3. Identification and characterization of *Plasmodium* fertility related genes.

Project 4. Characterization of *Plasmodium* splicing related kinase (SRPK1) and CDK-related kinase (CRK5) mediated signaling.

2011-2017 **Ph.D. Thesis. National Institute of Immunology**, New Delhi, India.  
Project. Dissection of second messenger mediated signaling in the malaria parasite.

2008-2011 **Master's Thesis. Dept. of Plant Molecular Biology, University of Delhi, New Delhi, India.**  
Project. Preparation and cloning of *Oryza sativa* (rice) OsCMT1:GUS/GFP constructs for validation of pollen-specific activity”.

**PUBLICATIONS** (Total- 26, First author- 15<sup>†</sup>, as Corresponding author\*\*- 8)

- 2023 Sydney Mauer, Nelly M. Camargo, Biley A. Abatiyow, Olivia R. Gargaro, Stefan H.I. Kappe, **Sudhir Kumar**\*\* . *Plasmodium* microtubule binding protein EB1 is critical for partitioning of nuclei in male gametogenesis. *mBio*. 2023. (\*\*Corresponding author).
- 2023 Charlie Jennison, Janna M. Gibson, Nina Hertoghs, Dorender A. Dankwa, **Sudhir Kumar**, Biley A. Abatiyow, Nana K. Minkah, Kristian E. Swearingen, Myo Naung, Alyssa E. Barry, Stefan H. I. Kappe, Ashley M. Vaughan. *Plasmodium berghei* GPI Anchored Micronemal Antigen is essential for parasite transmission through the mosquito host. *Molecular Microbiology*. 2023.
- 2023 Alfred Amambua-Ngwa<sup>†</sup>, Katrina A. Button-Simons<sup>†</sup>, Xue Li<sup>†</sup>, **Sudhir Kumar**<sup>†</sup>, Katelyn Vendrely Brenneman<sup>†</sup>, Marco Ferrari, Lisa A. Checkley, Meseret T. Haile, Douglas A. Shoue, Marina McDew-White, Sarah M Tindall, Ann Reyes, Elizabeth Delgado, Haley Dalhoff , James K. Larbalestier, Roberto Amato, Richard D Pearson, Alexander B. Taylor, François H. Nosten, Umberto D'Alessandro, Dominic Kwiatkowski, Ian H. Cheeseman, Stefan H. I. Kappe, Simon V Avery, David J. Conway, Ashley M. Vaughan, Michael T. Ferdig, Timothy J. C. Anderson. Chloroquine resistance evolution in *Plasmodium falciparum* is mediated by the putative amino acid transporter AAT1. *Nature Microbiology*. 2023. (<sup>†</sup>Joint first author).
- 2023 Antonino Schepis, **Sudhir Kumar**, Stefan H. I. Kappe. Malaria parasites harness Rho GTPase signaling and host cell membrane ruffling for productive invasion of hepatocytes. *Cell Reports*. 2023.
- 2023 Pankaj Chandley, Ravikant Ranjan, **Sudhir Kumar** and Soma Rohatgi. Host Immunity against *Plasmodium*: Immune evasion and Immunotherapies. *Frontiers in Immunology*. 2023.
- 2022 **Sudhir Kumar**, Clari Valansi, Meseret T. Haile, Xiaohui Li, Kateryna Flyak, Abhisek Dwivedy, Biley A. Abatiyow, Amanda S. Leeb, Spencer Y. Kennedy, Nelly M. Camargo, Ashley M. Vaughan, Nicolas G. Brukman, Benjamin Podbilewicz, Stefan H.I. Kappe. Malaria parasites utilize two essential plasma membrane fusogens for gamete fertilization. *Cellular and Molecular Life Sciences*. 2022.
- 2022 **Sudhir Kumar**\*\* , Olivia Gargaro, Stefan H.I. Kappe. Plasmodium falciparum CRK5 is critical for male gametogenesis and transmission to the mosquito. *mBio*. 2022. (\*\*Corresponding author).
- 2022 **Sudhir Kumar**\*\* , Stefan H.I. Kappe\*\*. *PfHMGB2* has a role in malaria parasite mosquito infection. *Frontiers in Cellular and Infection Microbiology*. 2022. (\*\*Joint Corresponding author).
- 2022 **Sudhir Kumar**\*\* , Vinay K. Baranwal, Amanda S. Leeb, Meseret T. Haile, Kenza M.Z. Oualim, Nina Hertoghs, Ashley M. Vaughan, Stefan H.I. Kappe\*\*. *PfSRPK1* Regulates Asexual Blood Stage Schizogony and Is Essential for Male Gamete Formation. *Microbiology Spectrum*. 2022. (\*\*Joint Corresponding author).

- 2022 Mariana De Niz<sup>¶</sup>, Daniel Gold<sup>¶</sup>, **Sudhir Kumar**<sup>¶</sup>, Fred D. Mast<sup>¶</sup>, Dave Richard<sup>¶</sup>, Maria L. Simões<sup>¶</sup>. Editorial: Rising Stars in Parasite and Host 2022. **Frontiers in Cellular and Infection Microbiology**. 2022. (in press). (<sup>¶</sup>**Equal contribution**).
- 2022 Sean C. Murphy, Ashley M. Vaughan, James G. Kublin, Matthew Fishbauger, Annette M. Seilie, Kurtis P. Cruz, Tracie Mankowski, Melike Firat, Sara Magee, Will Betz, Heather Kain, Nelly Camargo, Meseret T. Haile, Janna Gibson, Emma Fritzen, Nina Hertoghs, **Sudhir Kumar**, D. Noah Sather, Leeya F Pinder, Gregory A. Deye, Shirley Galbiati, Casey Geber, Jessica Butts, Lisa A. Jackson, Stefan H.I. Kappe. A genetically engineered *Plasmodium falciparum* parasite vaccine provides protection from controlled human malaria infection. **Science Translational Medicine**. 2022. **Cover page article**.
- 2022 Xue Li, **Sudhir Kumar**, Katelyn V. Brenneman, and Tim J. C. Anderson. Bulk segregant linkage mapping for rodent and human malaria parasites. **Parasitology International**. 2022.
- 2022 **Sudhir Kumar**<sup>\*\*</sup>, Vinay K. Baranwal, Meseret T. Haile, Biley A. Abatiyow, Kenza M.Z. Oualim, Ashley M. Vaughan, Stefan H.I. Kappe<sup>\*\*</sup>. *PfARID* regulates *Plasmodium falciparum* malaria parasite male gametogenesis and female fertility and is critical for parasite transmission to the mosquito vector. **mBio**. 2022. (<sup>\*\*</sup>**Joint Corresponding author**).
- 2022 **Sudhir Kumar**<sup>¶</sup>, Xue Li<sup>¶</sup>, Marina McDew-White, Ann Reyes, Elizabeth Delgado, Abeer Sayeed, Meseret T. Haile, Biley A. Abatiyow, Spencer Y. Kennedy, Nelly M. Camargo, Lisa A. Checkley, Katelyn V. Brenneman, Katrina A. Button-Simons, Manoj T. Duraisingh, Ian H. Cheeseman, Stefan H. I. Kappe, François Nosten, Michael T. Ferdig, Ashley M. Vaughan and Tim J. C. Anderson. A malaria parasite cross reveals genetic determinants of *Plasmodium falciparum* growth in different culture media. **Frontiers in Cellular and Infection Microbiology**. 2022. (<sup>¶</sup>**Joint first author**).
- 2022 **Sudhir Kumar**<sup>\*\*</sup>, Biley A. Abatiyow, Kenza M. Z. Oualim, Meseret T. Haile, Ashley M. Vaughan, Stefan H.I. Kappe<sup>\*</sup>. A putative *Plasmodium* RNA-binding protein plays a critical role in female gamete fertility and parasite transmission to the mosquito vector. **Frontiers in Cell and Developmental Biology**. 2022. (<sup>\*\*</sup>**Joint Corresponding author**).
- 2022 Katelyn Vendrely Brenneman<sup>¶</sup>, Xue Li<sup>¶</sup>, **Sudhir Kumar**<sup>¶</sup>, Elizabeth Delgado, Lisa A. Checkley, Douglas A. Shoue, Ann Reyes, Biley A. Abatiyow, Meseret T. Haile, Rupam Tripura, Tom Peto, Dysoley Lek, Katrina A Button-Simons, Stefan H. Kappe, Mehul Dhorda, François Nosten, Standwell C. Nkhoma, Ian H. Cheeseman, Ashley M. Vaughan, Michael T. Ferdig, Tim J. C. Anderson. Optimizing bulk segregant analysis of drug resistance in *Plasmodium falciparum* using genetic crosses conducted in humanized mice. **iScience**. 2022. (<sup>¶</sup>**Joint first author**).
- 2022 **Sudhir Kumar**<sup>\*\*</sup>, Amanda S. Leeb, Ashley M. Vaughan and Stefan H. I. Kappe. A *Plasmodium falciparum* Cysteine Rich Secretory protein uniquely localizes to one end of male gametes. **Molecular and Biochemical Parasitology**. 2022. (<sup>\*\*</sup>**Corresponding author**).
- 2022 Debashree Goswami, **Sudhir Kumar**<sup>¶</sup>, William Betz<sup>¶</sup>, Janna Gibson, Meseret T. Haile, Nelly Camargo, Sean C. Murphy, Ashley M. Vaughan, Stefan H.I. Kappe. A *Plasmodium falciparum* ATP binding cassette transporter is essential for liver stage entry into schizogony. **iScience**. 2022. (<sup>¶</sup>**Equal contribution**).
- 2022 Brandon K. Wilder, Vladimir Vigdorovich, Sara Carbonetti, Nana Minkah, Nina Hertoghs, Andrew Raappana, Hayley Cardamone, Brian G. Oliver, Olesya Trakhimets, **Sudhir Kumar**, Nicholas

- 2021 Dambrauskas, Silvia A. Arredondo, Nelly Camargo, Annette Seilie, Sean Murphy, Stefan H.I. Kappe, D. Noah Sather. Anti-TRAP/SSP2 monoclonal antibodies can inhibit sporozoite infection and may enhance protection of anti-CSP monoclonal. *npj Vaccines*. 2022.  
**Sudhir Kumar**<sup>\*\*</sup>, Meseret T. Haile, Michael R. Hoopmann, Linh T. Tran, Samantha A. Michaels, Seamus R. Morrone, Kayode K. Ojo, Laura M. Reynolds, Ulrike Kusebauch, Ashley M. Vaughan, Robert L. Moritz, Stefan H.I. Kappe, Kristian E. Swearingen<sup>\*\*</sup>. *Plasmodium falciparum* Calcium Dependent Protein Kinase 4 is critical for male gametogenesis and transmission to the mosquito vector. *mBio*. 2021. (**\*\*Joint Corresponding author**).
- 2021 Katrina A. Button-Simons, **Sudhir Kumar**, Nelly Camargo, Meseret T. Haile, Catherine Jett, Lisa A. Checkley, Spencer Y. Kennedy, Richard S. Pinapati, Douglas A. Shou, Marina McDew-White, Xue Li, François H. Nosten, Stefan H. Kappe, Timothy J. C. Anderson, Jeanne Romero-Severson, Michael T. Ferdig, Scott J. Emrich, Ashley M. Vaughan, Ian H. Cheeseman. The power and promise of genetic mapping from *Plasmodium falciparum* crosses utilizing human liver-chimeric mice. *Communications Biology*. 2021.
- 2021 Ryan W. J. Steel, Vladimir Vigdorovich, Nicholas Dambrauskas, Brandon K. Wilder, Silvia A. Arredondo, Debashree Goswami, **Sudhir Kumar**, Sara Carbonetti, Kristian E. Swearingen, Robert L. Moritz, Thao Nguyen, Will Betz, Nelly Camargo, Bridget S. Fisher, Jo Soden, Helen Thomas, Jim Freeth, D. Noah Sather, Stefan H.I. Kappe. Platelet Derived Growth Factor Receptor  $\beta$  (PDGFR $\beta$ ) is a host receptor for the human malaria parasite adhesin TRAP. *Scientific Reports*. 2021.
- 2020 Katelyn Vendrely<sup>¶</sup>, **Sudhir Kumar**<sup>¶</sup>, Xue Li<sup>¶</sup>, Ashley M Vaughan. Humanized mice and the rebirth of malaria genetic crosses. *Trends in Parasitology*. 2020. (<sup>¶</sup>**Joint first author**).
- 2019 Xue Li<sup>¶</sup>, **Sudhir Kumar**<sup>¶</sup>, Marina McDew-White, Meseret Haile, Ian H. Cheeseman, Scott Emrich, Katie Button-Simons, François Nosten, Stefan H. I. Kappe, Michael T. Ferdig, Tim J. C. Anderson, Ashley M. Vaughan. Genetic mapping of fitness determinants across the malaria parasite *Plasmodium falciparum* life cycle. *PLoS Genetics*. 2019. (<sup>¶</sup>**Joint first author**). **Recommended in Faculty Opinions**.
- 2017 **Sudhir Kumar**, Manish Kumar, Roseleen Ekka, R, Jeffrey D. Dvorin, Aditya S. Paul, Anil Kumar Madugundu, Tim W. Gilberger, Harsha Gowda, Manoj T. Duraisingh, T. S. K. Prasad, Pushkar Sharma. *PfCDPK1* mediated signaling in erythrocytic stages of *Plasmodium falciparum*. *Nature Communications*. 2017. **Recommended in Faculty Opinions**.
- 2017 Pushkar Sharma, **Sudhir Kumar**. Signaling in malaria parasites. *Advances in Malaria Research*. **Wiley online library**. 291-305 Chapter 10. 2017.

#### **PubMed:**

<https://www.ncbi.nlm.nih.gov/myncbi/sudhir.kumar.3/bibliography/public/?sortBy=pubDate&sdirection=descending>

#### **Patent**

1. **Sudhir Kumar**, Stefan H.I. Kappe, Ashley M. Vaughan, D. Noah Sather. Filed US patent application for “Broker compositions and methods for targeting a *Plasmodium* male gamete-expressed protein to block malaria parasite transmission”. 2021.

## Fellowships

- 2011 **Junior Research Fellowship** from Council for Scientific Research and Industrial Research. Govt. of India.
- 2011 **Junior Research Fellowship** from Department of Biotechnology, Govt. of India. (not availed)
- 2010 **Junior Research Fellowship** from Council for Scientific Research and Industrial Research. Govt. of India. (not availed)
- 2010 **Junior Research Fellowship** from Department of Biotechnology, Govt. of India. (not availed)
- 2010 **Junior Research Fellowship** from Indian Council of Medical Research. Govt. of India. (not availed).

## HONORS and AWARDS

- 2017 **Finalist for Inspiring Science Award, Cell Press-TNQ**, for best life science research paper published from India. Awarded a medal, citation, and a MacBook pro laptop.

## Membership of professional society

- American society for Microbiology (ASM)  
American Society for Biochemistry and Molecular Biology (ASBMB)

## INVITED TALKS

21. Midwest Neglected Infectious Diseases (MNID-2023) meeting, Champaign, USA, University of Illinois Urbana-Champaign. 11- 12 Aug 2023.
20. Biology and Pathology of the Malaria Parasite (BioMalPar) XIX meeting, Heidelberg, Germany, Virtual meeting. 23 - 25 May 2023.
19. Protein Kinases of Parasitic Protozoa V, College of Medicine, University of Central Florida, Florida, USA. March 20- March 23, 2023.
18. Special Lecture, Delhi Skill and Entrepreneurship university, Dwarka, New Delhi, India. Nov 11, 2022.
17. American Society for Tropical Medicine and Hygiene (ASTMH) meeting. Oct 30- Nov 3. 2022.
16. Center for Emerging and Re-emerging Infectious Diseases (CERID), University of Washington, WA, USA. 28 October 2022.
15. Future of Malaria Research Symposium, John Hopkins University, Baltimore, Maryland, USA. October 28, 2022.
14. Invited seminar, Department of Biological sciences and Bioengineering, Indian Institute of Technology, Roorkee, Uttarakhand, India. October 19, 2022.
13. Invited seminar, Department of Zoology, Sri Venkateswara College, University of Delhi, New Delhi, October 17, 2022.
12. Molecular Parasitology Meeting (MPM), XXXIII, Woods Hole, MA, USA, virtual/ in person meeting. September 18-22, 2022.
11. Invited seminar, Division of Emerging and Transfusion Transmitted Diseases (DETTD), Food and Drug Administration, Department of Health and Human services, USA, 4 May, 2022.
10. Pathogen Interest Group Meeting, CGIDR, Seattle Children's research Institute, WA, USA. 2022.
9. 5<sup>th</sup> Annual SCRI Research Symposium for postdocs and students, Seattle, USA, 9 Dec. 2021.
8. American Society for Tropical Medicine and Hygiene (ASTMH) meeting. 17-21 Nov. 2021.
7. Molecular Parasitology Meeting (MPM), XXXII, Woods Hole, MA, USA, virtual/ in person meeting. October 5-9. 2021.

6. Center for Emerging and Re-emerging Infectious Diseases (CERID), University of Washington, WA, USA. 2021.
5. Biology and Pathology of the Malaria Parasite (BioMalPar) XVII meeting, Heidelberg, Germany, Virtual meeting. 25 - 27 May. 2021.
4. Pathogen Interest Group Meeting, CGIDR, Seattle Children's research Institute, WA, USA. 2021.
3. Center for Emerging and Re-emerging Infectious Diseases (CERID), University of Washington, WA, USA. 2020.
3. Pathogen Interest Group Meeting, CGIDR, Seattle Children's research Institute, WA, USA. 2020.
2. American Society for Tropical Medicine and Hygiene (ASTMH) meeting Symposium #97. 2020.
1. Biology and Pathology of the Malaria Parasite (BioMalPar) XV meeting, Heidelberg, Germany, 28 - 30 May 2019.

### **EDITOR FUNCTIONS**

#### ***Manuscripts, Reviews, Opinions (for the following journals):***

Cellular and Molecular Life Sciences (CMLS)  
Frontiers in Cellular and Infection Microbiology

### **REVIEW FUNCTIONS**

#### ***Manuscripts (for the following journals):***

Nature Communications, Communications Biology, Cellular and Molecular Life Sciences (CMLS), Pathogens and Disease (Oxford Academic), Frontiers in Microbiology, Frontiers in Immunology, Evidence-Based Complementary and Alternative Medicine

### **Ongoing research support**

#### **2023-2026 Faculty start up grant (Kumar), Iowa State University**

This is my faculty start up grant towards establishing an independent research program at Biomedical Sciences, Iowa State University. My major goal for my research program is studying the mechanism of *Plasmodium falciparum* gametogenesis and gamete fertility which regulates parasite transmission to mosquitoes. These studies would help design transmission-blocking interventions and thus disease spread.

**Role:** Principal investigator

### **Completed research support**

#### **2017-2022 P01AI127338 (Ferdig), Notre Dame/NIH**

Harnessing the power of experimental genetic crosses and systems genetics to probe drug resistance in malaria (Project 1: Refining Mendelian genetics of malaria parasites). The overall goal of this Program Project grant (P01) is to comprehensively elucidate and map the complex genetic architectures that underlie malaria parasite drug resistance. The goal is to contribute critical new insights and tools to track, avoid and possibly counteract these parasite traits that pose a continuous threat to global health.

**Role:** Research Scientist