

## **Curriculum Vitae**

Dipak K. Raj, PhD

### **Associate Professor**

Division of Infectious Disease & International Medicine  
University of South Florida | USF Health Morsani College of Medicine

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### **EDUCATION**

Master of Science

Punjab University Chandigarh, MS  
in Biotechnology, 1999

Graduate School

Utkal University, Ph.D. in Life  
Sciences, 2005

### **POSTGRADUATE TRAINING**

Postdoctoral Fellowship

LMVR/NIAID, National Institute of  
Health, Bethesda, MD 20892-4874.  
Field of study: Identification of drug-  
resistant gene and vaccine candidate  
for falciparum malaria 2005-2010

### **ACADEMIC APPOINTMENTS**

2004-2005 Consultant to Department of Vector Research, Institute of Life Sciences, India,

2005-2010 Postdoctoral Fellow, LMVR/NIAID, National Institute of Health, MD, USA

2010- 2014 Research Scientist, CIHR/ Rhode Island Hospital, USA

2014 - 2021 Assistant Professor, of Pathology and Laboratory Medicine, Brown University, RI,  
USA

2021- Assistant Professor (Adjunct ) of Pathology and Laboratory Medicine, Brown  
University, RI, USA

2021- Associate Professor, Division of Infectious Disease & International Medicine  
University of South Florida | USF Health Morsani College of Medicine, FL, USA

### **SCIENTIFIC REVIEW APPOINTMENTS**

NIH/NIAID, The Small Business Innovation Research (**SBIR**) Study section, November 2018

NIH/NIAID, The Small Business Innovation Research (**SBIR**) Study section, March 2019

NIH/NIAID, The Small Business Innovation Research (**SBIR**) Study section, June 2019

NIH/NIAID, Vaccines against Microbial Diseases (**VMD**) Study section, May 2020

NIH/DNDA, clinical Neuroimmunology and brain tumors (**CNBT**), Study section, October 2020

NIH/NIAID, The Small Business Innovation Research (**SBIR**) Study section, March 2021

NIH/NIAID, Infectious Diseases Vaccines, Therapeutics, and Vector Biology”(AIDC-V) Study section, July 2021

NIH/DNDA, clinical Neuroimmunology and brain tumors (**CNBT**), Study section, October 2021

### **PUBLICATIONS**

#### Original peer-reviewed publication

1. **Raj DK**, Das BR, Dash AP and Supakar PC. Identification of telomerase activity in gametocytes of *Plasmodium falciparum*. Biochemical and Biophysical Research Communication. 2003; 309 (3): 685-8.
2. **Raj DK**, Das BR, Dash AP and Supakar PC. Genetic diversity in MSA-1 gene of *Plasmodium falciparum* in different malaria-endemic localities. American Journal of Tropical Medicine and Hygiene 2004;71 (3):285-9.
3. **Raj DK**, Das BR, Dash AP and Supakar PC. Detection of a rare point mutation in the C-terminus conserve region of MSA-1 gene in *Plasmodium falciparum*. Experimental Parasitology 2004;106 (1-2): 45-49.
4. Mishra K, **Raj DK**, Dash AP and Hazra RK. Combined detection of *Brugia malayi* and *Wuchereria bancrofti* using single PCR. Acta Trop. 2005; 93(3): 233-7.
5. Mishra K, **Raj DK**, Dash AP and Hazra RK. A simple Para film-based membrane-feeding method for in vivo radioisotope labeling of the polypeptide in mosquitoes. Annals of Tropical Medicine and Parasitology 2005; 99(8) 803-806.
6. **Raj DK**, Mishra S, Das BR, and Dash AP. *Plasmodium falciparum* Pfs25 gene promoter has no polymorphism in natural isolates of Eastern India Acta Protozoologica 2005; 44, 289-292.

7. Mishra S, **Raj DK**, Dash AP, and Supakar PC. An efficient detection of chloroquine resistance marker in pfCRT gene of *Plasmodium falciparum* by PCR-SSCP analysis in eastern Indian isolates. *Transaction of Royal Society of Tropical Medicine and Hygiene* 2006; 100(3): 243-7.
8. Mishra K, **Raj DK**, Hazra RK, Dash AP and Supakar PC. The development and evaluation of a single-step multiplex PCR method for simultaneous detection of *Brugia malayi* and *Wuchereria bancrofti*. *Mol Cell Probes*. 2007; 21: 355-62.
9. **Raj DK**, Mu J, Jiang H, Kabat J, Singh S, Sullivan M, Fay MP, McCutchan TF, Su XZ. Disruption of a *Plasmodium falciparum* multidrug resistance-associated protein (PFMRP) alters its fitness and transport of antimalarial drugs and glutathione. *Journal of Biological Chemistry* 2010; March 20; 284(12):7687-96.
10. Eastman RT, Pattaradilokrat S, **Raj DK**, Dixit S, Deng B, Miura K, Yuan J, Tanaka TQ, Johnson RL, Jiang H, Huang R, Williamson K, Lambert LE, Long C, Austin CP, Wu Y, and Su XZ. A Class of Tricyclic Compounds Blocking Malaria Oocyst Development and Transmission. *Antimicrobial Agents and Chemotherapy* 2012; Jan; 57(1): 425-35.
11. **Raj DK**, Nixon CP, Nixon CE, Dvorin JD, DiPetrillo CG, Pond-Tor S, Wu HW, Jolly G, Pischel L, Lu A, Michelow IC, Cheng L, Conteh S, McDonald EA, Absalon S, Holte SE, Friedman JF, Fried M, Duffy PE, and Kurtis JD. Antibodies to PfSEA-1 block parasite egress from RBCs and protect against malaria infection. *Science* 2014; 344:871-7. (IF: 41.845)
12. Nixon CE, Park S, Pond-Tor S, **Raj DK**, Lambert L, Orr-Gonzales S, Barnafo E, Friedman JF, Fried M, Duffy PE, and Kurtis JD. Identification of protective B-cell epitopes within the novel malaria vaccine candidate P. falciparum Schizont Egress Antigen-1. *Clinical and Vaccine Immunology* 2017; July 5; 24(7). PMID: 28468980 (IF: 3.5)
13. Nixon CP, Silva-Viera RA, Nixon CE, Obeidallah SA, Jha A, Dockery D, **Raj DK**, Park S, Patrick E, Duffy PE, and Kurtis JD. Antibodies to Pfs355, A Novel Early Gametocyte Protein, Predict Decreased Plasmodium falciparum Gametocyte Density In Humans. *Journal of Infectious Diseases*, 2018 October 20; 218(11): 1792-1801. PMID: 29982707 (IF: 5.02)
14. **Raj DK\***, Kurtis JD\*, Park S, Nixon CE, McDonald EA, Nixon CP, Pond-Tor S, Jha A, Taliano RJ, Kabyemela ER, Friedman JF, Duffy PE and Fried M. 2018. Maternally derived antibodies to Schizont Egress Antigen-1 protect offspring from severe malaria. *Clinical Infectious Diseases*. 2019 May 2; 68 (10):1718-1724. PMID: 30165569 (IF: 9.08)  
 \* Equal contribution as 1<sup>st</sup> and communicating Author
15. Clements RL, Strevva V, Dumoulin P, Huang W, **Raj DK**, Barbara Burleigh B, Llinás M, Winzeler E, Zhang Q, and Dvorin JF, 2019. A novel antiparasitic compound kills ring-stage Plasmodium falciparum and retains activity against artemisinin-resistant parasites. *Journal of Infectious Diseases* 2019 October 16. PMID: 31616928 (IF: 5.02)
16. **Raj DK**, Das Mohapatra A, Jnawali A, Zuromski J, Jha A, Cham-Kpu G, Sherman B, Rudlaff RM, Nixon CE, Hilton N, Oleinikov AV, Chesnokov O, Merritt J, Pond-Tor S, Burns L, Jolly G, Ben

Mamoun C, Kabyemela E, Muehlenbachs A, Lambert L, Orr-Gonzalez S, Gnädig NF, Fidock DA, Park S, Dvorin JD, Pardi N, Weissman D, Mui BL, Tam YK, Friedman JF, Fried M, Duffy PE, Kurtis JD. Anti-PfGARP activates programmed cell death of parasites and reduces severe malaria. *Nature*. 2020 Jun; 582(7810): 104-108. PMID: 32427965 (IF: 42.778)

17. Michelow IC, Park S, Tsai SW, Rayta B, Pasaje CFA, Nelson S, Early AM, Frosch AP, Ayodo G, **Raj DK**, Nixon CE, Nixon CP, Pond-Tor S, Friedman JF, Fried M, Duffy PE, Roch KGL, Niles JC, Kurtis JD. A Newly Characterized Malaria Antigen on Erythrocyte and Merozoite Surfaces Induces Parasite Inhibitory Antibodies. *Journal of Experimental Medicine*. 2021 September 6;218(9), Epub 2021 August 3. PMID: 34342640 (IF: 14.31)

## **PATENTS**

1. Su XZ, Yuan J, **Raj DK**, Pattaradilokart S, Jonshon R, and Huang R. "COMPOUND THAT TREAT MALARIA AND PREVENT MALARIA TRANSMISSION" *International patent PCT/US2010/047019, Pub. No. W.O./2011/025969, March, 03,2011.*
2. **Raj DK**, Pattaradilokart S, Jonshon R, Huang R, Su XZ "COMPOUND THAT treats MALARIA AND prevents MALARIA TRANSMISSION" *US Patent 13 392668, Pub. No. US2012/0196882A1, August, 02,2012.*
3. Kurtis J, Christian N, **Raj DK**, Friedman J, Fried M, Duffy P. "VACCINE FOR FALCIPARUM MALARIA" Appl. No. 16/283,472 *Patent No. US10, 960,065 B2 Date: 03,30,2021.*
4. Kurtis JK, Oleinikov A, **Raj DK**, COMPOSITIONS AND METHODS FOR THE TREATMENT OF PLASMODIUM FALCIPARUM MALARIA. *US Provisional Patent Application No. 63/154,105; filing date February 26, 2021 (pending).*
5. Kurtis JD, **Raj DK**, Das Mohapatra A & Zuromski J. ANTIBODIES TO PFGARP KILL PLASMODIUM FALCIPARUM MALARIA PARASITE AND PROTECT AGAINST INFECTION AND SEVERE DISEASE. *US Provisional Patent Application No. 17/146,423; filing date January 11, 2021 (pending).*

## **OTHER PUBLICATIONS**

1. Jenna Zuromski, Jonathan Kurtis & **Dipak Kumar Raj**. Protocol for differential biopanning of *P. falciparum* phage display cDNA library to identify parasite targets of protective antibodies. *Methods in Molecular Biology* (In Press) 2021, Springer Science+ Business Media New York (In Press).
2. Alok Das Mohapatra, Jenna Zuromski, **Dipak Kumar Raj** & Jonathan Kurtis. Assessing PfGARP mediated apoptosis of intra-erythrocytic *Plasmodium falciparum* parasites. *Methods in Molecular Biology 2021*, Springer Science+ Business Media New York In Press).

## **INVITED PRESENTATIONS**

Indo-US joint venture for the development of Science (Student Speaker)	Bengaluru, India, 2003. Title- Detection of telomerase activity in the gametocyte of <i>Plasmodium falciparum</i>
Utkal University, Research Seminar Series	Utkal University, India. 2005 "Title-Polymorphism in <i>P. falciparum</i> malaria vaccine candidate genes"
John Hopkins University, Malaria Seminar Series	John Hopkins University, MD, 2007. Title: PfMRP gene and drug resistance in malaria.
Woman and Infant Hospital Pediatric research colloquium	Woman and Infant Hospital, RI, 2013. Title- PfSEA-1, a novel vaccine candidate for pediatric falciparum malaria."
Woman and Infant Hospital Pediatric research colloquium	Woman and Infant Hospital, RI, 2014. Title- <i>Antibodies to Plasmodium falciparum glutamic acid-rich protein (PfGARP) inhibit parasite growth by arresting trophozoite development</i>
Kalinga Institute of Industrial Technology (Invited Speaker).	Kalinga Institute of Industrial Technology, Odisha, India, Title- characterization of PfGARP as a vaccine candidate against pediatric falciparum malaria, April 2015
Institute of Life Sciences (Invited Speaker)	Institute of Life Sciences Odisha, India, Title characterization of PfSEA-1 as a vaccine against pediatric falciparum malaria, April 2015
University of Rhode Island, COBRE Investigators Seminar,	University of Rhode Island, April 2017. Title- "Immune-Based Interventions Against Infectious Diseases"
Brown University, Department of Pathology and Laboratory Medicine Work In Progress Seminar Series	Brown University, Department of Pathology and Laboratory Medicine. Jan 2019. Title- " Characterizations of PfSEA-1 as a candidate for a pediatric malaria vaccine."
Brown University, Department of Pathology and Laboratory Medicine, Work In Progress Seminar Series	Brown University, Department of Pathology and Laboratory Medicine. Jan 2019. Title- "PfGARP as a pediatric malaria vaccine."
Invited Speaker for Research Collaboration (NCI, NIH)	National Cancer Institute, Laboratory of Molecular Biology June 12, 2019, Title-PfGARP as malaria vaccine and the possibility of phage-based therapy.
National Institute of health, Invited Speaker (virtual)	National Cancer Institute, Laboratory of Molecular Biology, December 2020 "Development of Lambda particle vaccine against malaria."
The University of South Florida, Invited Speaker (virtual)	The Department of Internal Medicine, Division of Infectious Disease & International Medicine, 2021 Research on Malaria-Resistant Children in Tanzania Leads to Promising New Vaccine Targets

## **OTHER PRESENTATIONS**

6th International Symposium on Vectors &	Regional Medical Research Centre, India. 2002 Title-
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Vector-Borne Diseases	<i>Plasmodium falciparum</i> Pfs25 gene polymorphism in natural isolates. Bhubaneswar, India
6th International Symposium on Vectors & Vector-Borne Diseases	Regional Medical Research Centre, India. 2002. Title- Genetic polymorphisms in MSA-1 gene of <i>Plasmodium falciparum</i> in different malaria-endemic localities. Bhubaneswar, India
International Symposium on Malaria	Malaria Research Centre, 2004. Title- Detection of rare point mutations in the C-terminus region of MSA-1 gene in <i>Plasmodium falciparum</i> . New Delhi, India
Am J Trop Med Hyg, Conference	Antibodies to Schizont Egress Antigen-1 (PfSEA-1) block schizont egress from falciparum-infected RBCs. 2013, USA
Am J Trop Med Hyg, Conference	PfCDPK5 as a novel vaccine antigen against pediatric malaria
Gordon Malaria Conference	(Switzerland ), PfGARP is the target for antimalarial vaccine development. 2019, USA

## GRANTS

### Completed

1. **Department of Biotechnology**, Govt. of India Study Award. " Identification of carbohydrate digesting bacteria from hot spring" 07/01/1997-06/31/1998, Total Costs: **\$405**. **Dr. Raj** is the Principal Investigator.
2. **University Grant Commission, India** Research fellowship " Identification of polymorphism in malaria antigens" 01/01/1999-12/30/2003. Total Costs: **\$13,125**. **Dr. Raj** is the Principal Investigator.
3. **Department of Biotechnology**, Govt. India, Grant for research on vector-borne diseases. Detection of malaria and filariasis in patients using the molecular diagnostic tool" 2004-2005. Total Costs: **\$3,000**. **Dr. Raj** is the Principal Investigator.
4. **COBRE P20GM1043-12** "Evaluation of PfCDPK-5 as pediatric malaria vaccine" 06/01/2015- 05/31/2016 Total Direct Costs: **\$80,000**. **Dr. Raj** is The Principal Investigator at 50% effort.
5. **Rhode Island Foundation** "Evaluation of vaccine potential for five malaria antigens identified in disease-resistant children." 05/01/2017-11/30/2018. Total Direct Costs: **\$25,000**. **Dr. Raj** is The Principal Investigator at 20% effort.
6. **Oh-Zopfi, Women & Infants Hospital Project Grant** "Preliminary evaluation of newly identified malaria antigens" 01/01/2018-11/30/2019. Total Direct Costs: **\$22,500**. **Dr. Raj** is The **Principal Investigator** at 10% effort.

7. **NIH/NIAID R01 5R01AI076353** "PfSEA-1 based vaccines for *falciparum* malaria" 09/01/2014-08/31/2020. Total Costs: **\$2,567,622**. **Dr. Raj** is a Co-investigator (RA) at 40% effort.
8. **NIH/NIAID R21 AI131047-01A1** "PfCDPK5 based vaccines for pediatric malaria" 02/2018-01/2021. Total Costs: \$445,000. **Dr. Raj** Principal Investigator at 50% effort.

Current

1. **R01 AI144014-01A1** "Multi-target blood-stage vaccine against Plasmodium." 12/13/2019-11/30/2024. Total Costs **\$2025,000**. **Dr. Raj** is the **Principal Investigator** at 50% effort.
2. **The Warren Alpert Foundation** "mRNA vaccines for falciparum malaria" 2021-2026. Total Costs **\$4,599,053**. **Dr. Raj** is a Co-Investigator at 50% effort.

Pending

- 1) **NIH/NIAID R21** "Lambda-Particle based Malaria Vaccine" 2022-2023. Total Costs **\$445,000**. **Dr. Raj** is the **Principal Investigator** at 40% effort.
- 2) **NIH/NIAID R01** "Identifying the targets of protective immunity to severe falciparum malaria" 2021-2026. Total Costs **\$3,553,058**. **Dr. Raj** is a Co-Investigator at 10% effort.
- 3) **NIH/NIAID R01** "Apoptosis-inducing anti-malaria drugs targeting PfGARP" 2021-2026. Total Cost: **\$3,867,909**. **Dr. Raj** is a Co-Investigator at 25% effort.
- 4) **NIH/NIAID R01** "Lipid encapsulated mRNA vaccines for falciparum malaria" 2021-2026. Total Costs: **\$3,880,995**. **Dr. Raj** is a Co-Investigator at 50% effort.

**MENTORING EXPERIENCE:**

Dr. Raj has supervised several independent senior thesis works of undergraduate and Master students.

<b>Student and Institution</b>	<b>Class</b>	<b>Year</b>	<b>Title of The Project</b>
Josephine Dunn	NIH Postbaccalaureate	2006-2008	Analysis of drug resistance genes in the malaria parasite <i>Plasmodium falciparum</i>
Veronica S Wright National Institute of Health, USA)	NIH Postbaccalaureate	2008-2010	Gene knockout and analysis of drug resistance genes in the malaria parasite <i>Plasmodium falciparum</i>
Camia Crawford (Brown Medical School, USA)	Brown Undergrad	2010-2011	Detection and analysis of malaria-specific antibodies in kids serum collected from Moherza Tanzania

Lauren Pischel (Brown University, USA)	Brown Undergrad (UTRA)	2010-2011	Heterogeneity in PfSEA-1 sequences from field isolates- implication for vaccine development
Marie Siwicki (Brown University, USA)	Brown Undergrad	2010-2011	Growth inhibition antibodies are targeting PfSEP-1 (Brown University).
Alini Lu (College of Human Ecology NY, USA)	Undergrad	2011-2012	Use of T7 phase display techniques for identification of potential vaccine candidates for pediatric malaria.
Nick Rich New York University, USA)	Undergrad	2013	Cloning and recombinant protein expression of a potential vaccine candidate, Pf-GARP for pediatric malaria
Hadly Witt (Brown University, USA)	Master Student	2014-2016	Optimization and adjuvant formulations of PfSEA-1 based vaccines and identification of RBC invasion ligands in murine challenge models
Brett Sherman (Brown University, USA)	Undergrad	2015-2017	Phenotyping of genetically altered potential malaria vaccine candidate gene, Pf-GARP
Shreya Ramyya (Brown University, USA)	Undergrad	2016-2018	Evaluation of PfCDPK-5 as pediatric malaria vaccine
Ambrish Jha (Medical Graduate, Nepal)	International medical student	2016-2017	"Optimization of Schizont Egress Antigen-1 (PfSEA-1) and adjuvant combination against P. Berghei ANKA challenge in mice."
Andrea Rodriguez (Brown University)	Visiting Undergrad	2017-2018	"Identification of Novel Vaccine Candidates against pediatric malaria."
Anup Janiwali (Medical Graduate, Nepal)	International medical student	2017-2019	PfGARP as pediatric malaria vaccine
Karan Modi (Brown University)	Undergrad	2018-2019	Evaluation of PfCDPK-5 as pediatric malaria vaccine
Lewis, Savannah	Undergrad (UTRA)	2020-2021	Anti-PfGARP Monoclonal antibodies against plasmodium falciparum
Monika Karera (Medical Graduate)	International medical student	2019-2021	Preliminary evaluation of newly identified malaria antigens
Elgodamy Yousef (Brown University)	Undergrad	2019-2021	Identification of smallest recombinant fragment from PfGARP gene to be used as malaria vaccine
Robidoux, Annalise (Brown University)	Master student	2020-	Identification of vaccine candidate for malaria parasite.



Huijun Edelyn Park (Brown University)	Master student	2020-	ABC transporter as the drug-resistant gene in Plasmodium falciparum
Maansi Gupta (Brown University)	Undergrad (SPRINT UTRA)	2020-	"Identification of vaccine candidate for malaria parasite.
Shreya Kamojjala (Brown University)	Undergrad	2020-	In-silico analysis of plasmodium falciparum genes for malaria vaccine
Tanbir Najrana	Postdoctoral Fellow	2020-	Characterization of a vaccine candidate against falciparum malaria