

VIJAYA NAGABHUSHANAM MD., PhD
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SUMMARY

Immunologist with 15+ years combined academic, health care and industry experience in autoimmune, immunodeficiency and infectious disease immunology. Expertise in T cell and cytokine biology and signaling, host-pathogen interactions, autoimmune and immunodeficiency disorders. Director of nationally recognized CAP/CLIA/ISO 15189 certified immunology and flow cytometry reference laboratory

EDUCATION

Ph.D. Immunology, Dept. of Medicine, Melbourne University, Australia.	1996 – 2000
M.B.B.S (MD Equiv) Mysore Medical College, Mysore University, India.	1986 – 1992

EXPERIENCE (INDUSTRY and ACADEMIA)

National Jewish Health	2008-Present
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Director, Advanced Diagnostic Immunology Laboratories
Assistant Professor, Division of Pathology, Dept of Medicine

Responsibilities:

- Oversee 12+ medical and clinical technologists as well as R&D associates in the clinical Immunology laboratories
- Develop and interpret clinical tests focused towards primary immunodeficiency disorders
- Develop collaborations with basic and clinical faculty to further translational research
- Collaborate with industry on preclinical testing/phase I and II clinical trials, biomarker discovery and/or validation

Accomplishments:

- Developed 9 immunological tests for evaluation of immune deficiency and dysregulation.
- Lead development, validation and implementation of immune monitoring assays (including customized assays for off-target effects) for clinical trials.
- Identified autoantibodies to interferon gamma in patients with chronic NTM, leading to development of a comprehensive immune panel for evaluation of chronic intracellular infections.
- Initiated and currently developing processes for management of clinical trials.
- Successfully lead laboratory through CAP and State of New York inspections.
- Managing an operating budget of 1.5 million.
- Initiated collaborative projects with clinical and basic science investigators at National Jewish Health focused on translational research.
- Initiated collaborations with Phadia to develop and refine testing for chronic urticaria.
- Initiated and currently drive educational seminars for laboratory staff of 100+

Medimmune Vaccines, Mountain View, CA	2006-2008
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Research Scientist, Translational Biology

Responsibilities:

- Provide immunological support to vaccine development groups
- Identify and develop assays for potential biomarkers of vaccination
- Develop *in vitro* and *in vivo* models to study immune responses to experimental vaccines
- Work with clinical groups to translate assays developed by research teams to those applicable to clinical trials for the evaluation of vaccine candidates

Accomplishments:

- Lead development of an animal model to study potential neurovirulence and neural transmission of live viral vaccine candidates. The studies formed part of the regulatory package presented to the EMEA and resulted in successful licensing of FluMist® in the EU..
- Lead development of virus-specific IFN γ ELISpots and multicolor flow cytometry panels, currently applied to immune monitoring studies for FluMist®
- Developed flow-based phospho-signaling assays to study early events post vaccination.
- Established a scientific discussion forum to encourage collaborative research among the research community at Medimmune (CA). Enabled communication among previously isolated

teams including R&D, clinical testing as well as diverse research groups (cell biology, virology, immunology and antibody engineering teams). Met with executive approval and participation.

University of California, San Francisco 2003 – 2005

JDRF Research fellow, Dept. of Pathology

Research focus: T cell regulation in infection and autoimmunity using transgenic mouse models.

Achievements.

- Analyzed individual roles of CTLA-4 and regulatory T cells in controlling autoreactive T cell responses (published in JEM)
- Developed mouse models to study the effect of Toll-Like Receptor signals on regulatory T cells.

University of California, San Francisco 2000 – 2003

Post doctoral researcher, Division of Infectious Disease

Research focus: Strategies employed by *Mycobacterium tuberculosis* to evade an immune response, with particular emphasis on the IFN-gamma-signaling pathway.

Achievements.

- Developed real time RT-PCR assays to examine IFN- γ -inducible genes.
- Identified IFN- γ -regulated genes severely affected by *M. tuberculosis* infection.
- Analyzed the role of *M. tuberculosis* induced-IL-6 in the inhibition of IFN- γ -regulated responses.

University of Melbourne, Australia 1996 – 2000

Doctoral Candidate, Dept of Microbiology and Immunology

Research focus: Analysis of T cell responses to mycobacterial antigens and the use of recombinant antigens and synthetic peptides as experimental vaccines.

Achievements:

- Identified immunodominant antigens of *M. avium* and developed immunoassays to identify and quantitate mycobacterial proteins
- Planned strategies for and identified immunodominant T cell epitopes using predictive algorithms, molecular and biochemical techniques.
- Analyzed differences between recombinant (*E. coli*-expressed) and native mycobacterial proteins

National Institute of Mental Health and Neurosciences, India 1993 – 1995

Resident, Medical Microbiology and Immunology

Diagnostic and clinical microbiology, chiefly focusing on the investigation of neurotuberculosis.

Responsibilities:

- Development of immunoassays for detection of anti-mycobacterial antibodies and immune complexes for future use as a diagnostic test for tuberculous meningitis.
- Epidemiological studies on hospital strains of multi-drug resistant *Staphylococcus aureus*.

Bangalore Cancer Hospital, Bangalore, India. 1992 – 1993

Resident Medical Officer

TEACHING AND MENTORING EXPERIENCE

National Jewish Health, Denver, CO 2008-Present

- Lectures and Seminars for Allergy and Immunology Fellows and Immunology Graduate students
- Reviewer -Journal of Allergy and Clinical Immunology, Human Immunology
- Train Allergy/Immunology Fellows in Clinical/Laboratory Immunology
- Mentor senior researchers
- Developed the "Lunch n' Learn' seminar series for the ADx laboratories

Medimmune Vaccines, Mountain View, CA 2006-2008

Research Scientist, Translational Biology

2 direct reports (associate scientist II) at Master's level.

- Oversee planning and execution of experiments,
- Encourage independence in data analysis and presentation
- Encourage writing up of technical reports and/or papers

University of California, San Francisco 2000 – 2003

Post doctoral researcher, Division of Infectious Disease

- Mentored graduate student on rotation research experience
- Mentored and trained research assistants

Melbourne University and Trinity College, Australia

1996 – 2000

Tutor, Medical Microbiology and Immunology

- Worked with small groups of students (10-20) and conducted both lecture-based and laboratory courses, including clinical case studies.
- Participated in course design involving problem-based learning.
- Taught undergraduate laboratory based courses comprising immunological techniques.
- Graded and evaluated students' tests and day to day laboratory work.
- Received appreciative feedback from students and course coordinators and was invited to teach the medical microbiology and immunology laboratory course the following year.

ADMINISTRATIVE AND MANAGEMENT EXPERIENCE

National Jewish Health

- Responsible for forecasting budgets for the Immunology laboratory 2008-Present
- Management of 8 technical personnel

Medimmune Vaccines, Mountain View, CA

2006-2008

- Write and review scientific documents, including manuscripts, documents required for product licensing, technical reports
- Manage and direct associate scientists

University of California, San Francisco

2003 – present

JDRF Research fellow, Dept. of Pathology

- Review and write manuscripts and grant proposals.
- Organized meetings for WILS (Women in Life Sciences) to help graduate students and postdoctoral researchers develop peer-mentored support groups.

University of California, San Francisco

2000 – 2003

Post doctoral researcher, Division of Infectious Disease

- Established a local interest group for mycobacterial research encompassing labs in San Francisco. This included contacting labs working on mycobacterial research, coordinating meetings and scheduling speakers.

TECHNICAL EXPERIENCE

Immunology: Flow cytometry, immunohistochemistry, TUNEL assays, development of mouse models of infection with intracellular pathogens, ELISPOTS, T cell cloning, cytokine bioassays, T cell proliferation assays, antibody and cytokine ELISA.

Molecular biology: Western blots, SDS PAGE, PCR, DNA cloning and sequencing, production and purification of recombinant proteins, Real time RT-PCR, analysis of Affymetrix gene chip arrays.

Cell biology: Transfection of mammalian cells and development and maintenance of stable transfectants, isolation and culture of human monocyte derived macrophages, *in-vitro* infection of human macrophages, isolation and culture of murine macrophages, differentiation of human dendritic cell subtypes from hematopoietic stem cells, tissue culture techniques.

Others: BSL3 laboratory protocols, culture and maintenance of *M. tuberculosis*, cerebrospinal fluid analysis including biochemical analysis, cell counts and cytology, clinical bacteriology and mycology, immunohistochemistry.

INVITED PRESENTATIONS (Posters and Symposium talks)

1. 2011. Anti-interferon gamma antibodies in NTM: case presentation. AMLI annual meeting.

2. 2010. Invited Talk "Utility of Metal Lymphocyte Proliferation Testing in Implant Failure Diagnosis": Dept of Orthopedics, PSL, Denver
3. 2010. AAAAI. Poster session
4. 2009. Symposium Talk. "Analysis of Protein Phosphorylation and Cell Signaling events by Flow Cytometry: Clinical applications" Assoc of Medical Laboratory Immunologists (AMLI) annual meeting.
5. 2009. Invited Talk. "Analysis of Protein Phosphorylation and Cell Signaling events by Flow Cytometry: applications" Front Range Flow cytometry users group.
6. 2009 Invited Talk "Translational research in Academia and Industry "Biomedical Engg seminars. School of Biomedical Engg, Colorado State University, Fort Collins
7. 2007 Midwinter conference of Immunologists, Asilomar
8. 2004. Division of Immunology and Genetics Seminar Series. Dept. of Immunogenomics. The John Curtin School of Medical Research, Canberra, Australia
9. 2004. Immunology Seminar series. Center for Immunology and Cancer Research. University of Queensland, Brisbane, Australia
10. 2004. Symposium talk "Manipulating the interface between infection and immunity". University of Melbourne, Melbourne, Australia
11. 2004. Diabetes Center Seminar series. University of California, San Francisco
12. 2004. 12th International Congress of Immunology, Montreal, Canada
13. 2003. Seminar series. Dept of Infectious Disease Research, University of California, Berkeley
14. 2002. The American Association of Immunologists, 90th Annual meeting, Denver, Colorado
15. 1999. The second annual conference on vaccine research, Bethesda, Maryland
16. 1998. 28th Annual conference of the Australasian Society for Immunology, Melbourne
17. 1997. 27th Annual conference of the Australasian Society for Immunology, Perth

PUBLICATIONS

1. Case report of a young child with disseminated histoplasmosis and review of hyper immunoglobulin e syndrome (HIES) Wilson S Robinson^{1,2†}, Sandra R Arnold^{1,2†}, Christie F Michael^{1,2}, John D Vickery¹, Robert A Schoumacher², Eniko K Pivnick², Jewell C Ward², Vijaya Nagabhushanam³ and Dukhee B Lew^{1,2*} Clinical and Molecular Allergy 2011, 9:14 doi:10.1186/1476-7961-9-14
2. Alpha-1 antitrypsin-which test when? Vijaya Nagabhushanam, Ronald J. Harbeck and Robert A. Sandhaus. Clinical Chemistry No. CC 10-2 (CC-384). American Society for Clinical Pathology. 2008
3. Disease-Specific Gene Expression Profiling in Multiple Models of Lung Disease
4. Christina C. Lewis, Jean Yee Hwa Yang, Xiaozhu Huang, Suman K. Banerjee, Michael R. Blackburn, Peter Baluk, Donald M. McDonald, Timothy S. Blackwell, Vijaya Nagabhushanam, Wendy Peters, David Voehringer and David J. Erle Am J of Resp and crit care med. 2007 Feb; 177(4):376-87
5. Lohr J, Knoechel B, Nagabhushanam V, Abbas AK. T-cell tolerance and autoimmunity to systemic and tissue-restricted self-antigens. Immunol Rev. 2005 Apr; 204:116-27
6. Abbas AK, Lohr J, Knoechel B, Nagabhushanam V. T cell tolerance and autoimmunity. Autoimmun Rev. 2004 Nov;3(7-8):471-5
7. Mark P. Eggena, Lucy S. K. Walker, Vijaya Nagabhushanam, Luke Barron, Anna Chodos and Abul K. Abbas. Cooperative roles of CTLA-4 and Regulatory T cells in tolerance to an islet cell antigen. J Exp Med. 2004 Jun 21;199(12):1725-30.)
8. Nagabhushanam V, Solache A, Ting LM, Escaron C and Ernst JD. Innate inhibition of adaptive immunity: M. tuberculosis induced Il-6 inhibits macrophage responses to interferon gamma. J Immunol. 2003 Nov 1;171(9):4750-4757
9. Nagabhushanam V, Purcell AW, Mannering S, Germano S, Paszkier J and Cheers C. Identification of an I-A^d-restricted peptide on the 65-kilodalton heat shock protein of M. avium. Immunol Cell Biol. 2002 Dec; 80(6): 574-83
10. John Stambas, Geoffrey Pietersz, Ian Mckenzie, Vijaya Nagabhushanam and Christina Cheers. Oxidized mannan-listeriolysin O conjugates induce Th1/Th2 cytokine responses after intranasal immunization. Vaccine. 2002 Mar 15; 20(13): 1877-86

11. Nagabhushanam V, Praszkier J, Cheers C. Molecular and immunological characterization of *Mycobacterium avium* 65 kDa heat shock protein (Hsp65). *Immunol Cell Biol.* 2001 Oct; 79(5): 454-61
12. Nagabhushanam V and Cheers C. Non-major histocompatibility complex control of antibody isotype and Th1 versus Th2 cytokines during experimental infection of mice with *Mycobacterium avium*, *Infect Immun.* 2001 Mar; 69(3): 1708-13
13. Patil SA, Gourie-Devi M, Anand AR, Vijaya N, Pratima N, Neelam K, Chandramuki A. Significance of mycobacterial immune complexes (IgG) in the diagnosis of tuberculous meningitis, *Tuber Lung Dis.* 1996 Apr;77(2):164-7

PROFESSIONAL MEMBERSHIPS

The Association of Medical Laboratory Immunologists (AMLI)
Federation of Clinical Immunological Societies (FOCIS).
Clinical Immunology Society (CIS)

AWARDS AND HONORS

Melbourne University Post graduate Scholarship (1996-1999)
Melbourne University Travel Award (1999)
The Juvenile Diabetes Foundation post doctoral fellowship (2003)