Curriculum Vitae

Kishore R. Alugupalli, PhD

Citizenship: United States of America

Education

1985-88 B. Sc. Osmania University, Hyderabad, India (Botany, Zoology and Chemistry)

1990-91 Post-baccalaureate, University Medical School of Pécs, Hungary (Microbiology)

1991-96 Ph.D. Lund University, Malmö, Sweden (Microbiology)

Research Training

1990 Research Assistant, Dept. Microbiology, University Medical School of Pécs, Hungary.

1991 Research Assistant, Dept. Bacteriology, National Institute of Hygiene, Budapest, Hungary.

1992 Research Assistant, Dept. Medical Microbiology, Malmö General Hospital, Sweden.

1997-02 Postdoctoral Fellow (Mentor: John M. Leong), Dept. of Molecular Genetics & Microbiology, University of Massachusetts Medical School, Worcester, MA.

Employment

2003-05 **Research Assistant Professor**, Dept. of Molecular Genetics & Microbiology, University of Massachusetts Medical School, Worcester, MA.

2005-14 **Assistant Professor,** Dept. of Microbiology & Immunology, Jefferson Medical College, Thomas Jefferson University, Philadelphia, PA.

2009-11 **Director,** Immunology and Microbial Pathogenesis PhD Program Jefferson College of Graduate Studies, Thomas Jefferson University, Philadelphia, PA.

2014-23 **Associate Professor,** Dept. of Microbiology & Immunology, Jefferson Medical College, Thomas Jefferson University, Philadelphia, PA.

2015- **Course Director,** Immunology for PharmD students Jefferson College of Pharmacy, Thomas Jefferson University. Philadelphia, PA.

2019- **Chief Scientific Officer (CSO)**, SRIN Therapeutics Inc, Philadelphia, PA.

2023- **Chief Executive Officer (CEO)**, TurboVax Inc, Horsham, PA.

2024- **Professor** (adjunct), Kanbar College, School of Design and Engineering, Thomas Jefferson University, Philadelphia, PA.

Professional Services

Reviewer for journals:
Immunity
The Journal of Immunology
Molecular Immunology
EMBO
Nature Vaccines
Infection and Immunity
BMC Microbiology
PLOS pathogens
PLOS one
PLOS Neglected Tropical Diseases
Vaccine
Biochemistry
Antimicrobial Agents and Chemotherapy

Editorial Board:
Frontiers in Cellular Microbiology
Frontiers in Immunology
Nature Scientific Reports

Reviewer on various study sections to evaluate the merit of NIH or MRC grant proposals:
Medical Research Council, United Kingdom.
NIH, Mucosal Immunology study section: ZAI1 WFD-I (M2)
NIH, Scientific Review Group: ZRG1 IMM-N (03)
NIH, NIAID review meeting for R13 conference grant applications
NIH, Scientific Review Group ZRG1 IMM-J (90)
NIH, Scientific Review Group ZRG1 IMM-J (91)
NIH, Scientific Review Group ZRG1 IMM-T (81) A
NIH, Scientific Review Group ZRG1 F07-T (20) L

Services on various committees at Thomas Jefferson University:
2005-2023 Member, Kimmel Cancer Center, Thomas Jefferson University
2006-2023 Member, Thomas Jefferson University - Institutional Biosafety Committee
2006-2018 Member, Faculty Search Committee, Jefferson Medical College

Memberships in Scientific Societies:

1997- 2024 American Society for Microbiology
2002- 2024 American Association of Immunologists

Teaching Experience

1998-2005 Laboratory instructor for MD students UMass Medical School (UMMS), Worcester, MA
1999-2005 Training PhD students in their research rotations at UMMS.
2006- 2012 Bacteriology to Medical students at Jefferson Medical College (TJU)
2006- 2024 Lecturer (IMP505): Immunology and Microbial Pathogenesis, TJU
2006- 2023 Course Coordinator & Lecturer (IMP600): Immunology and Microbial Pathogenesis, TJU
2006- 2023 Lecturer (IMP655): Immunology and Microbial Pathogenesis, TJU
2012- 2023 Lecturer (PHRM 525): Immunology for Pharmacy students, TJU
2013- 2015 Co-Director (PHRM 525): Immunology for Pharmacy students, TJU
2015- 2023 Course Director and Lecturer (PHRM 525): Immunology for Pharmacy students, TJU
2025- Course Director and Lecturer (ENGR 614): Vaccine Formulation, Philadelphia University.
2025- Lecturer (ENGR 612): Emerging Modalities, Philadelphia University.

Mentoring experience

PhD or MS students graduated in my lab and their present status:
Matthew Colombo (2006-2010), Global Medical Manager, Immunoscience at Bristol-Myers Squibb
Gregory Dickinson (2007-2011), Adjunct Faculty at the Montgomery County Community College, PA
Justin Walker (2015) (MS), Senior Research Associate at WuXi AppTec
Sarah Kaufhold (2016)(MS), Patient Strategies & Solutions Analyst, Janssen (Johnson & Johnson)
Kalgi Pandya (2017) (MS), Senior Scientist, CMC Regulatory Affairs, Merck
Dania Gulandijany (2018) (MS) Researcher, Saudi Arabia

Post-doctoral Fellows trained in my lab and their status:
Anne Shriner (2006-2008), Senior Contract and Grant Officer, Northwestern University, Chicago, IL
Hongqi Liu (2007-2010), Professor, Chinese Academy of Medical Science, Yunnan, China
Vivek Belde (2008), Physician, Apollo Hospitals, Hyderabad, India
Gregory Dickinson (2012-2015), Faculty, Montgomery County Community College, Blue Bell, PA.

PhD students trained for rotation in my lab on various research projects:
Matthew Colombo (2006) (PhD)
Gregory Dickinson (2007) (PhD)
Matthew Philips (2008) (PhD)
Tessa Lawrence (2009) (PhD)
Michael Quinn (2010) (MD/PhD)

Thesis Committees: (Member or chair of thesis committee of MD/PhD, PhD & MS students of others)
Amy O'connell (MD/PhD)
Celestine Wanjalla (MD/PhD)
Neda Nikbakht (MD/PhD)
Pedro Piexoto (MD/PhD)
Stephen Rosenberg (PhD)
Elizabeth Faul (PhD)
Francis Coffey (PhD)
Josephine Fox-Wixted (PhD)
James Testa (PhD)
Sandra Bonne-Anne (PhD)
Jordan Weslowski (PhD)
Erik Ronzone (PhD)

Nick Siciliano (PhD)
Samantha Garcia (PhD)
Rohan Keshwara (PhD)
Lindsay Meyes (PhD)
Catherine Yankowski (PhD)
Shannon McGettigan (PhD)

Invited speaker at National and International conferences and Seminars at other institutions

01/09/2004 Boston University School of Medicine, Boston, MA.
01/11/2004 Thomas Jefferson University, Philadelphia, PA.
01/12/2004 University of Alabama, Birmingham, AL.
12/10/2005 University of Maryland School of Dentistry, Baltimore, MD.
02/10/2005 University of Washington, Seattle, WA
05/05/2005 Stanford University, Stanford, CA
01/09/2006 Uniformed Services University of the Health Sciences, Bethesda, MD.
10/21/2006 Fox Chase Cancer Center, Philadelphia, PA.
05/23/2007 107th General Meeting of American Society for Microbiology, Toronto, Canada.
08/24/2007 13th International Congress of Immunology, Rio de Janeiro, Brazil.
06/08/2008 FASEB-Conference, Biology of the Immune System, Carefree, AZ.
06/28/2008 International Workshop on B cells, Oxford, United Kingdom.
10/15/2008 Boston University School of Medicine, Boston, MA.
11/02/2009 NIAID workshop on B cell memory, NIH, Bethesda, MD
10/25/2010 Cedarcrest College, Allentown, PA
10/29/2010 University of Pennsylvania, Philadelphia PA.
05/06/2011 University of Montreal, Montreal, Canada
05/13/2011 98th American Association of Immunologists (Major Symposium) San Francisco, CA.
09/29/2011 University of Maryland, College Park, MD
12/06/2011 Congress of British Society of Immunology, Liverpool, United Kingdom.
04/19/2012 University of Massachusetts Medical School, Worcester, MA.
12/10/2012 University of Maryland School of Medicine, Baltimore, MD.
01/21/2014 Gordon Research Conference, Biology of Spirochetes, Ventura, CA.
03/10/2014 9th International Symposium on Pneumococci and Pneumococcal Diseases, India
06/16/2014 Merinoff World Congress: B-1 Cell Development & Function, Tarrytown, NY.
09/03/2014 Virginia-Maryland Regional College of Veterinary Medicine, College Park, MD
10/21/2014 University of Kentucky School of Medicine, Lexington, KY.
11/13/2014 Loyola University Chicago, Chicago, IL.
11/20/2014 Temple University School of Medicine, Philadelphia, PA.
02/13/2015 University of California, Davis, CA
02/23/2015 American Society for Microbiology (Eastern Pennsylvania Branch), Philadelphia, PA
11/04/2015 International conference on Vaccines: Research & Development, Baltimore, MD
12/16/2015 Fox Chase Cancer Center, Philadelphia, PA.
01/13/2016 Gordon Research Conference, Biology of Spirochetes, Ventura, CA
02/18/2016 Penn State College of Medicine, Hershey Medical Center, Hershey, PA
04/21/2016 United States Food & Drug Administration (FDA/CBER), Silver Spring, MD
11/04/2018 International Lyme Associated Diseases Society conference, Chicago, IL.
07/22/2023 Gordon Research Conference, Salmonella Biology and Pathogenesis, Ciocco, Italy
04/01/2024 World Vaccine Conference, Washington DC.
11/06/2024 5th Annual Network Meeting, Ho Chi Minh City, Vietnam.
11/14/2024 Vaccines Summit 2025, Boston, MA
11/28/2024 The 2nd International Electronic Conference on Vaccines, 2024.
03/31/2025 24th International Pathogenic Neisseria Conference (IPNC2025), Florence, Italy

Peer-reviewed scientific publications (Total 50):

[!] In first 5 publications my first name appeared as my last name
[*] Indicates principal investigator and corresponding author

1. **Kishore AR[!],** Erdei J, Naidu SS, Falsen E, Forsgren A, Naidu AS. Specific binding of lactoferrin to Aeromonas hydrophila. **FEMS Microbiology Letters**. 1991 Sep 15;67(1):115-9. doi: 10.1016/0378-1097(91)90454-i. PMID: 1778417.

2. Tigyi Z., **Kishore AR[!],** Maeland JA, Forsgren A, Naidu AS. Lactoferrin-binding proteins in Shigella flexneri**. Infection and Immunity**. 1992 Jul;60(7):2619-26. doi: 10.1128/iai.60.7.2619-2626.1992. PMID: 1319403; PMCID: PMC257212.

3. **Kishore AR[!],** Erdei J, Kalfas S, Forsgren A, Naidu AS. Detection of bacterial interaction with lactoferrin by an enzyme-linked ligand binding assay (ELBA). **Journal of Medical Microbiology**. 1992 Nov;37(5):341-5. doi: 10.1099/00222615-37-5-341. PMID: 1433256.

4. Naidu SS, Svensson U, **Kishore AR[!]**, Naidu AS. Relationship between antibacterial activity and porin binding of lactoferrin in Escherichia coli and Salmonella typhimurium. **Antimicrobial Agents and Chemotherapy**. 1993 Feb;37(2):240-5. doi: 10.1128/AAC.37.2.240. PMID: 8383941; PMCID: PMC187646.

5. Paulsson MA, Svensson U, **Kishore AR[!]**, Naidu AS. Thermal behavior of bovine lactoferrin in water and its relation to bacterial interaction and antibacterial activity. **Journal of Dairy Sciences**. 1993 Dec;76(12):3711-20. doi: 10.3168/jds.s0022-0302(93)77713-9. PMID: 8132877.

6. **Alugupalli KR[*],** Kalfas S, Edwardsson S, Forsgren A, Arnold RR, Naidu AS. Effect of lactoferrin on interaction of Prevotella intermedia with plasma and subepithelial matrix proteins. **Oral Microbiology and Immunology**. 1994 Jun;9(3):174-9. doi: 10.1111/j.1399-302x.1994.tb00055.x. PMID: 7936724.

7. **Alugupalli KR[*],** Kalfas S, Edwardsson S, Naidu AS. Lactoferrin interaction with Actinobacillus actinomycetemcomitans. **Oral Microbiology and Immunology**. 1995 Feb;10(1):35-41. doi: 10.1111/j.1399-302x.1995.tb00115.x. PMID: 7644271.

8. **Alugupalli KR[*],** Kalfas S. 1995. Kalfas S. Inhibitory effect of lactoferrin on the adhesion of Actinobacillus actinomycetemcomitans and Prevotella intermedia to fibroblasts and epithelial cells. **Acta Pathologica, Microbiologica, et Immunologica Scandinavica**. 1995 Feb;103(2):154-60. PMID: 7748540.

9. **Alugupalli KR[*],** Kalfas S, Forsgren A. Laminin binding to a heat-modifiable outer membrane protein of Actinobacillus actinomycetemcomitans. **Oral Microbiology and Immunology**. 1996 Oct;11(5):326-31. doi: 10.1111/j.1399-302x.1996.tb00189.x. PMID: 9028258.

10. **Alugupalli KR[*],** Kalfas S. Degradation of lactoferrin by periodontitis-associated bacteria. **FEMS Microbiology Letters**. 1996 Dec 1;145(2):209-14. doi: 10.1111/j.1574-6968.1996.tb08579.x. PMID: 8961558.

11. Nyman M, **Alugupalli KR,** Strömberg S, Forsgren A. Antibody response to Arcanobacterium haemolyticum infection in humans. **The Journal of Infectious Diseases.** 1997 Jun;175(6):1515-8. doi: 10.1086/516490. PMID: 9180197.

12. **Alugupalli KR*,** Kalfas S. Characterization of the lactoferrin-dependent inhibition of the adhesion of Actinobacillus actinomycetemcomitans, Prevotella intermedia and Prevotella nigrescens to fibroblasts and to a reconstituted basement membrane. **Acta Pathologica, Microbiologica, et Immunologica Scandinavica**. 1997 Sep;105(9):680-8. doi: 10.1111/j.1699-0463.1997.tb05071.x. PMID: 9350211.

13. Magoun L, Zückert WR, Robbins D, Parveen N, **Alugupalli KR**, Schwan TG, Barbour AG, Leong JM. Variable small protein (Vsp)-dependent and Vsp-independent pathways for glycosaminoglycan recognition by relapsing fever spirochaetes. **Molecular Microbiology**. 2000 May;36(4):886-97. doi: 10.1046/j.1365-2958.2000.01906.x. PMID: 10844676.

14. **Alugupalli KR,** Michelson AD, Barnard MR, Robbins D, Coburn J, Baker EK, Ginsberg MH, Schwan TG, Leong JM. Platelet activation by a relapsing fever spirochaete results in enhanced bacterium-platelet interaction via integrin alphaIIbbeta3 activation. **Molecular Microbiology**. 2001 Jan;39(2):330-40. doi: 10.1046/j.1365-2958.2001.02201.x. PMID: 11136454.

15. **Alugupalli KR,** Michelson AD, Barnard MR, Leong JM. Serial determinations of platelet counts in mice by flow cytometry. **Thrombosis and Haemostasis**. 2001 Aug;86(2):668-71. PMID: 11522020.

16. **Alugupalli KR***, Gerstein RM, Chen J, Szomolanyi-Tsuda E, Woodland RT, Leong JM. The resolution of relapsing fever borreliosis requires IgM and is concurrent with expansion of B1b lymphocytes. **The Journal of Immunology**. 2003 Apr 1;170(7):3819-27. doi: 10.4049/jimmunol.170.7.3819. PMID: 12646649.

17. **Alugupalli KR*,** Michelson AD, Joris I, Schwan TG, Hodivala-Dilke K, Hynes RO, Leong JM. Spirochete-platelet attachment and thrombocytopenia in murine relapsing fever borreliosis. **Blood**. 2003 Oct 15;102(8):2843-50. doi: 10.1182/blood-2003-02-0426. Epub 2003 Jul 10. PMID: 12855586.

18. **Alugupalli KR*,** Leong JM, Woodland RT, Muramatsu M, Honjo T, Gerstein RM. B1b lymphocytes confer T cell-independent long-lasting immunity. **Immunity.** 2004 Sep;21(3):379-90. doi: 10.1016/j.immuni.2004.06.019. PMID: 15357949.

19. **Alugupalli KR,** Gerstein RM. Divide and conquer: division of labor by B-1 B cells. **Immunity**. 2005 Jul;23(1):1-2. doi: 10.1016/j.immuni.2005.07.001. PMID: 16039572.

20. **Alugupalli KR*,** Akira S, Lien E, Leong JM. MyD88- and Bruton's tyrosine kinase-mediated signals are essential for T cell-independent pathogen-specific IgM responses. **The Journal of Immunology**. 2007 Mar 15;178(6):3740-9. doi: 10.4049/jimmunol.178.6.3740. PMID: 17339472.

21. Wong SM, **Alugupalli KR**, Ram S, Akerley BJ. The ArcA regulon and oxidative stress resistance in Haemophilus influenzae. **Molecular Microbiology**. 2007 Jun;64(5):1375-90. doi: 10.1111/j.1365-2958.2007.05747.x. PMID: 17542927; PMCID: PMC1974803.

22. Colombo MJ, **Alugupalli KR***. Complement factor H-binding protein, a putative virulence determinant of Borrelia hermsii, is an antigenic target for protective B1b lymphocytes. **The Journal of Immunolology**. 2008 Apr 1;180(7):4858-64. doi: 10.4049/jimmunol.180.7.4858. PMID: 18354209.

23. **Alugupalli KR*.** A distinct role for B1b lymphocytes in T cell-independent immunity. **Current Topics in Microbiology and Immunolology.** 2008;319:105-30. doi: 10.1007/978-3-540-73900-5_5. PMID: 18080416.

24. O'Brien K, Fitzgerald DC, Naiken K, **Alugupalli KR***, Rostami AM, Gran B. Role of the innate immune system in autoimmune inflammatory demyelination. **Current medicinal chemistry**. 2008;15(11):1105-15. doi: 10.2174/092986708784221458. PMID: 18473806.

25. Faber M, Li J, Kean RB, Hooper DC, **Alugupalli KR**, Dietzschold B. Effective preexposure and postexposure prophylaxis of rabies with a highly attenuated recombinant rabies virus. **The Proceedings of the National Academy of Sciences of the United States of America**. 2009 Jul 7;106(27):11300-5. doi: 10.1073/pnas.0905640106. Epub 2009 Jul 6. PMID: 19581599; PMCID: PMC2706273.

26. **Alugupalli KR,** Abraham D. B cell multitasking is required to control nematode infection. **Immunity**. 2009 Mar 20;30(3):317-9. doi: 10.1016/j.immuni.2009.02.004. PMID: 19303384.

27. Benoit VM, Petrich A, **Alugupalli KR**, Marty-Roix R, Moter A, Leong JM, Boyartchuk VL. Genetic control of the innate immune response to Borrelia hermsii influences the course of relapsing fever in inbred strains of mice. **Infection and Immunity**. 2010 Feb;78(2):586-94. doi: 10.1128/IAI.01216-09. Epub 2009 Dec 7. PMID: 19995898; PMCID: PMC2812184.

28. Liu H, Fitzgerald D, Gran B, Leong JM, **Alugupalli KR***. Induction of distinct neurologic disease manifestations during relapsing fever requires T lymphocytes. **The Journal of Immunolology**. 2010 May 15;184(10):5859-64. doi: 10.4049/jimmunol.0902737. Epub 2010 Apr 9. PMID: 20382883.

29. Shriner AK, Liu H, Sun G, Guimond M, **Alugupalli KR***. IL-7-dependent B lymphocytes are essential for the anti-polysaccharide response and protective immunity to Streptococcus pneumoniae. **The Journal of Immunolology**. 2010 Jul 1;185(1):525-31. doi: 10.4049/jimmunol.0902841. Epub 2010 May 26. PMID: 20505146.

30. Colombo MJ, Sun G, **Alugupalli KR***. T-cell-independent immune responses do not require CXC ligand 13-mediated B1 cell migration. **Infection and Immunity**. 2010 Sep;78(9):3950-6. doi: 10.1128/IAI.00371-10. Epub 2010 Jun 28. PMID: 20584971; PMCID: PMC2937435.

31. Dickinson GS, Piccone H, Sun G, Lien E, Gatto L, **Alugupalli KR***. Toll-like receptor 2 deficiency results in impaired antibody responses and septic shock during Borrelia hermsii infection. **Infection and Immunity**. 2010 Nov;78(11):4579-88. doi: 10.1128/IAI.00438-10. Epub 2010 Aug 9. PMID: 20696824; PMCID: PMC2976319.

32. Colombo MJ, Abraham D, Shibuya A, **Alugupalli KR***. B1b lymphocyte-derived antibodies control Borrelia hermsii independent of Fcα/μ receptor and in the absence of host cell contact.

Immunological Research. 2011 Dec;51(2-3):249-56. doi: 10.1007/s12026-011-8260-8. PMID: 22139824; PMCID: PMC6707740.

33. Vuyyuru R, Liu H, Manser T, **Alugupalli KR***. Characteristics of Borrelia hermsii infection in human hematopoietic stem cell-engrafted mice mirror those of human relapsing fever. **The Proceedings of the National Academy of Sciences of the United States of America**. 2011 Dec 20;108(51):20707-12. doi: 10.1073/pnas.1108776109. Epub 2011 Dec 5. PMID: 22143787; PMCID: PMC3251092.

34. Dickinson GS, **Alugupalli KR***. Deciphering the role of Toll-like receptors in humoral responses to Borreliae. **Frontiers in Biosciences** (Schol Ed). 2012 Jan 1;4(2):699-712. doi: 10.2741/s294. PMID: 22202086.

35. Dickinson GS, Sun G, Bram RJ, **Alugupalli KR***. Efficient B cell responses to Borrelia hermsii infection depend on BAFF and BAFFR but not TACI. **Infection and Immunity**. 2014 Jan;82(1):453-9. doi: 10.1128/IAI.01147-13. Epub 2013 Nov 11. PMID: 24218480; PMCID: PMC3911873.

36. Uslu K, Coleman AS, Allman WR, Katsenelson N, Bram RJ, **Alugupalli KR**, Akkoyunlu M. Impaired B cell receptor signaling is responsible for reduced TACI expression and function in X-linked immunodeficient mice. **The Journal of Immunolology.** 2014 Apr 15;192(8):3582-95. doi: 10.4049/jimmunol.1203468. Epub 2014 Mar 19. PMID: 24646744.

37. Dickinson GS, Akkoyunlu M, Bram RJ, **Alugupalli KR***. BAFF receptor and TACI in B-1b cell maintenance and antibacterial responses. **Annals of the New York Academy of Sciences**. 2015 Dec;1362:57-67. doi: 10.1111/nyas.12772. Epub 2015 May 11. PMID: 25962322.

38. Haley SL, Tzvetkov EP, Lytle AG, **Alugupalli KR**, Plummer JR, McGettigan JP. APRIL:TACI axis is dispensable for the immune response to rabies vaccination. **Antiviral Research**. 2017 Aug;144:130-137. doi: 10.1016/j.antiviral.2017.06.004. Epub 2017 Jun 12. PMID: 28619678; PMCID: PMC5547903.

39. Walker JA, Vuyyuru R, Manser T, **Alugupalli KR***. Humoral Immunity in Mice Transplanted with Hematopoietic Stem Cells Derived from Human Umbilical Cord Blood Recapitulates That of Human Infants. **Stem Cells and Development**. 2017 Dec 1;26(23):1715-1723. doi: 10.1089/scd.2017.0156. Epub 2017 Nov 3. Erratum in: Stem Cells and Dev. 2018 Jul 1;27(13):948. doi: 10.1089/scd.2017.0156.correx. PMID: 29099340; PMCID: PMC5706618.

40. Pandya KD, Palomo-Caturla I, Walker JA, K Sandilya V, Zhong Z, **Alugupalli KR***. An Unmutated IgM Response to the Vi Polysaccharide of *Salmonella* Typhi Contributes to Protective Immunity in a Murine Model of Typhoid. **The Journal of Immunolology**. 2018 Jun 15;200(12):4078-4084. doi: 10.4049/jimmunol.1701348. Epub 2018 May 9. PMID: 29743315; PMCID: PMC6033073.

41. Dickinson GS, Levenson EA, Walker JA, Kearney JF, **Alugupalli KR***. IL-7 Enables Antibody Responses to Bacterial Polysaccharides by Promoting B Cell Receptor Diversity. **The Journal of Immunolology**. 2018 Aug 15;201(4):1229-1240. doi: 10.4049/jimmunol.1800162. Epub 2018

Jul 13. PMID: 30006375; PMCID: PMC6085875.

42. Belde V., Cravens MP, Gulandijany D, Walker JA, Palomo-Caturla I, Alugupalli AS, Sandilya VK, Mahmoud T, Bäumler AJ, Kearney JF, **Alugupalli KR***. Terminal Deoxynucleotidyl Transferase Is Not Required for Antibody Response to Polysaccharide Vaccines against Streptococcus pneumoniae and Salmonella enterica Serovar Typhi. **Infection and Immunity**. 2018 Aug 22;86(9):e00211-18. doi: 10.1128/IAI.00211-18. PMID: 29967094; PMCID: PMC6105908.

43. Cheng M, Xu J, Ding K, Zhang J, Lu W, Liu J, Gao J, **Alugupalli KR***, Liu H. Attenuation of relapsing fever neuroborreliosis in mice by IL-17A blockade. **The Proceedings of the National Academy of Sciences of the United States of America**. 2022 Oct 18;119(42):e2205460119. doi: 10.1073/pnas.2205460119. Epub 2022 Oct 10. PMID: 36215473; PMCID: PMC9586318.

44. Cravens MP, Alugupalli AS, Sandilya VK, McGeady SJ, **Alugupalli KR***. The Immunoglobulin M Response to Pneumococcal Polysaccharide Vaccine Is Sufficient for Conferring Immunity. **The Journal of Infectious Diseases**. 2022 Nov 11;226(10):1852-1856. doi: 10.1093/infdis/jiac339. PMID: 35932228; PMCID: PMC10205626.

45. Alugupalli AS, Cravens MP, Walker JA, Gulandijany D, Dickinson GS, Debes GF, Schifferli DM, Bäumler AJ, **Alugupalli KR***. The Lack of Natural IgM Increases Susceptibility and Impairs Anti-Vi Polysaccharide IgG Responses in a Mouse Model of Typhoid. **Immunohorizons**. 2022 Dec 1;6(12):807-816. doi: 10.4049/immunohorizons.2200088. PMID: 36480484; PMCID: PMC10205010.

46. **Alugupalli KR*,** Kothari S, Cravens MP, Walker JA, Dougharty DT, Dickinson GS, Gatto LA, Bäumler AJ, Wangdi T, Miller DR, Pardo-Manuel de Villena F, Siracusa LD. Identification of collaborative cross mouse strains permissive to Salmonella enterica serovar Typhi infection. **Scientific Reports**. 2023 Jan 9;13(1):393. doi: 10.1038/s41598-023-27400-1. PMID: 36624251; PMCID: PMC9829673.

47. **Alugupalli KR***. TLR4 Ligands in Typhoid Vi Polysaccharide Subunit Vaccines Contribute to Immunogenicity. **Immunohorizons**. 2024 Jan 1;8(1):29-34. doi: 10.4049/immunohorizons.2300085. PMID: 38180344; PMCID: PMC10832388.

48. **Alugupalli KR*.** Monophosphoryl Lipid A-based Adjuvant to Promote the Immunogenicity of Multivalent Meningococcal Polysaccharide Conjugate Vaccines. **Immunohorizons**. 2024 Apr 1;8(4):317-325. doi: 10.4049/immunohorizons.2400013. PMID: 38625118; PMCID: PMC11066721.

49. **Alugupalli KR*.** A TLR4 ligand-based adjuvant for promoting the immunogenicity of typhoid subunit vaccines. **Frontiers in Immunology**. 2024 May 10;15:1383476. doi: 10.3389/fimmu.2024.1383476. PMID: 38799439; PMCID: PMC11116679.

50. **Alugupalli KR*.** Characterization of Turbo, a TLR Ligand-based Adjuvant for Glycoconjugate Vaccines. **Immunohorizons**. 2024 Aug 1;8(8):527-537. doi: 10.4049/immunohorizons.2400040. PMID: 39093309; PMCID: PMC11374753.

51. Lebel, M.-È., C. A. Bonkoungou, J. Thibault, J. Rauch, **Alugupalli KR,** and H. J. Melichar. 2024. CD271 restrains the B1b cell antibody response in a T cell dependent manner. **bioRxiv**: 2024.2001.2008.574733

Alternate media

Alugupalli K. R., 2012**.** (Podcast) Borrelia hermsii-infected, humanized NSG mice: a better model of relapsing fever
https://www.jax.org/news-and-insights/2012/january/borrelia-hermsii-infected-humanized-nsg-mice-a-better-model-of-relapsing-fe

Travel Awards:

1995 Royal Physiographic Association, Sweden
1995 European Research Group for Oral Biology, United Kingdom.
2014 9th International Symposium on Pneumococci and Pneumococcal Diseases, India

Contributions to science at career stages

1. PhD student: Lactoferrin is known to be an iron-binding protein that is present in various body fluids and in the granules of neutrophils. Prior to my work, lactoferrin was considered to have bacteriostatic and bactericidal activity due to its iron-binding capability. As a PhD student, I showed that lactoferrin can bind to specific bacterial surface proteins and competes with bacterial attachment to host cells and extracellular matrix and alters bacterial growth. My thesis work demonstrated adhesion counteracting mechanisms against periodontitis and gingivitis associated bacteria.

1. **Alugupalli KR*,** Kalfas S, Edwardsson S, Forsgren A, Arnold RR, Naidu AS. Effect of lactoferrin on interaction of *Prevotella intermedia* with plasma and subepithelial matrix proteins. **Oral Microbiology and Immunology**. 1994 Jun;9(3):174-9. doi: 10.1111/j.1399-302x.1994.tb00055.x. PMID: 7936724.

2. **Alugupalli KR*,** Kalfas S. 1995. Kalfas S. Inhibitory effect of lactoferrin on the adhesion of Actinobacillus actinomycetemcomitans and Prevotella intermedia to fibroblasts and epithelial cells. **Acta Pathologica, Microbiologica, et Immunologica Scandinavica**. 1995 Feb;103(2):154-60. PMID: 7748540.

3. **Alugupalli KR*,** Kalfas S. Characterization of the lactoferrin-dependent inhibition of the adhesion of Actinobacillus actinomycetemcomitans, Prevotella intermedia and Prevotella nigrescens to fibroblasts and to a reconstituted basement membrane. **Acta Pathologica, Microbiologica, et Immunologica Scandinavica**. 1997 Sep;105(9):680-8. doi: 10.1111/j.1699-0463.1997.tb05071.x. PMID: 9350211.

II. Post-doctoral Fellow: Decreased platelet count (thrombocytopenia) alters hemostasis that can result in spontaneous bleeding disorders and is a common feature during bacteremia. During my postdoctoral work in Dr. John Leong's laboratory, I not only developed a method to monitor platelet count during bacteremia but discovered that the bacterial attachment to the platelets that results in platelet activation and platelet depletion from circulation and enables bacterial retention and colonization in the vascular compartment.

1. **Alugupalli KR,** Michelson AD, Barnard MR, Robbins D, Coburn J, Baker EK, Ginsberg MH, Schwan TG, Leong JM. Platelet activation by a relapsing fever spirochaete results in enhanced bacterium-platelet interaction via integrin alphaIIbbeta3 activation. **Molecular Microbiology**. 2001 Jan;39(2):330-40. doi: 10.1046/j.1365-2958.2001.02201.x. PMID: 11136454.

2. **Alugupalli KR,** Michelson AD, Barnard MR, Leong JM. Serial determinations of platelet counts in mice by flow cytometry. **Thrombosis and Haemostasis**. 2001 Aug;86(2):668-71. PMID: 11522020.

3. **Alugupalli KR*,** Michelson AD, Joris I, Schwan TG, Hodivala-Dilke K, Hynes RO, Leong JM. Spirochete-platelet attachment and thrombocytopenia in murine relapsing fever borreliosis. **Blood**. 2003 Oct 15;102(8):2843-50. doi: 10.1182/blood-2003-02-0426. Epub 2003 Jul 10. PMID: 12855586.

III. **Research Assistant Professor:** During the transition from a post-doc to an independent investigator I discovered a role for B1b cells, a subset of mature B cells in mice. My work provides compelling evidence that not only answers the riddle of B1b cell function but also undermines the immunological dogma that only T cell dependent antigens elicit memory such that re-exposure to the antigen later induces a vigorous secondary response. I showed that protective immunity to *Borrelia hermsii* is a property of the B1b cells and implicated Toll-like receptor signaling in this process. Later other investigators have shown that B1b cells provide immunity to Pneumococcus as well as Typhoidal and non-typhoidal Salmonella

1. **Alugupalli KR***, Gerstein RM, Chen J, Szomolanyi-Tsuda E, Woodland RT, Leong JM. The resolution of relapsing fever borreliosis requires IgM and is concurrent with expansion of B1b lymphocytes. **The Journal of Immunology**. 2003 Apr 1;170(7):3819-27. doi: 10.4049/jimmunol.170.7.3819. PMID: 12646649.

2. **Alugupalli KR*,** Leong JM, Woodland RT, Muramatsu M, Honjo T, Gerstein RM. B1b lymphocytes confer T cell-independent long-lasting immunity. **Immunity.** 2004 Sep;21(3):379-90. doi: 10.1016/j.immuni.2004.06.019. PMID: 15357949.

3. **Alugupalli KR*,** Akira S, Lien E, Leong JM. MyD88- and Bruton's tyrosine kinase-mediated signals are essential for T cell-independent pathogen-specific IgM responses. **The Journal of Immunolology**. 2007 Mar 15;178(6):3740-9. doi: 10.4049/jimmunol.178.6.3740. PMID: 17339472.

IV. Assistant Professor: Although the power of murine models in elucidating immunological mechanisms is unquestioned, it is not known whether a functional equivalent of B1b cell-mediated immunity exists in humans. To begin to translate the discoveries I have teamed up with Dr. Timothy Manser, a colleague, and have generated and characterized human-mouse chimeric model systems to a better understanding of the development of humoral immunity in humans. We have utilized hematopoietically humanized mice as a translational platform. We have discovered the development of putative human B1 cells in this system. Recently, we have compared several sources of hematopoietic stem cells. Although umbilical cord blood hematopoietic stem cells (UCB HSC)-transplanted mice generated robust antibody responses to *B. hermsii* and specific protein antigens of *B. hermsii*, they failed to respond to classical T cell-independent antigens such as bacterial polysaccharides. This situation resembles that seen in human infants and young children. Therefore, UCB HSC transplanted mice can serve as a translation platform to explore approaches to overcome the impaired anti-polysaccharide responses characteristic of human infants.

1. Vuyyuru R, Liu H, Manser T, **Alugupalli KR***. Characteristics of *Borrelia hermsii* infection in human hematopoietic stem cell-engrafted mice mirror those of human relapsing fever. **The Proceedings of the National Academy of Sciences of the United States of America**. 2011 Dec 20;108(51):20707-12. doi: 10.1073/pnas.1108776109. Epub 2011 Dec 5. PMID: 22143787; PMCID: PMC3251092.

2. Walker JA, Vuyyuru R, Manser T, **Alugupalli KR***. Humoral Immunity in Mice Transplanted with Hematopoietic Stem Cells Derived from Human Umbilical Cord Blood Recapitulates That of Human Infants. **Stem Cells and Development**. 2017 Dec 1;26(23):1715-1723. doi: 10.1089/scd.2017.0156. Epub 2017 Nov 3. Erratum in: Stem Cells and Dev. 2018 Jul 1;27(13):948. doi: 10.1089/scd.2017.0156.correx. PMID: 29099340; PMCID: PMC5706618.

V. Associate Professor: Bacterial polysaccharide vaccines such as Pneumovax®23 and Typhim Vi®, induce robust antibody responses in adults, but not in young children and the reasons for this difference are not completely understood. Interleukin-7 dependency in B cell development increases progressively with age and Interleukin-7 receptor α-mediated signals are required for efficient utilization of distal V_H gene families, such as V_HJ558 during $V_H(D_H)J_H$ recombination. Therefore, we hypothesized that B cells generated early in life do not recognize a wide range of antigens due to a limitation in BCR diversity. Indeed, we found that both young mice and Interleukin-7-deficient adult mice fail to generate a protective antibody response to typhoid vaccine Vi polysaccharide and α-glucans present on a variety of microbes. Our work indicates that a restricted V_H usage and paucity of antigen-specific B cell precursors limits polysaccharide response early in life. Furthermore, we showed that unmutated IgM antibodies play a significant protection against Salmonella Typhi and *Streptococcus pneumoniae*. Improved understanding of the foundation for polysaccharide non-responsiveness in the young may open new avenues for the rational development of more effective vaccines targeting a wide array of encapsulated bacterial pathogens that currently kill hundreds of thousands of children each year.

1. Shriner AK, Liu H, Sun G, Guimond M, **Alugupalli KR***. IL-7-dependent B lymphocytes are essential for the anti-polysaccharide response and protective immunity to Streptococcus pneumoniae. **The Journal of Immunolology**. 2010 Jul 1;185(1):525-31. doi: 10.4049/jimmunol.0902841. Epub 2010 May 26. PMID: 20505146.

2. Dickinson GS, Levenson EA, Walker JA, Kearney JF, **Alugupalli KR***. IL-7 Enables Antibody Responses to Bacterial Polysaccharides by Promoting B Cell Receptor Diversity. **The Journal of Immunolology**. 2018 Aug 15;201(4):1229-1240. doi: 10.4049/jimmunol.1800162. Epub 2018 Jul 13. PMID: 30006375; PMCID: PMC6085875.

3. Pandya KD, Palomo-Caturla I, Walker JA, K Sandilya V, Zhong Z, **Alugupalli KR***. An Unmutated IgM Response to the Vi Polysaccharide of *Salmonella* Typhi Contributes to Protective Immunity in a Murine Model of Typhoid. **The Journal of Immunolology**. 2018 Jun 15;200(12):4078-4084. doi: 10.4049/jimmunol.1701348. Epub 2018 May 9. PMID: 29743315; PMCID: PMC6033073.

4. Cravens MP, Alugupalli AS, Sandilya VK, McGeady SJ, **Alugupalli KR***. The Immunoglobulin M Response to Pneumococcal Polysaccharide Vaccine Is Sufficient for Conferring Immunity. **The Journal of Infectious Diseases**. 2022 Nov 11;226(10):1852-1856. doi: 10.1093/infdis/jiac339. PMID: 35932228; PMCID: PMC10205626.

VI. Biotech Entrepreneur: Activation of T cell-dependent B cell responses to glycoconjugate subunit vaccines requires the engagement of co-stimulatory molecules CD80/86 and CD40 in addition to B and T cell antigen receptor signaling. Adjuvants play a crucial role in this process. Surprisingly, majority of bacterial glycoconjugate vaccines including typhoid Vi polysaccharide (ViPS) conjugate vaccine e.g. Typbar TCV®, and tetravalent meningococcal conjugate (MCV4) vaccines do not incorporate adjuvants, and the basis for their immunogenicity is unknown.

We discovered that endotoxin, an undesirable pyrogen and a potent TLR4 agonist as an impurity in Typbar TCV® and Typhim Vi® is the major driver for the immunogenicity of these vaccines. Interestingly, such TLR4 ligand activity is not present in MCV4 (MENVEO® and MenQuadfi®) which explains the relatively poor immunogenicity of MCV4 vaccines. To induce an optimal antibody titer required for a protective threshold in infants, four immunizations of MCV4 at 2, 4, 6, and 12-15 months of age are needed. This strategy is neither cost- nor compliance-effective due to periodic visits to the clinic for

multiple immunization schedules particularly for those individuals in low- and middle-income countries. To develop single dose glycoconjugate vaccines against wide range of bacterial pathogens, we developed **Turbo**, an adjuvant composed of non-toxic TLR4 ligand, monophosphoryl lipid A as a liposome formulation to target B cell-centric functions needed to engage T cell-help and to generate high titers of long-lasting IgG. When adjuvanted with Turbo, Typbar TCV® and Typhim Vi® induced high levels of long-lasting IgG of all isotypes in infant, young, adult and aged mice with a single immunization. Similarly, MCV4 vaccines adjuvanted with Turbo also induced high levels of IgG and eliminated the requirement for booster for all ages. Turbo adjuvanticity is dependent on TLR signaling, CD86 and CD40. These data demonstrate that Turbo can serve as an adjuvant for single dose glycoconjugate vaccines against many bacterial pathogens.

1. **Alugupalli KR***. TLR4 Ligands in Typhoid Vi Polysaccharide Subunit Vaccines Contribute to Immunogenicity. **Immunohorizons**. 2024 Jan 1;8(1):29-34. doi: 10.4049/immunohorizons.2300085. PMID: 38180344; PMCID: PMC10832388.

2. **Alugupalli KR*.** Monophosphoryl Lipid A-based Adjuvant to Promote the Immunogenicity of Multivalent Meningococcal Polysaccharide Conjugate Vaccines. **Immunohorizons**. 2024 Apr 1;8(4):317-325. doi: 10.4049/immunohorizons.2400013. PMID: 38625118; PMCID: PMC11066721.

3. **Alugupalli KR*.** A TLR4 ligand-based adjuvant for promoting the immunogenicity of typhoid subunit vaccines. **Frontiers in Immunology**. 2024 May 10;15:1383476. doi: 10.3389/fimmu.2024.1383476. PMID: 38799439; PMCID: PMC11116679.

4. **Alugupalli KR*.** Characterization of Turbo, a TLR Ligand-based Adjuvant for Glycoconjugate Vaccines. **Immunohorizons**. 2024 Aug 1;8(8):527-537. doi: 10.4049/immunohorizons.2400040. PMID: 39093309; PMCID: PMC11374753.

Pending patent applications (Provisional or PTC)

1. Alugupalli, A.S. and K.R. Alugupalli, CANNABINOID COMPOSITIONS AND METHODS OF USE THEREOF FOR IMMUNE MODULATION, IMMUNE PROTECTION, AND TREATMENT OF CANCER, in Patent Cooperation Treaty 2020. p. WO/2020/163775.

2. Provisional patent application “A-Turbo: an adjuvant for generating long-lasting antibody responses to polysaccharide vaccines”, No. 63,431,247, filed on December 8, 2022.

3. Provisional patent application “A-Turbo: an adjuvant for generating long-lasting antibody responses to polysaccharide vaccines”, No. 63/469,951, filed on May 31, 2023.

4. Patent Cooperation Treaty “A-Turbo: an adjuvant for generating long-lasting antibody responses to polysaccharide vaccines”, PCT/US23/82976, filed on Dec 7, 2023.
   Publication of WO2024124052A1 (2024-06-13)

A total of $4,067,678 grant funding was secured from the NIH (2006-2024)

1. NIH RO1-AI065750-01 (PI: Alugupalli)
Project period: 07/15/06 – 06/30/2012
Project title: B1b lymphocytes generate T cell-independent IgM memory.
Project budget: Total costs $1,385,678

2. 1R56AI097421-01A1 (PI: Alugupalli)
Project period: 08/14/12 – 07/31/2014
Project title: Toll-like receptor signaling in the generation of B1b cell memory.
Project budget: Total costs $387,500

3. 1R03AI105724-01A1 (PI: Alugupalli)
Project period: 01/01/2014 – 12/31/2016
Project title: Induction of polysaccharide vaccine responses in the young by interleukin 7
Project budget: $155,000

4. 1R03AI112624-01 (PI: Alugupalli)
Project period: 06/01/2014 – 06/30/2017
Project Title: B1 cell-mediated immunity in Human Immune System mice
Project budget: $155,000

5. R03AI109217-01 (PI: Alugupalli)
Project period: 08/1/2014 – 07/31/2017
Project Title: Role of BAFFR in antigen specific B1b cell persistence
Project budget: $155,000

6. 1R03AI115412-01: (PI: Alugupalli)
Project period: 12/01/2014 -11/30/17
Project title: Toll-like receptor signaling in B1b memory.
Project budget: $155,000

7. 1 R56 AI121270-01A1: (PI: Alugupalli)
Project period: 8/22/2016 – 7/31/2019
Project title: Regulation of B cell responses to bacterial polysaccharides
Project budget: Total costs $387,500

8. 1 R21 AI133075-01: (PI: Alugupalli; Co-PI Manser)
Project period: 6/5/2017 – 5/31/2020
Project title: Effect of IL-7 on B cell development and function in humanized mice
Project budget: Total costs $429,000

9. R21AI151737-01 : (PI: Alugupalli; Co-PI Manser)
Project period: 5/5/2020 – 4/30/2024
Project Title: Stem cell origins of human fetal/neonatal B cell subsets
Project budget: Total costs $429,000

10. R21 AI159798-01: (PI: Alugupalli)
Project period: 3/1/2021 – 2/28/2024
Project Title: A System to Study Salmonella Typhi Infection and Immunity
Project budget: Total costs $429,000