Curriculum Vitae

Sunil K. Joshi *DVM, MVSc, Ph.D.*

Contact Information

OFFICE:

School of Medical Diagnostic and Translational Sciences,
Frank Reidy Research Center of Bioelectrics, Old Dominion University
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Current Affiliations:

- **Assistant Professor (tenure-track):** School of Medical Diagnostic and Translational Sciences, College of Health Sciences, ODU
- **Lab Head:** Cellular Immunology, Frank Reidy Research Center of Bioelectrics.
- **Faculty Member:** Old Dominion University Center for Global Health
- **Adjunct Assistant Professor:** Department of Microbiology and Molecular Cell Biology Eastern Virginia Medical School
- **Senior Scientist:** Sickle Cell Cure Foundation (SCCF), Oklahoma City, OK

Professional / Research Objectives:

- Cutting edge research in immunology and infectious diseases by integrating engineering and synthetic biology.
- Teaching and professional training to students and postdoctoral fellows.
- Acquire long-term extramural funding.
- Establish collaboration within and outside the institute.
- Provide support to the administration and organization activities.

Highlights and qualifications:

- DVM and Veterinary Clinical Residency training in Infectious Diseases.
- More than 18 years of research experience in the area of immunology, pathogenesis, inflammation and infectious diseases.
- Extensive knowledge of *in vitro* and *in vivo* immunological assays, infectious diseases, auto-immunity and various genetically engineered animal models for cancer and infectious diseases.
- Proficient in cellular and molecular bio-techniques, as well as small animal handling and experimental procedures.
- Good knowledge of Peptide and Protein structure, Epitope designing, T cell epitope mapping and Peptidomimetics.
- Solid background in public health, clinical sciences, global burden of diseases and epidemiological research.
- Excellent written and oral communication skills.
- Self-motivated individual and a team player whenever it is required.
- Excellent skills in communication and collaboration.
- Highly inquisitive, creative and resourceful. Excited by the challenges of research and experimentation.

Visa Status: Permanent Resident (Green Card).

Education:

- **Post-doctoral Fellowship (Molecular Immunology):** Molecular Immunology Program, Medical College of Georgia, Augusta, GA, USA – 2000-2006.
- **Ph.D. (Structural & Cellular Immunology):** International Center for Genetic Engineering & Biotechnology, New Delhi, India - 2000.
- **M.V.Sc. (Immunology / Virology):** Indian Veterinary Research Institute, Izzatnagar, India – 1994.
- **D.V.M. / B. V. Sc. (Veterinary Medicine):** College of Veterinary Medicine, GB Pant University of Agriculture & Technology, Pantnagar, India - 1992.
- **B.S. (Biology & Chemistry):** K. R. College, Mathura, Agra University, Agra, India - 1985.

Professional license:

- Clinical Veterinary Practitioner (small animal), India
  1. *Uttar Pradesh State Veterinary Registration No. # UPSVC / 354 / 92*
  2. *Indian Veterinary Practice Registration No. # 224 / 05 / 27 / 98*
- Diplomat of American College of Veterinary Microbiology / Immunology DACVIM (Approved for exams: expecting 2016).

Positions / employment:

- **2013 - Present:** Assistant Professor (tenure-track), Frank Reidy Research Center for Bioelectrics and School of Medical Diagnostic and Translational Sciences, Old Dominion University, Norfolk, VA
- **2011 - Present :** Senior Scientist, Sickle Cell Cure Foundation (SCCF), Oklahoma City, OK
- **2011 - 2012:** Primate Immunologist, Department of Comparative Medicine, OUHSC, Oklahoma City, OK
- **2009 – 2011:** Assistant Professor of Research (non-tenure track), Department of Microbiology & Immunology, and Senior Scientist, Sickle Cell Cure Foundation (SCCF), OUHSC, Oklahoma City, OK
- **2008 – 2009:** DTRA Research Fellow, Department of Microbiology & Immunology, OUHSC, Oklahoma City, OK
- **2007 – 2008:** Data Analyst, Global Disease Burden, Section of Cardiology, Department of Medicine, MCG, Augusta, GA
- **2007 – 2008:** Consultant Veterinary Physician (Infectious Diseases), SFAH, Augusta, GA
- **2006 – 2007:** Immunologist, ABSL-3 Program In-charge, and attending Clinical Veterinarian, Laboratory Animal Resources , Medical college of Georgia, Augusta, GA
- **2005 – 2006:** Assistant Research Scientist, CBGM, MCG, Augusta, GA
- **2003 – 2005:** Research Associate in Molecular Immunology Program at Institute of Molecular Medicine & Genetics, Medical college of Georgia, Augusta, GA
- **2000 – 2003:** Post-Doctoral Research Fellow in Molecular Immunology Program at Institute of Molecular Medicine & Genetics, Medical college of Georgia, Augusta, GA
- **1998 – 1999:** Visiting Research Fellow at Institut Pasteur and Immunobiologie Cellulaire et Moleculaire des Infections Parasitaires, Hopital Pitie-Salpetriere, Paris, France
- **1994 – 1999:** Research Fellow and In-charge vivarium in Malaria Research group at International Center for Genetic engineering & Biotechnology (United Nations), New Delhi, India
- **1992 – 1994:** Teaching and Research Assistant for graduate courses in Molecular Immunology at Indian Veterinary Research Institute, Izzatnagar, India
- **1991 – 1992:** Attending Wild life Pathologist at National Zoo in Lucknow, India (for six months).
- **1991 – 1992:** Attending Veterinary Physician at City Veterinary Hospital in Agra, India (for six months).
- **1990 – 1991:** Teaching Assistant for veterinary undergraduate courses in Microanatomy, Pathology and Immunology at College of Veterinary medicine, Pantnagar, India

Fellowships / Awards / Special recognition:

- **2015:** Recipient of the 2015 "AAI Travel Award to present poster at European Congress of Immunology, Sept. 5-9, Vienna, Austria.
- **2014:** Recipient of the 2014 "AAI Travel for Techniques Award". Visiting Scholar: Department of Physics, Dielectric Spectroscopy Lab, New Jersey Institute of Technology, Newark NJ 07103. (15-19 December, 2014).
- **2013:** Early Career Faculty Award, 100th American Association of Immunology Conference, Honolulu, HI.
- **2014:** Chair the 3rd day session "Therapeutic applications of the Innate Immune system" at Innate Immunity Summit-2014, London, UK. Nov. 12, 2014.
- **2014:** Early Career Faculty Award to attend Single Protein Dynamics in Cellulo: Spatio-Temporal, Structural and Quantitative Analyses (SPDC) April 21 – 25,**:** Okinawa Institute of Science & Technology, Okinawa, Japan. All expenses paid by Government of Japan.
- **2014:** Special recognition: Best talk and special Q&A session organized at Innate Immunity Summit-2014, London, UK. Nov. 12, 2014.
- **2014:** Visiting Scholar: Department of Physics, Dielectric Spectroscopy Lab, New Jersey Institute of Technology, Newark NJ 07103. (15-19 December, 2014).
- **2009:** Recipient of Wellcome Trust Bursary Award for advanced training in "Genetic Manipulation of Embryonic Stem Cell" at Sanger Genome Institute, Hinxton, Cambridge, UK.
- **1999:** Recipient of United Nations Visiting Research Fellowship Institut Pasteur and Immunobiologie Cellulaire et Moleculaire des Infections Parasitaires, Hopital Pitie-Salpetriere, Paris, France.
- **1998:** Recipient of Young Scientist Scholarship for Advanced Course on "Cytokines in Immunity" at Scuola Superiore d' Immunologia Ruggero Ceppellini, Naples, Italy.
- **1996:** Recipient of Young Scientist Scholarship for Advanced Course on "Mechanism and Manipulation of Autoimmunity" at Istituto Nazionale Tumori-Naples, Italy.
- **1994:** Recipient of Junior Research Fellowship in Immunology during M.V.Sc. program.
- **1994:** Recipient of ICAR- National Eligibility Test Award for Assistant Professorship.
- **1992:** Recipient of Bursary Scholarship during DVM program.
- **1991:** Recipient of University Merit Award for DVM program.

Peer reviewer:

- **2015:** Senior Editor: MOJ Cell Science Report
- **2015:** Member editorial board and reviewer: Pharmacologia
- **2015-:** Reviewer for World Journal of Surgical Oncology
- **2015-:** Reviewer for Brain, Behavior, and Immunity
- **2014-:** Reviewer for PLoS One.
- **2014-:** Reviewer for International Immunopharmacology.

- **2013-:** Reviewer for Expert Review of Vaccines.
- **2013:** Guest Editor for Journal of Immunology & Clinical Research (special issue on “Immunity and inflammation in Neglected Diseases”).
- **2013-:** Reviewer for IEEE Transactions on Plasma Science.
- **2013-2014:** Reviewer for Journal of Immunology & Clinical Research.
- **2013-:** Reviewer for Journal of Cell Science & Report.
- **2011-2012:** Research grant reviewer INBRE-OUHSC Study Section.
- **2009:** Ph.D. thesis examiner, Dept. of Biochemistry, University of Madras, India.

Invited speaker:

- **2014:** Department of Physics (Dr. Camelia Prodan), New Jersey Institute of Technology, Newark, NJ. “**Long Exponential Electric Pulse (LEEP) Applications in Modulating Innate Immunity”.** Dec. 15, 2014.
- **2014:** Innate Immunity Summit-2014, Nov. 12, 2014, London, UK. Title: **“High-intensity ultra-short electric pulse applications in modulating innate immunity**.
- **2014:** Department of Biology, College of Sciences, ODU. Title: **“Immune Dysregulation in a Major Hematologic Disease”**. October 10, 2014.
- **2014:** Department of Internal Medicine, Center of Research on Health Disparity, VCU Medical Center at Richmond, VA. Title: **“Immune Dysregulation in a Major Hematologic Disease”**. May 06, 2014.
- **2014:** Department of Biology, College of Sciences, ODU. Title: **“Enhanced Functional Maturation of Dendritic Cells by Exponential Wave Electric Pulse Application”**. March 7, 2014.
- **2013:** Title**: Hemoglobinopathies and Danger to the Herd Immunity**;. Host: Prof. Wally Smith, Vice Chair for Scientific Research, VCU Center for Health Disparities, Richmond, VA. Sept. 17, 2013
- **2012:** Frank Reidy Research Center for Bioelectrics**,** ODU, Norfolk, VA. Title: “**Restoring Functional Rights of Dendritic Cells by Electro Potential Energy.”** March 26, 2012. Host: Prof. Richard Heller (Job Seminar).
- **2010:** OUHSC-OMRF Immunology Retreat 2010: Title **“*Bacillus anthracis* Lethal Toxin Abrogates TCR-Induced Cytokine Production by CD1d-Restricted NKT Cells”**.
- **2009:** Faculty of Life Sciences, Global Health Institute, EPFL, Lausanne, Switzerland. Title: **“NKT Cell Anergy Induced by Bacterial Toxins.”** Nov. 11, 2009. Host: Prof. G. Van der Goot.
- **2009:** Department of Clinical Sciences, University of Bern, Switzerland. Title: **“Silencing Innate Immunity by Bacterial Toxins.”** Nov. 10, 2009. Host: Prof. Amit V. Pandey.
- **2008:** Department of Microbiology & Immunology, OUHSC, Oklahoma City, OK. Title **“Antigen Cross Presentation: At the Cross Roads of Immune Tolerance & Effective Immune Response”** May 2008. Host: Dr. Mark L. Lang. (Job seminar)

- **2008:** Sanofi-Pasteur, Toronto, ON, Canada. Title: **"Host-Pathogen Interactions: The Dark Side of Immuno-protection Strategies"**. April 17, 2008. (Job seminar)
- **2005:** Center of Tropical & Global Diseases, University of Georgia, Athens. Title: **"Molecular Mechanism of Antigen Cross-presentation"**. Feb. 2005. Host: Prof. Dan Colley, Director, CTGD.

Seminars / Courses / Conferences attended:

- **2015:** 4th European Congress of Immunology, September 5-9, 2015 Vienna, Austria.
- **2014:** Innate Immunity Summit-2014, London, UK. Title: "High-intensity ultra-short electric pulse applications in modulating innate immunity". Nov. 10-12, 2014.
- **2014:** Quarterly Sickle Cell Research Meeting at VCU Massey Cancer Center, Richmond, VA. May 06, 2014.
- **2014:** Single Protein Dynamics *in Cellulo* 2014: Spatio-Temporal, Structural and Quantitative Analyses (SPDC) April 21 – 25, 2014: Okinawa Institute of Science & Technology, Okinawa, Japan.
- **2014:** 5TH Annual Virginia Regional Herpes Virus Symposium (VRHS2014): Department of Microbiology and Molecular Cell Biology, Eastern Virginia Medical School, Norfolk, VA, April 12th 2014.
- **2013:** Pancreatic Cancer Symposium June 14, 2013, East Virginia Medical School, Norfolk, VA.
- **2013:** 100th Annual Conference of American Association of Immunologist (AAI) Honolulu, HI; May 3-7, 2013. Poster presentation: Immune dysregulation in a major hematologic disease.
- **2011:** 6th International Symposium on **"CD1 and NKT Cells"** Chicago September 23-27, 2011. Poster presentation: Regulation of Anthrax Toxin-specific Antibody Titers by Natural Killer T Cell-derived IL-4 and IFNγ.
- **2009:** Advanced training in **"Genetic Manipulation of Embryonic Stem Cell**" at Sanger Genome Institute, Hinxton, Cambridge, UK (Oct. 26 to Nov. 8, 2009). Hands-on training to design the knockout, conditional knockout and knock-in construct to generate genetically engineered mouse models.
- **2009: "Immunology 2009"** The 96th Annual Meeting of the American Society of Immunologist" in Seattle, WA from May 8-12, 2009. Poster presentation: *"Bacillus anthracis* lethal toxin disrupts TCR-signaling in CD1d-restricted NKT cells in vivo leading to functional anergy".
- **2009:** Keystone Symposia in Molecular and Cellular Biology **"B Cells in Context"** at Taos Convention Center, Taos, New Mexico from Feb. 24-March 1, 2009.
- **2002: "Dendritic Cells at the Host-Pathogen Interface"** at Airlie conference center, in Warrenton, VA, USA, from May 4-7, 2002 (NIAID, NIH). To learn new advances in dendritic cell biology and more about host-pathogen relationship.
- **1998:** "**International Congress of Immunology"** at New Delhi, India, from 2-6 Nov., 1998. Member of the organizing committee and host institute "International Center for Genetic Engineering & Biotechnology, New Delhi, India.

- **1998:** "**Continuing Education Workshop in Immunology"** at Jawaharlal Nehru University, New Delhi, India, from 30 Oct- 1 Nov., 1998. Training course in advance immunology during Ph.D. program.
- **1997:** "**Advanced Course on Cytokines in Immunity"** at Scuola Superiore d' Immunologia Ruggero Ceppellini, Naples, Italy from 3-7 Nov. 1997. Training course in advance immunology during Ph.D. program.
- **1997:** "**Global Meet on Parasitic Diseases"**, 18-22 August, 1997, Hyderabad, India. Poster presentation "Liver Stage Antigen-1 (LSA-1) of *Plasmodium falciparum* as a vaccine candidate".
- **1996:** "**Advanced Course on Mechanism and Manipulation of Autoimmunity"** at Istituto Nazionale Tumori-Naples, Italy from June 23-27, 1996. Training course in advance immunology during Ph.D. program.
- **1996:** "**Global Meet on Parasitic Diseases"**, New Delhi from March 18-22, 1996. Member of the organizing committee and host institute "International Center for Genetic Engineering & Biotechnology, New Delhi, India.
- **1995:** Indo-French **symposium on Immuno-modulation"** at National Institute of Immunology, New Delhi from December 10-13, 1995. Poster presentation "Synthetic T cell peptide epitopes as vaccine candidate for malaria."
- **1993:** IUIS-AIIMS "**Advance Course in Basic immunology"** at All India Institute of Medical Sciences, New Delhi, from 22 to 27 November, 1993. Six days intensive course on advance topics in immunology taught by well-known immunologists.
- **1993:** 80th Session of "**Indian Science Congress"** at Goa from 3-8 January, 1993. Abstract: Hormone Prolactin improves the functions of NK cells in bovines.

Administrative training & experience:

- **2014:** Faculty Development Workshop, Batten College of Engineering & Technology, ODU. April 30^{th,} 2014.
- **2013:** Provost's Conversations on Teaching and Learning "From Research Question to Conceptual Model to Software Selection: Teaching Students Analysis through Modeling led by John Sokolowski Associate Professor Modeling, Simulation, Visualization and Engineering and Catherine Banks Research Associate Professor, VMASC. 11/14/2013
- **2013:** Provost's Conversations on Teaching and Learning "Leveraging Technology to Support both Face-to-Face and Online or Hybrid Teaching" by Steve Zeil. 10/10/2013.
- **2013:** Provost's Conversations on Teaching and Learning "The use of Technology in Teaching" by Jackie Sharpe. 09/12/2013.
- **2011: "EPSCoR National Science Foundation Grant Workshop"** sponsored by Oklahoma EPSCoR Research Infrastructure, on April 20, 2011.
- **2009:** Grant Writers Seminars and Workshops LLC. **"Write Winning Grants"** sponsored by Department of Medicine, OUHSC, Oklahoma City, OK on Feb. 5, 2009.
- **2006:** Scientist Center for Animal Welfare **"IACUC Advanced Workshop"** at Cornell University, Ithaca, NY on September 12, 2006. As a laboratory

veterinarian requirement, completed this mandatory course on IACUC and animal welfare issues.

- **2006-2007:** Attending veterinarian and in charge: ABSL3 and Transgenic / Knockout Mice Unit, Medical college of Georgia, Augusta, GA (2006 – 2007).
- **2006-2007:** IACUC member and reviewer, Lab Animal services, Medical college of Georgia, Augusta, GA (2006 – 2007).

Services:

University Committees:

- Member, Faculty Forward Task Force, OUHSC (2011).
- Member, Old Dominion University, IACUC.
- Member, ODU Animal User Committee.
- Member, Faculty Senate Committee for Administration, Finance & Academic support services.
- Member, ODU College of Health Sciences Inter-professional Education (IPE) advisory Committee.
- Member, Frank Reidy Research Center for Bioelectrics Award Committee.
- Member, Frank Reidy Research Center for Bioelectrics Graduate Education committee.
- Member, Search Committee, Grant Development Specialist for the College of Health Sciences, 2014.
- Member, Scientific Advisory Board, Sickle cell Cure foundation, Oklahoma City, Oklahoma.

Professional Organizations:

- Member, American Association for Immunology (AAI).
- Member, Society of Leukocyte Biology (SLB).
- Member, American association for the Advancement of Science (AAAS).
- Member, American heart association (AHA).
- Member, Institute of Electrical and Electronics Engineers (IEEE).
- Member, Engineering in Medicine and Biology Society (EMBS).
- Member, Council on Cardiopulmonary, Critical Care, Perioperative & Resuscitation.
- Member, Federation of Clinical Immunology Societies (FOCIS).
- Member, Society for Mucosal Immunology (SMI).
- Member, American Society of Hematology (ASH).
- Member, New York Academy of Sciences (NYAS).
- Member, American Chemical Society (ACS).

Other:

- ODU College of Health Sciences Trailing Marshal Spring 2014 commencement.
- ODU College of Health Sciences Trailing Marshal Fall 2014 commencement.

- ODU Judge for Medical Sciences (STEM): Tidewater Science and Engineering Fair, March 15, 2014.
- Fire Safety In-charge: Center for Bioelectrics, IRP-2, 4th Floor, ODU.
- Fall 2014 Volunteer for REACH Old Dominion University.
- ODU Faculty Volunteer for new students (Week of Welcome in fall 2014).
- Joint Faculty at Center of Global Health, College of Health Sciences, ODU.
- Adjunct Faculty, Department of Microbiology and Molecular Cell Biology, Eastern Virginia Medical School, Norfolk, VA.
- Advocating Service learning initiative at ODU.
- ODU Biomedical Engineering Program.
- Designing and developing Immunology and Cytopathology courses for MDTS / Bioelectrics Graduate Research Program.
- Managing and assisting investigators to use X-ray Irradiator in ODU Vivarium.
- Providing equipment and assisting ODU undergraduate students to learn Fluorescent Microscopy.
- STEM Judge for Chemical Sciences, 64th Annual Tidewater Science and Engineering Fair, Old Dominion University, March 14, 2015.
- Students supervised in independent research at any level: Sarah Parrish, senior biology major, ODU and Brittany Hanbury-Collins, junior biochemistry major, ODU.
- Featured cover story on College of Health Sciences Feb. 2015 News Letter (www.odu.edu/.../Health%20Sciences%20February%20Newsletter.pdf) and ODU-INSIDE (https://www.odu.edu/news/2015/3/tattoo_research).
- Guest Lecturer: EVMS Biotechnology Course (BT704) Research Design (Spring-2015): Generation of Genetically Engineered Mouse Models.
- Guest Lecturer: College of Health Sciences (MDTS-600): Spring-2015: Hemoglobinopathies and Coagulopathies / Advanced Molecular Diagnosis of Infectious Diseases.

Community Welfare:

- Invited speaker for Medical Conference at Cheyenne Middle School, Edmond, OK on March 8, 2011. **"Immune System: A Basic Understanding".**
- Regular Blood Donor for Red Cross.

Teaching:

1. **EVMS Biotechnology Course (BT704) Research Design:**
   Spring 2014: 2 lectures (3 hr. each)
   Spring 2015: 2 lectures (3 hr. each)
   Evaluated and Graded.

2. **MDTS-600**
   Fall 2014: 2 lectures (3 hr. each)
   Spring 2015: 2 lectures (3 hr. each)
   Fall 2015: 1 lecture (3 hr.)

3. **Invited Speaker (2014):** Department of Biology, College of Sciences, ODU. Title: “Enhanced Functional Maturation of Dendritic Cells by Exponential Wave Electric Pulse Application”. March 7, 2014.

4. **Invited Speaker (2014):** The Okinawa Institute of Science and Technology Okinawa**,** Japan.
   Title: Enhanced Functional Maturation of Dendritic Cells by Exponential Wave Electric Pulse Application”. April 23, 2014.

5. **Invited Speaker (2014):** Department of Internal Medicine, Center of Research on Health Disparity, VCU Medical Center at Richmond, VA.
   Title: “Immune Dysregulation in Major Hematologic Disease”. May 6, 2014.

6. **Invited guest speaker (2015):** Tri-beta Biology Honors Society of Old Dominion University. Title: “Tattoo ink and Functional Immunomodulation”. March 24, 2015.

New Teaching Responsibility:

From spring 2016, I will be the course director for Cyto-technology course CYTO 407 Histology (3 Credit).

Students supervised in independent research at any level:

- Sarah Parrish, senior biology major, ODU.
- Brittany Hanbury-Collins, junior biochemistry major, ODU.

Administrative and technical lectures:

- Retro-orbital injections and blood collection in mouse.
- X-ray irradiation and mouse and rat bone marrow chimera generation.
- Reviewer for IACUC protocols and defining guidelines at ODU.
- ARRIVE (Animal Research: Reporting of In Vivo Experiments) guidelines based on National Center of the Replacement, Reduction and Refinement (NC3Rs) of animals in research.

Peer-reviewed publications:

1. **Joshi SK***. Disparities in Sickle Cell Disease Management: Quest for Global Protective Immunity. *J Cell Sci Rep* **2015** 2(4): 00036. DOI: 10.15406/mojcsr.2015.02.00036
2. T. Scott Devera, Dawn Kennedy, **Sunil K. Joshi**, Jimmy D. Ballard and Mark L. Lang. Immunization of mice with anthrax Protective Antigen limits cardiotoxicity but not hepatotoxicity following Lethal Toxin challenge. *Toxins* **2015**, *7*, 2371-2384.
3. Shah HB, **Joshi SK**, Rampuria P, Devera TS, Lang GA, Stohl W, Lang ML. BAFF- and APRIL-dependent maintenance of antibody titers after immunization with T-dependent antigen and CD1d-binding ligand. *J Immunol.* **(2013)** Vol 191(3):1154-1163.
4. **Joshi SK***, Lang ML. Fine tuning a well-oiled machine: Influence of NK1.1 and NKG2D on NKT cell development and function. *Int Immunopharmacol.* **(2013)** Vol 17(2):260-266.
5. **Joshi SK***, Lang GA, Devera TS, Johnson AM, Kovats S, Lang ML. (2012) Differential contribution of dendritic cell CD1d to NKT cell-enhanced humoral immunity and CD8+ T cell activation. *J Leukoc Biol.* May;91(5):783-90.
6. H. B. Shah, **Sunil K. Joshi** and Mark L. Lang (2011). CD40L-null NKT cells provide B cell help for specific antibody responses. *Vaccine* 29, 9132–9136.
7. T. Scott Devera, **Sunil K. Joshi**, Lindsay M. Aye, Gillian A. Lang, Jimmy D. Ballard and Mark L. Lang (2011). Regulation of anthrax toxin-specific antibody titers by Natural Killer T cell-derived IL-. *PLoS ONE* 6(8): e23817.
8. G. A. Lang, Johnson A. M., Devera T. S., **Sunil K. Joshi** and M. L. Lang (2011). Reduction of CD1d expression *in vivo* minimally affects NKT-enhanced antibody production but boosts B-cell memory. *International Immunol.* (4):251-260.
9. Elizabeth Charles, **Sunil K. Joshi*,** John D. Ash, Barbara Fox, A. Darise Farris, David J. Bzik, Mark L. Lang, and Ira J. Blader. CD4 T-cell suppression by cells from Toxoplasma gondii-infected retinas is mediated by surface protein PD-L1 (2010). *Infection & Immunity* Aug;78(8):3484-3492. **Equal contribution*.
10. T.S. Devera, L.M. Aye, G.A. Lang, **Sunil K. Joshi**, J.D. Ballard and M.L. Lang (2010) CD1d-dependent B-cell help by NK-like T cells leads to enhanced and sustained production of Bacillus anthracis lethal toxin-neutralizing antibodies. *Infection & Immunity* (4):1610-1617.
11. **Sunil K. Joshi,** G. A. Lang, J. Larabee, L. M. Aye, T. S. Devera, H.B. Shah, J. D. Ballard, and M. L. Lang. *Bacillus anthracis* lethal toxin disrupts TCR signaling in CD1d-restricted NKT cells leading to functional anergy. (2009) *PLoS Pathogens* 5(9): 1-10.
12. Dodani S, Grice D. G., and **Sunil K. Joshi**. Is HDL function as important as HDL quantity in the coronary artery disease risk assessment? (2009) *Journal of Clinical Lipidology*, Vol. 3, issue 2 : 70-77.
13. Degui Geng, **Sunil K. Joshi**, and J. X. She. GCSF receptor regulates antigen cross-presentation and expression of cytokines and costimulatory molecules in dendritic cells. (2007) *Molecular Immunology* Jan; 44(4): 521-529.

14. M. Shimoda, F. Mmanywa, **Sunil K. Joshi,** T. Li, K. Miyake, J. Pihkala , J. A. Abbas, and P. A. Koni. Conditional ablation of MHC-II suggests an indirect role for MHC-II in regulatory CD4 T cell maintenance. (2006), *Journal of Immunology,* June 1; 176 (11): 6503-6511.
15. J. Pablo Abonia, K. Frank Austen, Barrett J. Rollins, **Sunil K. Joshi**, Richard A. Flavell, William. A. Kuziel, Pandelakis A. Koni, and Michael F. Gurish. Constitutive homing of mast cell progenitors to the intestine depends on autologous expression of the chemokine receptor CXCR2. (2005) *Blood,* June 1; 105 (11) 4308-4313.
16. **Sunil K. Joshi**, K. Hashimoto, and Pandelakis A. Koni. Induced DNA Recombination by Cre Recombinase Protein Transduction. (2002) *Genesis*, May; 33 (1): 48-54.
17. K. Hashimoto, **Sunil K. Joshi**, P. A. Koni. A conditional null allele of the major histocompatibility IA-beta chain gene. (2002) *Genesis*, Feb; 32 (2): 152-3.
18. P. A. Koni, **Sunil K. Joshi**, U. A. Temann, D. Olson, L. Burkly, R. A. Flavell. Conditional vascular cell adhesion molecule 1 deletion in mice: impaired lymphocyte migration to bone marrow. (2001), *Journal of Experimental Medicine*,19; 193 (6): 741-54.
19. **Sunil K. Joshi**, P. Suresh and V. S. Chauhan. Flexibility in TCR recognition: Degenerate specificity at the T cell level in the recognition of promiscuous TH epitopes exhibiting no primary sequence homology. (2001), *Journal of Immunology*, June 1;166 (11): 6693-703.
20. **Sunil K. Joshi**, A. Bharadwaj, S. Chatterjee, and V. S. Chauhan. Analysis of Immune Responses against T and B Cell Epitopes from *Plasmodium falciparum* Liver Stage Antigen-1 (PfLSA-1) in Rodent Malaria Models and malaria-exposed Human Subjects in India. (2000), *Infection and Immunity*, Vol. 68 (1): 141-150.
21. A.V. Pandey, **Sunil K. Joshi**, B. L. Tekwani and V. S. Chauhan. A colorimetric assay for heme in biological samples using 96 wells plate. (1999), *Analytical Biochemistry*, Vol. 268, p 159-161.
22. Bharadwaj, P. Sharma, **Sunil K. Joshi**, B. Singh and V. S. Chauhan. Induction of protective immune responses by immunization with linear multiepitope peptides based on conserved sequences from *Plasmodium falciparum* antigens. (1998), *Infection and Immunity*, Vol. 66, No.7, p 3232-3241.
23. Bharadwaj, P. Sharma, V. N. Sailaja, **Sunil K. Joshi** and V. S. Chauhan. Immunogenecity of synthetic peptides containing multiple epitope from malaria antigens. (1997), *Annals of Tropical Medicine and Parasitology*, Vol 91, No. 1, p S19-S20.

Book chapters & articles:

24. **Sunil K. Joshi**. Comparative study of policies for management of adventitious infections of rodents. (2006) Main article in *LAS newsletter*, Division of Laboratory Animal Services, MCG Vol1, Issue 1; p1-2.
25. **Sunil K. Joshi** and V. S. Chauhan. Diagnostic Methods in Malaria. (1998), "*Recent Trends in Pediatrics*", Vol1 (B.I. Churchill Livingstone publication) p 245-250

26. Sharma, P., Bharadwaj, A., Sailaja, V.N., **Sunil K. Joshi,** Chauhan, V.S. The conserved-motif peptide of the Plasmodium falciparum TRAP: a putatively protective immunogen. (1997). In: Proceedings of the Third Annual Ranbaxy Science Foundation Symposium "*Molecular Genetic Approaches to Vaccination*", P.L. Sharma and O.P. Sood (eds.), Communicore, 40-45.

***Corresponding Author**

Conference Proceedings in Peer-reviewed Journals:

1. Sunil K. Joshi, Gillian Lang, T. Scott Devera, Lindsay M Aye, Hemangi B Shah, Jimmy Ballard, and Mark Lang. Bacillus anthracis lethal toxin abrogates TCR-induced cytokine production by CD1d-restricted Natural killer like - T cells *J Immunol* 2009 182:134.15
2. Mark Lang, Hemangi Shah, Sunil K. Joshi, Susan Kovats, Gillian Lang, and T. Devera CD1d expression by dendritic cells and CD40L or ICOS expression by NKT cells is dispensable for NKT-enhanced humoral immunity. *J. Immunol* 2011 186:61.16
3. R. H. Broyles, Sunil K. Joshi, V. Belegu, A. C. Roth, E. J. Curry, R. A. Floyd, S. Levi, P. Santambrogio, P. Aroslo and M. Trudel (2011). In vivo testing in mouse models using ferritin heavy chain and abscissic acid as potential therapies for malaria, sickle cell disease and beta thalassemias. *American Journal of Hematology* Volume 86, Issue 9;17 AUG 2011.
4. Robert H. Broyles, Visar Belegu, Austin C. Roth, Emily J. Curry, Robert A. Floyd, Sonia Levi, Paolo Arosio, Paolo Santambrogio, Marie Trudel and Sunil K. Joshi (2011). Ferritin-H and a Phytotherapeutic, Alone or Combined, Reprogram RBC Precursor Cells From SCD Patients to Produce Levels of Fetal Hemoglobin That Constitute a Phenotypic Cure for Sickle Cell As Well As Providing Resistance to Malaria and a Probable Treatment for Beta-Thalassemia. *Blood* 2011 118:903
5. Robert Broyles, Austin Roth, Robert Floyd, Visar Belegu, Emily Curry, Carol Curtis, Marie Trudel, Paolo Santambrogio, Sonia Levi, Paolo Arosio, and Sunil K. Joshi (2013). Nuclear Ferritin: From Discovery to Promising Treatments to Stop Sickle Cell Disease and Malaria: Visits from the Three Princes of Serendip and Recent Progress. *American Journal of Hematology* Volume 88, Issue 5, pages E5–E243, May 2013
6. Robert Broyles, Austin Roth, Carol Curtis, Robert Floyd, and Sunil K. Joshi (2013) Edx−17, A Safe Phytohormone that Promises a Phenotypic Cure for Sickle Cell Disease and a Blocking Treatment for Malaria: In Vivo Proof of Principle in Animals. *American Journal of Hematology* Volume 88, Issue 5, pages E5–E243, May 2013
7. Sunil K. Joshi, David Carey, Maria Chavez-Suarez, Mark Lang, Robert Broyles, and Gary White Immune dysregulation in a major hematologic disease *J Immunol* 2013 190:43.45
8. Sunil K. Joshi. Enhanced functional maturation of dendritic cells by exponential wave electric pulse application. *J. Clin. Cell Immunol* 2014, 5.5.

9. Sunil K. Joshi. High-intensity ultra-short electric pulse applications in modulating innate immunity. Innate immunity: views on cutting-edge research. *The Biomedical Scientist* 2015 March; 59 (3): 146-7.
10. Robert Broyles, Sunil K. Joshi, Carol Curtis, Austin Roth, Patrick Floyd, Marie Trudel, Visar Belegu and Robert Floyd. EdX-17: a novel, safe and efficacious treatment for Sickle Cell Disease. *Blood* 2014; 124:1357 (21).

Peer reviewed abstracts / Poster presentations:

1. **Sunil K. Joshi** (2015). An electrical engineering approach to modulate innate immunity. 4th European Congress of Immunology, September 5-9, Vienna, Austria.
2. Robert Broyles, **Sunil K. Joshi**, Carol Curtis, Austin Roth, Patrick Floyd, Marie Trudel, Visar Belegu and Robert Floyd (2014). EdX-17: a novel, safe and efficacious treatment for Sickle Cell Disease. 56th American Society of Hematology (ASH) Annual Meeting December 5-9, 2014, San Francisco, CA.
3. **Sunil K. Joshi** (2014). Enhanced Functional Maturation of Dendritic Cells by Exponential Wave Electric Pulse Application. Single Protein Dynamics in Cellulo 2014: Spatio-Temporal, Structural and Quantitative Analyses (SPDC) April 21 – 25, 2014: Okinawa Institute of Science & Technology, Okinawa, Japan.
4. **Sunil K. Joshi**, David Carey, Maria Chavez-Suarez, Mark Lang, Robert Broyles, Gary White (2013). Immune Dysregulation in a Major Hematologic Disease. 100th Annual Conference of American Association of Immunologist (AAI) Honolulu, HI; May 3-7, 2013.
5. Robert Broyles, Austin Roth, Robert Floyd, Visar Belegu, Emily Curry, Carol Curtis, Marie Trudel, Paolo Santambrogio, Sonia Levi, Paolo Arosio, and **Sunil K. Joshi** (2013). Nuclear Ferritin: From Discovery to Promising Treatments to Stop Sickle Cell Disease and Malaria: Visits from the Three Princes of Serendip and Recent Progress. **International BioIron Society Fifth World Congress**, at University College London, London, U.K., April 14-18, 2013.
6. Robert Broyles, Austin Roth, Carol Curtis, Robert Floyd, and **Sunil K. Joshi** (2013) Edx−17, A Safe Phytohormone that Promises a Phenotypic Cure for Sickle Cell Disease and a Blocking Treatment for Malaria: In Vivo Proof of Principle in Animals. **International BioIron Society Fifth World Congress**, at University College London, London, U.K., April 14-18, 2013.
7. Robert H. Broyles, Visar Belegu, Austin C. Roth, Emily J. Curry, Robert A. Floyd, Sonia Levi, Paolo Arosio, Paolo Santambrogio, Marie Trudel and **Sunil K. Joshi** (2011). Ferritin-H and a Phytotherapeutic, Alone or Combined, Reprogram RBC Precursor Cells From SCD Patients to Produce Levels of Fetal Hemoglobin That Constitute a Phenotypic Cure for Sickle Cell As Well As Providing Resistance to Malaria and a Probable Treatment for Beta-Thalassemia. Annual meeting of **"American Society of Hematology (ASH)"**, December 10-13, 2011, San Diego, CA.
8. T. Scott Devera, **Sunil K. Joshi**, Lindsay M. Aye, Gillian A. Lang, Jimmy D. Ballard and Mark L. Lang (2011). Regulation of anthrax toxin-specific antibody titers by Natural Killer T cell-derived IL-4 and IFNγ. **"6th International**

Symposium on CD1 and NKT Cells" September 23 - 27, 2011 - Chicago, Illinois.

9. R. H. Broyles, **Sunil K. Joshi**, V. Belegu, A. C. Roth, E. J. Curry, R. A. Floyd, S. Levi, P. Santambrogio, P. Aroslo and M. Trudel (2011). In vivo testing in mouse models using ferritin heavy chain and abscissic acid as potential therapies for malaria, sickle cell disease and beta thalassemias. Fourth **"Congress of the International BioIron Society (IBIS)"**, May 22-26, 2011, Vancouver, BC, Canada.
10. Mark Lang, Hemangi Shah, **Sunil K. Joshi**, Susan Kovats, Gillian Lang, and T. Devera (2011) CD1d expression by dendritic cells and CD40L or ICOS expression by **NKT** cells is dispensable for **NKT**-enhanced humoral immunity. **"98th, American Association of Immunologists"** Annual Meeting, May 13-17, 2011, San Francisco, CA.
11. Kevin M. Brown, E. Charles, **Sunil K. Joshi**, D. M. Sherry, M. Al-Ubaidi, M. Lang, and I. J. Blader (2011). Retinal Neurons Express MHC Class II and PD-L1 to Suppress Activated T cells in *Toxoplasma gondii*-Infected Eyes **"ARVO 2011 Conference"** May 1-5 Fort Lauderdale, FL.
12. Kevin M. Brown, E. Charles, **Sunil K. Joshi**, M. Lang, and I. J. Blader (2010). Toxoplasma infection of retina induces class II and PD-L1 on neuroretinal cells. **"Vision Retreat of DMEI"** 7-8th Oct. 2010, Oklahoma City, OK.
13. G. A. Lang, H. B. Shah, A. M. Johnson, T. Scott Devera, **Sunil K. Joshi** and M. L. Lang (2010). CD40L expression by NKT cells influences B cell memory but is dispensable for CD1d ligand-enhanced antibody production. **"Graduate research Day"**, OUHSC, Oklahoma City, OK.
14. Kevin M. Brown, E. Charles, **Sunil K. Joshi**, M. Lang, and I. J. Blader (2010). Toxoplasma infection of retina induces class II and PD-L1 expression on resident retinal cells. "WHIP 2010 **14th Annual Woods Hole Immuno-Parasitology Conference**, April 25-28, 2010.
15. T. S. Devera, L. M. Aye, G. A. Lang, **Sunil K. Joshi**, J. D. Ballard and M. L. Lang (2009). NKT cells enhance production of *Bacillus anthracis* lethal toxin-neutralizing antibodies. **"Chemical and Biological Science and Technology Conference"**, Dallas, TX, Nov 16 -20th, 2010.
16. **Sunil K. Joshi**, G. A. Lang, J. L. Larabee, T. S. Devera, L. M. Aye, H. B. Shah, J. D. Ballard and M. L. Lang (2009). *Bacillus anthracis* lethal toxin disrupts TCR-signaling in CD1d-restricted NKT cells in vivo leading to functional anergy. **"96th, American Association of Immunologists Annual Meeting"**, May 8-12, 2009, Seattle, WA.
17. **Sunil K. Joshi** and V. S. Chauhan (1997). Liver Stage Antigen-1 (LSA-1) of *Plasmodium falciparum* as a vaccine candidate. Second **"Global Meet on Parasitic Diseases"**, 18-22 August, 1997, Hyderabad, India.

Research Support

(Current / Previous / Pending)

Current Research Support

1. NIH-P40: 2 P40 OD 010988-16 (Parent grant PI: White, OUHSC, Oklahoma City, OK)
   Project Title: "Baboon Research Resources Program"
   Sub-Project # 4: "**Immunity to *Plasmodium knowlesi* Malaria in Baboons".**
   Funding Period: 2013 – 2018
   Role on Project: Principal Investigator
   Project Goals: P40 grant is responsible for managing National Resources for Baboon Specific Pathogen Free colonies and Research on several independent projects. In this sub-project # 4, we will characterize and optimize the pulsed electric fields-treated autologous dendritic cell based prophylactic immunotherapy to protect baboons from *P. knowlesi* malaria and also we will test the direct *in vivo* delivery of the pulsed electric fields as novel method of immunotherapy in *P. knowlesi* infected baboons.

2. EpimedX / SCCF Pilot grant: PI: Joshi 04/30/2015-12/31/2015
   Project Title: "**Pathophysiology of Sickle cell disease in transgenic mouse models".**
   Role on Project: Principal Investigator
   Project Goals: We will evaluate immunological modulations with sickle cell disease progression in two sickle cell disease mouse models.

Pending Research Support

1. CHRB-2016**:**
   Project Title: "**Sickle Cell Disease Progression leads to Dysfunctional Immunity: Growing Threat to Public Health in Virginia".**
   Funding Period: 2016-2018
   Role on Project: PI
   Project Goals: We will determine "the state of immune-dysregulation and identify the possible mechanism pathway of immuno-pathogenesis in a humanized mouse (NSG) model of SCD exposed to blood-stage *P. berghei.*

2. CDMRP-DOD Idea Award (W81XWH-15-PRMRP-DA):
   Project Title: **"Impact of Next Generation Metals on Wound Healing: Nano-Metal Composites".**
   Funding Period: 2016-2019
   Role on Project: Co-PI
   Project Goals: We will develop and then test a group of novel nanocomposite materials that are of significance in terms of their potential military relevance. Those materials will be tested in cells to identify those that clearly impact cell function and then proceed to whole animal testing. We will be particularly interested in determining if cellular responses predict those in the intact

organism; if so, we can envision rapid screening of new materials as they enter the pipeline while minimizing the use of animal testing.

3. Antibody Resources-2016
   Project Title: **"Tattooing Functionally Impairs the Immune System: A growing threat to public health".**
   Funding Period: 2016-
   Role on Project: PI
   Project Goals: The proposed research project will probe health-risk assessment for tattooing practice that may pose a significant threat to public health in many ways: Phagocytosis and migration of larger amount of ink particles by residential 'professional phagocytes' (Macrophages, Langerhans cells, Dendritic cells, Neutrophils) will over-activate the inflammatory pathway and induce autophagy in healthy cells; render the phagocytes frustrated to perform functions; interfere the antigen processing and presentation thus altering the adaptive immunity and further cause the immune suppression.

Previous Research Support

1. NIH-G20 Grant: **1G20RR024019-01:** National Center For Research Resources (PI: Tambrallo)
   Project Title: **"Developing and Improving Institutional Animal Resources"**
   Funding Period: 06/15/2007 - 06/14/2008
   Role on Project: Co-Investigator.

2. Bill & Melinda Gates Foundation (OPP1015489): Grand Challenge Exploration (GCE Round 4) (PI: Joshi).
   Project Title: **"Development of Safe, Cost-effective, and Functional Strategy for Immune Intervention"**
   Funding Period: 05/01/2010 – 10/31/2011
   Project Goals: We established the Proof of Concept on the proposed hypothesis which states "Defined Exponential Pulse Electric Fields (pEFs) delivered to skin and superficial lymph nodes can significantly enhance DC maturation and antigen-presenting function without inducing cell death, thus, triggering antigen-specific T cell priming and activation." Further research in a malaria model is being done.
   Role on Project: Principal Investigator

3. NIH-U19: AI062629 (PI: Coggeshall, OMRF)

   Project Title: **"Molecular and Immunologic Analysis of the Pathobiology of Anthrax"**
   Sub Project Title: "Anthrax toxin-induced anergy in primary human NKT cells" (PI: Lang)
   Funding Period: 09/01/2010 – 08/31/2012
   Project Goals: We analyzed the effects of anthrax toxin on dendritic cell function in shaping the human NKT mediated immune-tolerance.

Role on Project: Co-Investigator

Grants Reviewed but not Funded

1. Bill & Melinda Gates Foundation Grand Challenge Exploration (Round-15): New Approaches for Addressing Outdoor / Residual Malaria Transmission.
   Project Title: **Digital Love Song for Residual Malaria Vector Control**
   Funding Period: 2015 – 2017
   Role on Project: Principal Investigator

2. NIH-RO1 Parent grant application (Grant # 11663123):
   Project Title: "**Safety, Cell Death and Immunity Mechanisms with Hepatocellular Carcinoma Ablation".**
   Funding Period: 2016-2019
   Role on Project: Co-PI

3. NCCAM / NIH R21 (PA-14-167: Biology of Manual Therapies):
   Project Title: **"Molecular Mechanism of Neuro-immunomodulation Induced by Therapeutic Massage".**
   Funding Period: 08/01/2015-07/31/2017
   Role on Project: Principal Investigator

4. NIH EBRG-R21 (PA12-284): Exploratory Bioengineering Research Grants):
   Project Title: "**Bioengineering Approach to Stop Malaria".**
   Funding Period: 2015-2017
   Role on Project: Principal Investigator

5. Bill and Melinda Gates Foundation for New Interventions for Global Health:
   Project Title: **"An Innovative and Game-Changing Bioengineering Approach to Eradicate Malaria: Striving Novel Concept for Vaccination."**
   Funding Period: 07/01/015 to 06/30/2019
   Role on Project: Principal Investigator

6. BD Biosciences 2014 Immunology Grant:
   Project Title: "**Functional Modulation of Liver & Splenic Dendritic Cells by Anthrax Toxins".**
   Funding Period: 2015-2017
   Role on Project: Principal Investigator

7. NIH-RO1 Parent grant application (Grant # 11663123; Stephen Beebe PI):
   Project Title: "**Safety, Cell Death and Immunity Mechanisms with Hepatocellular Carcinoma Ablation".**
   Funding Period: 2015-2018
   Role on Project: Co-PI

8. DoD 2014 - Discovery Award PR140112 - GRANT11712596:

Project Title: **"Protective Immunity against Malaria via Transcutaneous Application of Non-Thermal Ambient Pressure Plasma".**
Funding Period: 08/01/2015-01/31/2017
Role on Project: Principal Investigator

9. ODU Research Seed Funding Program (RSFP) 2014-2015:
   Project Title: **"Tattooing Functionally Impairs the Immune System: A growing threat to public health".**
   Funding Period: 01/01/2015-12/31/2016
   Role on Project: Principal Investigator

10. ODU Summer Research Fellowship Program (SRFP) 2014-2015:
    Project Title: **"Flow Cytometric Analysis of Dysfunctional Immune State in Sickle Cell Disease Patients".**
    Funding Period: 06/01/2015-07/31/2015
    Role on Project: Principal Investigator

11. Commonwealth Health Research Board Grants (CHRB) FY 2015/2016:
    Project Title: **"Immune Dysregulation in Sickle Cell Disease: Public Health at Risk in Virginia".**
    Funding Period: 07/01/2015-06/30/2017
    Role on Project: Principal Investigator

12. Burroughs Wellcome Fund Innovation in Regulatory Science Awards (IRSA) 2015:
    Project Title: **"Dark Side of Tattooing: Dysregulated Immunity, Phagocytic Exhaustion, and Metabolic Syndrome".**
    Funding Period: 01/01/2016-06/30/2021
    Role on Project: Principal Investigator

13. EVMS/ODU Health Sciences Research Grant 2014:
    Project Title: **"Immuno-Pathogenesis of Sickle Cell Disease: Pilot Study on a Major Global Health Challenge in Human Population".**
    Funding Period: 01/01/2015-12/31/2016
    Role on Project: Principal Investigator

14. EVMS/ODU Health Sciences Research Grant 2014: (PI: Neel Krishna, EVMS):
    Project Title: **"Novel Peptide-Based Drug Therapy to Treat Acute Lung Injury in Sickle Cell Disease".**
    Funding Period: 01/01/2015-12/31/2016
    Role on Project: Co-PI

15. American Heart / Stroke Association Summer 2014 NCRP Innovative Research Grant (15IRG21860007):
    Project Title: **"Multiplex Genome Editing to Cure Sickle Cell Disease"**.
    Funding Period: 01/01/2015-12/31/2016

Role on Project: Principal Investigator

16. Jeffress Trust Awards Program-2015-2016**:**
    Project Title: **"Simulation-assisted Retrieval of Cryptic Immunogenic Epitopes by Cold Atmospheric Plasma (CAP) Streams".**
    Role on Project: Principal Investigator

17. NIH-U19: AI062629 PI, Coggeshall:
    Project title: **"Functional Modulation of Liver & Splenic Dendritic Cells by Anthrax Toxins".**
    Funding Period: 2009-2011
    Role on Project: Co-Investigator

18. Congressionally Directed Medical Research Programs (CDMRP2010):
    Dept. of Defense Concept Award: W81XWH-10-PRMRP-CA.
    Project Title: **"Novel Strategy to Break Immune-Tolerance against Malignant Mesothelioma by Dendritic Cell based Immunotherapy."**
    Role on Project: Principal Investigator

19. Exploratory / Developmental Bioengineering Research Grants (EBRG) EBRG-NIH-R21: 2013
    Project Title: **"Improving Immunity via Pulse Electric Fields (pEFs)"**.
    Role on Project: Principal Investigator

20. Bill & Melinda Gates Foundation: Grand Challenge Exploration (Round 12)
    Project Title: **"In Pursuit of Vaccine against Human and Animal Tuberculosis".**
    Role on Project: Principal Investigator

21. BD Biosciences Immunology Grant**: 2014**
    Project title: **"Flow Cytometric Analysis of Peripheral Blood from Sickle Cell Disease Patients for Identification of Immune-Dysregulation State".**
    Role on Project: Principal Investigator

22. Jeffress Trust Awards Program-2014:
    Project Title: **"Mathematical Modeling, Simulation of Bio-Impedance and Local Anisotropy Analysis for Electrical Pulse Delivery at Tissue-Interfaces".**
    Role on Project: Principal Investigator

23. ODU-Multidisciplinary Seed Funding Program 2014**:**
    Project Title: **"Immuno-Pathogenesis of Sickle Cell Disease in Human Patients: A Global Health Challenge".**
    Role on Project: Principal Investigator

Major Contribution to Science

1. **Synthetic T and B cell peptide epitopes from human and murine malaria parasite as vaccine candidate:** During my Ph.D. research, I studied the immune response in human subjects living in malaria endemic areas in India and several murine malaria models. This was an intensive training in structural immunology which was emphasized on the structural basis of MHC-peptide interaction and how a diverse human population responds to these synthetic epitopes. Further, several modified malaria T and B cell peptide epitopes has been characterized for their capability of inducing protective immune responses in murine malaria model.
   http://iai.asm.org/cgi/reprint/66/7/3232 / http://iai.asm.org/cgi/reprint/68/1/141

2. **Promiscuity and degeneracy in MHC-TCR interactions:** In early 90s, the concept of strict specificity in MHC-peptide recognition by T cells was overwhelming. In my Ph.D. program, I was delineating the T cell epitopes in malaria parasite proteins and testing their T cell specificity in human subjects infected or exposed to malaria[2]. The most interesting finding was that T cells from the control human subjects (not exposed to malaria) were reactive to one or two major Th epitopes of malaria parasite protein. This led me ask the question about specificity. It is known that almost every human is exposed to tetanus and respiratory syncytial virus (RSV) at some point in their lifetime. I selected well established known universal Th epitopes each from malaria, tetanus, RSV. When these epitopes were tested in human and mouse T cell assays, they all reacted to the T cells specific for malaria. In 1998, Ian Wilson and colleagues solved the crystal structure of MHC-Peptide-TCR complex and data of which indicated that TCR-MHC interaction is flexible and much more promiscuous than earlier thought. This report clearly supported finding from my own work and I became very curious to understand the new ways of pathogens to invade host immunity.
   http://www.jimmunol.org/content/166/11/6693.full.pdf+html

3. **Role of VCAM1 in lymphocyte homing and gene manipulation:** As a postdoc in the lab of Dr. Koni, I and Dr. Koni worked together on the function of VCAM1 (an adhesion molecule) in lymphocyte homing using a conditional knockout mouse for VCAM1. We found that lymphocyte migration to bone marrow was impaired suggesting therapeutic potential in developing VCAM1 antagonists in the treatment of leukemia (http://jem.rupress.org/content/193/6/741.full.pdf+html). In collaboration with other labs, we defined the role of chemokine receptors in the migration of mast cell progenitors (http://bloodjournal.hematologylibrary.org/cgi/reprint/105/11/4308). In another related project, we designed a TAT-Cre-recombinase protein able to translocate directly in the nucleus thereby deleting the knock-in gene of interest flanked by the *loxP* sites.
   http://onlinelibrary.wiley.com/doi/10.1002/gene.10089/pdf
   http://onlinelibrary.wiley.com/doi/10.1002/gene.10056/pdf
   http://www.jimmunol.org/content/176/11/6503.full.pdf+html

4. **Host-pathogen Interactions (Toxoplasma), Bacterial Toxins and Immunity:** Many pathogenic bacteria generate protein toxins that modulate properties of host cells and tissues in order to create a more suitable niche for colonization and, in some cases, to persist for extraordinary periods of time. In August 2008, I joined the lab of Dr. Mark Lang to work on a project funded by Defense Threat Reduction Agency (DTRA). One of the major questions was how *anthrax lethal toxin (LT)* modulates the function of NKT cells? Dr. Lang's work along with few other labs has established that NKT cell help by cognate or non-cognate interactions is essential for enhanced B cell responses. We found that the LT inhibits the TCR-stimulated MAP kinase signaling in NKT cells and down regulated the NKG2D (activation marker) expression on NKT cells suggesting possible mechanism of functional anergy in NKT cells induced by LT. Further, it is important to investigate the mechanisms by which pathogenic bacteria not only survive encounters with host immune cells, but are able to exploit these cells by entering, surviving, and in some cases, replicating and escaping. http://www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1000588 http://iai.asm.org/cgi/reprint/78/4/1610. In another project of Ocular toxoplasmosis with my senior colleague, we found that in *Toxoplasma gondii* infected retina, CD4 T cell suppression was mediated by PD-L1 (also named B7-H1 or CD274) an inhibitory molecule despite the upregulation of MHC II. http://iai.asm.org/cgi/reprint/78/8/3484

5. **Role of Dendritic cells CD1d in licensing iNKT cells to Regulate B and $CD8^+$ T Cell Functions:** CD1d-restricted Type I NKT cells provide help for specific antibody production. However, the role of dendritic cell CD1d in humoral immunity remains unknown. We therefore constructed mixed bone marrow chimeras containing CD1d-expressing diphtheria toxin receptor transgenic dendritic cells and $CD1d^+$ or $CD1d^-$ non-transgenic dendritic cells. Following diphtheria toxin-mediated dendritic cell ablation and immunization, we observed that the primary and secondary antibody responses were equivalent in the presence of $CD1d^+$ and $CD1d^-$ dendritic cells. In contrast, a total ablation of dendritic cells delayed the primary antibody response. Further experiments revealed that depletion of $CD1d^+$ dendritic cells blocked *in vivo* expansion of antigen-specific cytotoxic ($CD8^+$) T lymphocytes. (http://www.jleukbio.org/content/91/5/783.full.pdf+html); (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3759579/pdf/nihms490851.pdf); (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3720783/pdf/nihms485633.pdf);

Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/sunil.joshi.1/bibliography/44099601/public/?sort=date&direction=ascending