

The Faculty of Medicine of Harvard University Curriculum Vitae

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Education:

2003	AB (magna cum laude)	Biochemical Sciences	Harvard University
2008	MD	Medicine	Washington University, St. Louis, MO
2008	MA	Biology and Biomedical Sciences (Research Mentor: Dr. John Constantino)	Washington University
2014	MPH	Biostatistics (Research Mentor: Dr. Lloyd Edwards)	University of North Carolina, Chapel Hill, NC

Postdoctoral Training:

07/08-06/11	Resident	Pediatrics	St. Louis Children's Hospital, St. Louis, MO
07/11-06/14	Clinical Fellowship and Research Fellow	Allergy and Immunology (Research Mentor: Dr. Wesley Burks)	Duke University, Durham, NC
07/12-06/14	Clinical Research Fellowship	Duke Clinical Research Institute (Research Mentor: Dr. Brian Smith)	Duke University

Faculty Academic Appointments:

07/14-Present	Instructor	Pediatrics	Harvard Medical School
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Appointments at Hospitals/Affiliated Institutions:

07/14-Present	Assistant Physician	Pediatrics (Allergy and Immunology Division)	Massachusetts General Hospital
02/16-Present	Associate Epidemiologist	Channing Division of Network Medicine	Brigham and Women's Hospital
12/18-Present	Associated Scientist	Food Allergy Science Initiative	Broad Institute, Cambridge, MA

Other Professional Positions:

2001	Marx Summer Internship Recipient. Research assistant in the lab of Dr. Kathy Schilling. Assisted in clinical trial on the efficacy of MRI for breast cancer detection in high-risk patients	Center for Breast Care, Boca Raton Community Hospital, Boca Raton, FL
2002-2003	Undergraduate Research Assistant in the lab of Dr. Michael Farzan. Investigated the structure of Duffy/Antigen/Receptor for Chemokines (DARC), a receptor critical for Plasmodium vivax infection of erythrocytes	Brigham and Women's Hospital, Department of Microbiology and Immunology
2004	Research Assistant in the lab of Dr. Thallachallour Mohanakumar. Investigated Porcine Endogenous Retrovirus (PERV) in xenotransplantation and the role of CD103 and CD154 in chronic lung transplant rejection	Washington University in St. Louis, Department of Surgery
2005-2008	Student Fellow with Dr. Ira Kodner. Assisted in the creation of a palliative care service for the hospital, and identified research opportunities for medical students in health care systems.	Washington University in St. Louis, Center for the Study of Ethics and Human Values
2006-2007	Masters student in the laboratory of Dr. John N. Constantino. Characterized the transmission of subthreshold autistic traits among three generations of single-incidence and multiple-incidence families with autism	Washington University in St. Louis, Department of Child Psychiatry
2018-Present	Resident Tutor As a residential tutor and officer of Harvard College, I serve the undergraduate community as a Sophomore Advisor, Pre-Medical Advisor, and member of the Leverett House Pre-Med Committee.	Harvard University

Major Administrative Leadership Positions:

Local

2014-Present	Director, Pediatric Allergy and Immunology Rotation for Residents	Massachusetts General Hospital for Children
2019-Present	Director of Biostatistics and Data Management Core	Food Allergy Center, Massachusetts General Hospital for Children

Committee Service:

Local

2014-2016	Pediatric Allergy Epic Transition Committee, Department of Pediatrics, Division of Allergy and Immunology (Co-coordinator)	Massachusetts General Hospital
2018-Present	Research Advisory Committee for Allergy/Immunology Fellow, Department of Pediatrics, Division of Allergy and Immunology	Massachusetts General Hospital

National

2017-Present	Steering Committee	Consortium of Food Allergy Research (COFAR), NIAID/NIH
2017-Present	Collaborations and Liaisons Committee	COFAR, NIAID/NIH
2018-Present	Food Allergy Educational Course Planning Committee	American Academy of Allergy, Asthma, and Immunology (AAAAI)

Professional Societies:

2008-2011	American Academy of Pediatrics	Trainee Member
2011-2014	American College of Allergy, Asthma, and Immunology	Fellow In Training Member
2011-Present	AAAAI	
	2011-2014	Fellow In Training Member
	2011-Present	Committee Member, Adverse Reactions to Foods
	2014-2018	Member
	2019-Present	Fellow
2015-Present	American Society of Human Genetics	Member
2017-Present	Metabolomics Society	Member

Editorial Activities:

Ad hoc Reviewer

International Archives of Allergy and Immunology
Allergy
Journal of Allergy and Clinical Immunology
Journal of Allergy and Clinical Immunology: In Practice

Honors and Prizes:

1999	Detur Book Prize	Harvard University	Academic excellence
2000	John Harvard	Harvard University	Academic excellence

	Scholarship		
2001, 2002	Harvard College Scholarship	Harvard University	Academic excellence
2009	Distinguished Service Teaching Award for Medical Students	Washington University in St. Louis	Teaching excellence
2012, 2013, 2014	AAAAI Travel Award	AAAAI	Research excellence
2014	Induction into Delta Omega	Delta Omega National Public Health Honor Society	Academic excellence
2015-2017 2017-2019	Pediatric Loan Repayment Award and Renewal of Award	NIH/NIAID	Research excellence
2017	MGH Caring For Dependents Travel Award	MGH	Research excellence
2018	Scholarly Writing Award	Center for Faculty Development – MGH	Research excellence
2018	Peak Travel Award	Metabolomics Society 2018	Research excellence
2018	Hypersensitivity Summer School – for research and career development	AAAAI	Research excellence

Report of Funded and Unfunded Projects

Funding Information:

Past

2004	Investigations in Transplant Immunology NIH supported short term training grant / 5T35HL007815-10 Grant Awardee The major goal of this project was to examine the role of CD103 and CD154 in chronic lung transplant rejection and identify Porcine Endogenous Retrovirus (PERV) integration sites in host genomes.
2014-2015	Predictors of Adverse Events Associated with Peanut Oral Immunotherapy ARTrust Minigrant 2014 The major goal of the study was to use baseline clinical and immunologic characteristics, as well as metabolomic data, to predict rates of adverse events associated with the use of peanut oral immunotherapy in children.
2015-2016	A Prospective Randomized Controlled Trial to Evaluate the Effect of Infant Formula on the Resolution of Cow's Milk Allergy of Infancy Mead Johnson Co-investigator / Biostatistician

The major goal of this study was to compare the effects of three infant formulas, amino acid based, hydrolyzed formula, and hydrolyzed formula with probiotics, on the resolution of cow's milk allergy.

Training Grants and Mentored Trainee Grants

2012-2014 **The Duke University Multidisciplinary Training Program in Pediatric Lung Disease
NHLBI/5T32HL098099-03**
Grant awardee
This training grant supported my clinical research during fellowship, examining the use of dexamethasone in neonates with bronchopulmonary dysplasia and the predictors of adverse events in peanut allergic children receiving oral immunotherapy.

Current

2017-2025 **Consortium of Food Allergy Research (COFAR)
NIAID/UM1 AI130934-01**
Co-Investigator
COFAR is a multi-center consortium with the goal of furthering clinical research in food allergy, including development of immunotherapy approaches to treat food allergy.

2018-2023 **Endophenotypes of Food Allergy in Response to Oral Immunotherapy
NIAID/1K23AI130408-01A1**
This proposal aims to examine which patients receiving oral immunotherapy are at highest risk for adverse reactions, which are mostly likely to benefit, and the changes in gene expression and metabolites that may explain these different risk-benefit profiles, in order to develop safer and more efficacious forms of immunotherapy for food allergy.

Unfunded Current Projects

2014-Present Co-investigator / Analysis of Oral Food Challenge Outcomes
The goal of this quality improvement project is to assess outcomes of oral food challenges among food allergic children who may have outgrown their food allergies.

2015-Present Co-investigator / Early Risk Factors for gastrointestinal mucosal food allergies
The goal of this project is to assess the changes in the gut microbiota among infants with gastrointestinal mucosal food allergies compared to healthy infants.

2016-Present Co-investigator / Analysis of Oral Food Challenge Outcomes Among Infants with IgE-mediated Food Allergies
This goal of this project is to conduct oral food challenges in infants suspected of having IgE mediated food allergies and assess the influence of demographic and clinical factors in challenge outcomes.

Report of Local Teaching and Training

Teaching of Students in Courses:

2007	Newborn Medicine Selective Course 1 st year medical students	Washington University in St. Louis I was involved in organizing and teaching a first-year medical student selective with Dr. Joan Rosenbaum about newborn medicine, with a focus on intensive care unit experience. 2 hours per week for 8
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weeks

2018	Immunology Advanced Integrated Science Course 2 nd year medical students	Harvard Medical School I was a preceptor for clinical shadowing for a second-year course on Allergy/Immunology and GI clinical experiences, which involved a combination of clinical shadowing, didactic teaching. 4 hours per week for 4 weeks
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Clinical Supervisory and Training Responsibilities:

2014-	Supervision of pediatric residents in pediatric allergy/immunology clinics	Massachusetts General Hospital 40 hours/year
2014-	Supervision of Allergy/Immunology fellows on inpatient ward rotations	Massachusetts General Hospital 30 hours/year
2015-	Supervision of Allergy/Immunology fellows in pediatric Allergy/Immunology clinics	Massachusetts General Hospital 4 hours/week

Local Invited Presentations:

No presentations below were sponsored by outside entities

2018	Update on Food Allergy Allergy Grand Rounds	Single Presentation Massachusetts General Hospital
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Regional Invited Presentations:

No presentations below were sponsored by outside entities

2015	Rising Rates of Food Allergies Pentucket Medical Associates, Haverhill, MA	Single Presentation Massachusetts General Hospital
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Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by outside entities

National

2013	Safety of Peanut Oral Immunotherapy Massachusetts General Hospital, Department of Allergy and Immunology (given while at Duke University)
2013	Safety of Peanut Oral Immunotherapy Johns Hopkins University, Department of Allergy and Immunology, Baltimore, MD
2013	Safety of Peanut Oral Immunotherapy Texas Children's Hospital, Department of Allergy and Immunology, Houston, TX
2014	Safety Of Pediatric Peanut Oral Immunotherapy Is Complicated By High Adverse Event Rates

2015 Oral Abstract Session, Selected Abstract
AAAAI Annual Meeting, San Diego, CA
Predictors of Elevated Rates of Adverse Events While on Peanut Oral Immunotherapy
Oral Abstract Session, Selected Abstract
AAAAI Annual Meeting, Houston, TX

International

2017
2018

Report of Clinical Activities and Innovations

Current Licensure and Certification:

2010 USMLE completed
2011- American Board of Pediatrics
2011-2014 North Carolina Board of Registration
2014- Massachusetts Board of Registration
2014- American Board of Allergy and Immunology

Practice Activities:

2014-	Ambulatory Care, Massachusetts General Practice Organization	Pediatric Allergy and Immunology (Food Allergy Center)	8 hours per week
2014-	Inpatient Consult Service	Pediatric Allergy and Immunology	9-10 weeks per year

Report of Education of Patients and Service to the Community

Those presentations below sponsored by outside entities are so noted and the sponsor is identified.

Activities

2003-2004 Students Teaching AIDS To Students / Teacher
Provided AIDS education to middle school students
2005 Center for the Study of Ethics and Human Values / Co-organizer
I helped organize an educational symposium for the community on medical malpractice and tort reform, inviting panelists from the local government, medicine, business, and insurance companies. Event was sponsored by the Arthur and Helen Baer Foundation.
May 2015 "Food Allergy Research Update: Desensitization and Other Promising Treatments".
Patient education presentation given to the Metro Boston Asthma & Allergy Educational Support Group. Sponsored by: Asthma and Allergy Foundation of America, New England Chapter

Report of Scholarship

Peer-Reviewed Scholarship in print or other media:

Research Investigations

1. **Virkud YV**, Todd RD, Abbacchi AM, Zhang Y, Constantino JN. Familial aggregation of quantitative autistic traits in multiplex versus simplex autism. *Am J Med Genet B Neuropsychiatr Genet* 2009; 150B (3): 328-334
2. Constantino JN, Majmudar P, Bottini A, Arvin M, **Virkud Y**, Simons P, Spitznagel E. Infant head growth in male siblings of children with and without autism spectrum disorders. *J Neurodev Disord* 2010; 2(1):39-46.
3. Vickery BP, Scurlock AM, Kulis M, Steele PH, Kamilaris J, Berglund JP, Burk C, Hiegel A, Carlisle S, Christie L, Perry TT, Pesek RD, Sheikh S, **Virkud Y**, Smith PB, Shamji MH, Durham SR, Jones SM, Burks AW. Sustained unresponsiveness to peanut in subjects who have completed peanut oral immunotherapy. *J Allergy Clin Immunol* 2013; 133(2): 468-475.
4. Vickery BP, Berglund JP, Burk CM, Fine JP, Kim EH, Kim JI, Keet CA, Kulis M, Orgel, KG, Guo R, Steele, PH, **Virkud YV**, Ye P, Wright BL, Wood RA, Burks AW. Early oral immunotherapy in peanut-allergic preschool children is safe and highly effective. *J Allergy Clin Immunol* 2017. 139(1):173-181.
5. **Virkud YV**, Burks AW, Steele PH, Edwards LJ, Berglund JP, Jones SM, Scurlock AM, Perry TT, Pesek RD, Vickery BP. Novel baseline predictors of allergic side effects during peanut oral immunotherapy. *J Allergy Clin Immunol* 2017. 139(1):173-181.e8.
6. Burk CM, Dellon ES, Steele PH, **Virkud YV**, Kulis M, Burks AW, Vickery BP. Eosinophilic esophagitis during peanut oral immunotherapy with omalizumab. *J Allergy Clin Immunol Pract* 2017. 5(2): 498-501.
7. **Virkud YV**, Hornik CP, Benjamin DK, Laughon MM, Clark RH, Greenberg RG, Smith PB. Respiratory support for very low birth weight infants receiving dexamethasone. *J Pediatr* 2017. 183: 26-30.
8. Kelly RS, **Virkud Y**, Giorgio R, Celedón JC, Weiss ST, Lasky-Su J. Metabolomic profiling of lung function in Costa-Rican children with asthma. *Biochim Biophys Acta Mol Basis Dis* 2017; 1863(6):1590-1595.
9. **Virkud YV**, Kelly RS, Croteau-Chonka DC, Celedón JC, Dahlin A, Avila L, Weiss ST, Lasky-Su JA. Novel eosinophilic gene expression networks associated with IgE in two distinct asthma populations. *Clin Exp Allergy* 2018. 48(12):1654-1664.
10. Kelly RS, Chawes BL, Blighe K, **Virkud YV**, Croteau-Chonka DC, McGeachie MJ, Clish CB, Bullock K, Celedón JC, Weiss ST, Lasky-Su JA. An Integrative transcriptomic and metabolomic study of lung function in children with asthma. *Chest* 2018. 154(2):335-348.
11. Kelly RS, McGeachie MJ, Lee-Sarwar KA, Kachroo P, Chu SH, **Virkud YV**, Huang M, Litonjua AA, Weiss ST, Lasky-Su J. Partial least squares discriminant analysis and bayesian networks for metabolomic prediction of childhood asthma. *Metabolites* 2018. 8(4). pii: E68.
12. Miller BC, Sen DR, Al Aboosy R, Bi K, **Virkud YV**, LaFleur ML, Yates KB, Lako A, Felt K, Naik GS, Manos M, Gjini E, Kuchroo JR, Ishizuka JJ, Collier JL, Griffin GK, Maleri S, Comstock DE, Weiss SA, Brown FD, Panda A, Zimmer MD, Manguso RT, Hodi FS, Rodig SJ, Sharpe AH, Haining WN. Functionally specialized subsets of exhausted CD8+ T cells mediate tumor control and differentially respond to checkpoint blockade. *Nature Immunology* 2019. 20(3):326-336.
13. **Virkud YV**, Chen YC, Stieb ES, Alejos AR, Renton N, Shreffler WG, Hesterberg PE. Analysis of Oral Food Challenge Outcomes in IgE-mediated Food Allergies to Almond in a Large Cohort. *J Allergy Clin Immunol Pract*. 2019. [Epub ahead of print]
14. Wu EY, Li SC, Torok KS, Virkud YV, Fuhlbrigge RC, Rabinovich CE. Baseline description of the juvenile localized scleroderma subgroup from the Childhood Arthritis and Rheumatology Research Alliance Legacy Registry. *ACR Open Rheumatol*. 2019 [Accepted]

Other peer-reviewed scholarship

1. **Virkud YV**, Vickery BP. Advances in immunotherapy for food allergy. *Discov Medicine* 2012. 14(76):159-165.
2. Kuhlen JL, **Virkud YV**. Pathogenesis, newly recognized etiologies, and management of idiopathic anaphylaxis. *Discov Medicine* 2015. 19(103): 137-144.
3. **Virkud YV**, Wang J, Shreffler WG. Enhancing the safety and efficacy of food allergy immunotherapy: a review of adjunctive therapies. *Clin Rev Allergy Immunol* 2018. 55(2):172-189. PubMed PMID: 29968170.

Non-peer reviewed scholarship in print or other media:

Reviews, chapters, monographs and editorials

1. Encyclopedia of Medical Immunology. Ian R. Mackay and Noel R. Rose. Subsection – Delayed Anaphylaxis to Mammalian Meat (Alpha-Gal), Vol 1. 2014

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings:

* oral presentation

1. Martin VJ, Seay HL, **Virkud YV**, Keet C, Shreffler WG, Yuan Q. (2017 Feb) *Prospective Incidences And The Relationship Between Allergic Proctocolitis And IgE-Mediated Food Allergies In Early Childhood*. Oral presentation given by Martin VJ at AAAAI; Atlanta, GA.
2. Tracy LE, **Virkud YV**, Hayden LG, Smith N, Ruiter B, Patil S, Shreffler WG. (2018 Feb). *Clinical Sensitivity, Reproducibly Defined by Double-Blind Placebo-Controlled Food Challenge, is Associated with Peanut Specific Skin Testing and Peanut IgE*. Poster presentation at AAAAI; Atlanta, GA.
3. ***Virkud YV**, Kelly RS, Litonjua A, Weiss ST, Lasky-Su JA. (2017, June) *Enrichment of Secondary Bile Acids associated with Food Allergy in Healthy Infant Cohort*. Oral presentation at International Conference of the Metabolomics Society; Brisbane, Australia.
4. **Virkud YV**, Kelly RS, Patil SU, Ruiter B, Smith N, Hickey A, Litonjua A, Weiss ST, Lasky-Su JA, Shreffler WG. (2018, Jan) . Poster presentation at Gordon Conference for Food Allergy; Ventura, CA.
5. Wallace KG, **Virkud YV**, Patil SU, Leader JB, Southwick C, Katz AJ, Shreffler WG, Virk Hundal NK. (2018, Feb) *The Limited Utility of the Double-blind Food Challenge in Diagnosing Non-IgE Mediated Cow's Milk Allergy in Infants*. Poster presentation at AAAAI; Orlando, FL.
6. Rondeau CP, Calatroni A, Smith N, Tang H, **Virkud YV**, Ruiter B, Shreffler WG, Patil SU. (2018, Feb) *Decrease in Early Basophil Sensitivity to Ara h 2 Correlates with Sustained Unresponsiveness in Peanut Oral Immunotherapy*. Poster presentation at AAAAI; Orlando, FL.
7. **Virkud YV**, Kelly RS, Patil SU, Ruiter B, Smith N, Hickey A, Litonjua A, Weiss ST, Lasky-Su JA, Shreffler WG. (2018, Jun) . Thematic Poster presentation at Food Allergy and Anaphylaxis Meeting; Copenhagen, Denmark.
8. ***Virkud YV**, Kelly RS, Patil SU, Ruiter B, Smith N, Hickey A, Litonjua A, Weiss ST, Lasky-Su JA, Shreffler WG. (2018, Oct) . Oral presentation at International Conference of the Metabolomics Society; Seattle, WA, USA.
9. Seay HL, Martin VM, **Virkud YV**, Keet C, Shreffler WG, Yuan Q. (2019, Feb) *Acid Suppression in Infancy is not Prospectively Associated with Childhood IgE-Mediated Food Allergy*. Poster presentation at AAAAI, San Francisco, USA.
10. Ndahayo R, Martin VM, Seay HL, **Virkud YV**, Yuan Q, Shreffler WG, Rotter NS, Hirshfield-Becker D. (2019, Feb) *Shy and/or fearful temperament not associated with IgE mediated food allergy in early childhood*. Poster presentation at AAAAI, San Francisco, USA.
11. Phadke NA, **Virkud YV**, Martin V, Seay HL, Keet C, Yuan Q, Shreffler WG. (2019, Feb) *Food-Protein Induced Allergic Proctocolitis is Prospectively Associated with IgE-Mediated Milk and Egg Allergies by Age 3*. Oral presentation at AAAAI, San Francisco, USA.

12. Martin VM, **Virkud YV**, Seay HL, Keet C, Shreffler WG, Yuan Q. (2019, Feb) *A Prospective Assessment of Food Protein-Induced Allergic Proctocolitis from the GMAP Healthy Infant Cohort*. Poster presentation at AAAAI, San Francisco, USA.
13. Smith NP, Ruiter B, Virk Hundal NK, Tang HG, **Virkud YV**, Patil SU, Shreffler WG. (2019, Feb) *TCR Repertoire Analysis Reveals Public Motifs with High Probability for Allergen Epitope Specificity*. Oral presentation at AAAAI, San Francisco, USA.
14. Esteban CA, Shreffler WG, **Virkud YV**, Pistiner M. (2019, Feb) *Infant/Toddler Oral Food Challenge Outcomes*. Poster presentation at AAAAI, San Francisco, USA.
15. Eaton AR, Calatroni A, Tang HG, **Virkud YV**, Love JC, Shreffler WG, Patil SU. (2019, Feb) *IgE^{hi} Endophenotype in Those with Transient Desensitization after Peanut Oral Immunotherapy*. Oral presentation at AAAAI, San Francisco, USA.
16. Ruiter B, Smith NP, Monian B, Tu A, Fleming E, **Virkud YV**, Patil SU, Gierahn TM, Whittaker CA, Love JC, Shreffler WG. (2019, Feb) *Immune Progression Within the Memory CD4⁺ T Cell Compartment is a Marker of Heightened Clinical Sensitivity for Patients with Peanut Allergy*. Poster presentation at AAAAI, San Francisco, USA.