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Deshmukh, Hitesh

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors. Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Deshmukh, Hitesh S

eRA COMMONS USER NAME (credential, e.g., agency login): deshmukhh

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Mumbai	MBBS	06/2001	
University of Cincinnati	PHD	07/2007	Enviromental Health
Duke University		06/2008	Post-Doctoral Fellowship
State University of New York at Buffalo		06/2009	Internship in Pediatrics
State University of New York at Buffalo		06/2011	Residency in Pediatrics
University of Pennsylvania		06/2014	Fellowship in Perinatal Medicine

A. Personal Statement

Development of the immune system requires a series of coordinated events that begin early in fetal life. Disruption of immune development during the early life, results in abnormal postnatal immune responses that persistent into childhood, highlighting the importance of neonatal period as a critical developmental window. While several genetic factors modulate the development of the immune system during fetal and early post-natal life, the role of environmental exposures in immune ontogeny is unclear. Exposure to commensal bacteria immediately after birth, represents an intimate environmental exposure for the developing immune system. Interruption of commensal colonization in the newborns has enduring consequences for the developing immune system, exemplified by increased risk of pneumonia in the newborn period and increased likelihood of developing asthma in infancy. Studies from my laboratory have established the role of inflammation in the ontogeny of the newborn's immune response. The long-term goal of

these studies is to clarify the developmental pathways that shape the development of lung immunity in newborns. My laboratory is supported by generous startup funds from Perinatal Institute at Cincinnati Children's Hospital Medical Center (CCHMC). Career development awards like the Parker B Francis Fellowship and NIH K08 award provide me with 80% protected time for research.

B. Positions and Honors

Positions

2008-2011 Clinical Instructor, Department of Pediatrics State University of New York at Buffalo, Buffalo, NY
2011-2014 Clinical Instructor, Department of Pediatrics University of Pennsylvania, Philadelphia, PA
2014-2015 Clinical Instructor, Department of Pediatrics University of Cincinnati, Cincinnati, OH
2015- Assistant Professor, Department of Pediatrics University of Cincinnati, Cincinnati, OH

Board Certications

2012- American Board of Pediatrics, Chapel Hill, NC
2014- American Board of Pediatrics, Subboard of Neonatal Perinatal Medicine, Chapel Hill, NC

Honors and Awards

2002 University Graduate Scholarship University of Cincinnati
2008 Infectious Diseases Fellow Award Infectious Diseases Society of America (IDSA)
2010 Thomas Frawley Young Investigator Award State University of New York (SUNY) at Buffalo
2011 Resident Research Award Eastern Society of Pediatric Research (ESPR)
2011 Resident of the Year Erie County Medical Society, Buffalo, NY
2011 House Officer Research Award Society of Pediatric Research / Pediatric Academic Society (SPR/PAS)
2013 Delegate to American Academy of Pediatrics, Section of Perinatal Pediatrics Conference Aspen, CO
2014 Fellow Basic Science Research Award Society of Pediatric Research / Pediatric Academic Society (SPR/PAS)
2014 Thomas H Boggs Award Philadelphia Perinatal Society
2014 Young Investigator in Neonatal Medicine Cardiopulmonary Biology Young Investigators Forum
2015 Moderator for session on Neonatal Infections Eastern Society of Pediatric Research Annual Meeting
2015 Parker B. Francis Fellow Francis Family Foundation

2016 **Moderator for session on Neonatal Infections Pediatric Academic Society/Society of Pediatric Research Annual Meeting**

Scientific Peer Review

2006- **Ad hoc Reviewer for Nature Medicine, Am J of Respir Crit Care Med (AJRCCM), Scientific Reports and Journal of Immunology.**

2015-2016 **Moderator for the Pediatric Academic Societies Annual Meeting, Session on 'Pediatric Infectious Diseases"**

2016 Ad-hoc Review **Reviewer for Immunity and Host Defense Study Section (NIH Early Career Program), Grant reviewer for Netherlands Organization for Health Research.**

C. Contributions to Science

1. Studies from my laboratory established that commensal colonization in the developmental window of newborn period is critical in development (*Nature Med 2014*) and education (*Science Trans Med 2017*) of the innate immune system in the newborn. We showed that interruption of the intestinal colonization by the commensal bacteria in murine and human newborns inhibited the development of several distinct immune cell lineages and contributed to increased susceptibility of neonates to infections. This led to the following publications.

    a. Gray GS, Oherle BS, Worthen GS, Alenghat TA, Whitsett JA and **Deshmukh HS.** Intestinal Commensal Bacteria Direct the Development of Lung Mucosal Immunity and Promote Newborn's Resistance to infections. Science Translational Medicine. 2017 Feb 8 9(376). PubMed PMID: 28179507

    b. **Deshmukh HS**, Liu Y, Menkiti OR, Mei J, Dai N, O'Leary CE, et al. The microbiota regulates neutrophil homeostasis and host resistance to *Escherichia coli* K1 sepsis in neonatal mice. Nature Medicine. 2014 Apr 20. PubMed PMID: 24747744.

    c. Taft DH, Ambalavanan N, Schibler KR, Yu Z, Newburg DS, **Deshmukh HS**, Ward DV, Morrow AR. Center Variation in Intestinal Microbiota Prior to Late-Onset Sepsis in Preterm Infants 2015. PLoS One 10(6):e0130604. PubMed PMID: 26110908.

2. The following studies established specific host factors that direct innate immune responses to *S. aurues,* a leading cause of sepsis in the newborns. Using combination of inbred mouse strains, genome wide associations studies we identified novel roles for NOD2 (*Infec & Imm*, *J Clin Micro*), DUSP3 and PSME3 (*Plos Pathogens 2004, 2014*) in host defense against *S. aureus*.

a. **Deshmukh Hitesh**, Hamburger JB, Ahn SH, McCafferty DG, Yang SR, Fowler VG, Jr. Critical role of NOD2 in regulating the immune response to *Staphylococcus aureus*. Infection and immunity. 2009 Apr;77(4):1376-82. PubMed PMID: 19139201. Pubmed Central PMCID: 2663139.

b. Campbell SJ, **Deshmukh Hitesh**, Nelson CL, Bae IG, Stryjewski ME, Federspiel JJ, et al. Genotypic characteristics of Staphylococcus aureus isolates from a multinational trial of complicated skin and skin structure infections. Journal of Clinical Microbiology. 2008 Feb;46(2):678-84. PubMed PMID: 18077636. (Co-first author)

c. Ahn SH, **Deshmukh HS**, Johnson N, Cowell LG, Rude TH, Scott WK, et al. Two genes on A/J chromosome 18 are associated with susceptibility to *Staphylococcus aureus* infection by combined microarray and QTL analyses. PLoS Pathogens. 2010;6(9):e1001088. PubMed PMID: 20824097 (Co-first author).

d. Yan QS, Sharma-Kuinkel BK, **Deshmukh HS**, Tsalik EL, Cr DD, Lucas JA et al. Dusp3 and Psme3 Are Associated with Murine Susceptibility to Staphylococcus aureus Infection and Human Sepsis. Plos Pathogens. 2014 Jun 5;10(6). PubMed PMID: 24901344.

3. My graduate thesis focused on the signal transduction mechanism regulating mucus production (*AJRCCM 2005, 2008 and 2009*) an important component of innate lung defense in infants and neonates. I described a novel role for metalloproteinase in activating epidermal growth factor receptor in regulating mucus production (*AJRCMB 2008*).

   a. **Deshmukh Hitesh**, Case LM, Wesselkamper SC, Borchers MT, Martin LD, Shertzer HG, et al.
   Metalloproteinases mediate mucin 5AC expression by epidermal growth factor receptor activation. American Journal of Respiratory and Critical Care Medicine. 2005 Feb 15;171(4):305-14. PubMed PMID: 15531749.

   b. Leikauf GD, **Deshmukh Hitesh**. When wheeze leads to squeeze: growth under pressure. American Journal of Respiratory Cell and Molecular Biology. 2005 May;32(5):366. PubMed PMID: 15837725.

   c. **Deshmukh Hitesh**, Shaver C, Case LM, Dietsch M, Wesselkamper SC, Hardie WD, et al. Acrolein-activated matrix metalloproteinase 9 contributes to persistent mucin production. American Journal of Respiratory Cell and Molecular Biology. 2008 Apr;38(4):446-54. PubMed PMID: 18006877. Pubmed Central PMCID: 2274947.

   d. **Deshmukh Hitesh**, McLachlan A, Atkinson JJ, Hardie WD, Korfhagen TR, Dietsch M, et al. Matrix metalloproteinase-14 mediates a phenotypic shift in the

airways to increase mucin production. American Journal of Respiratory and Critical Care Medicine. 2009 Nov 1;180(9):834-45. PubMed PMID: 19661247.

Complete bibliography of my publications is available at:
https://www.ncbi.nlm.nih.gov/sites/myncbi/hitesh.deshmukh.1/bibliography/49693127/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

K08 HD084686
07/01/2015-06/30/2019
NIH/NICHD
Title: Role of commensal bacteria in regulating neutrophil-mediated host defense in neonates
The primary goal of this project is to determine the mechanism by which commensal bacteria induce IL17-
production by ILC3 to control postnatal granulopoiesis and regulate neonatal host resistance.
Role: Principal Investigator

Parker B. Francis Fellowship
07/01/2015-06/30/2018
Parker B Francis Family Foundation
Title: Developmental Regulation of granulopoeisis by Intestinal Microbes
The primary goal of this project is to understand the how intestinal commensal bacteria direct the ontogeny of granulocytes in the newborn mice.
Role: Principal Investigator

U01ES029234
NIH/NIAID
01/07/2017-06/30/2021
Title: Perinatal inflammatory expsoures and neonatal immune development (**PI: Chougnet)**
This project will use the experimental model of pregnant rhesus macaque to determine how fetal inflammation
impacts neonatal immune responses after birth.
Role: Co-Investigator

Pending

R01 AI138553-01
Title: Role of Microbiome in Neonatal Lung Maturation and Immune Susceptibility (PI: Miller)

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This projects investigates the role of microbiome in development of neonatal lung immunity
Role: Co-Investigator