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: Gosain, Ankush

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

POSITION TITLE: Professor and Chief, Dr. David R. and Kiku Akers Endowed Chair in Pediatric Surgery

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)	END DATE MM/YYYY	FIELD OF STUDY
Johns Hopkins University, Baltimore, MD	BA	05/1996	Chemistry
Eastern Virginia Medical School, Norfolk, VA	MD	06/2000	Medicine
Loyola University Chicago, Chicago, IL	PHD	06/2006	Cell Biology, Neurobiology & Anatomy
Loyola University Medical Center, Maywood, IL	Resident	06/2008	General Surgery
University of Tennessee and St. Jude Children's Research Hospital, Memphis, TN	Fellow	06/2010	Pediatric Surgery & Pediatric Surgical Oncology

A. Personal Statement

I am a Pediatric Surgeon-Scientist with an NIH-funded basic/translational science laboratory studying enteric nervous system and gastrointestinal mucosal immune development and function as they relate to congenital colorectal disease (e.g., Hirschsprung disease). My PhD training focused on neuro-immune modulation, specifically the role of the peripheral nervous system in modulating innate immune cell function in cutaneous wound healing. My clinical training in Pediatric Surgery led to my interest in understanding the mechanisms and developing therapies for congenital diseases of the gastrointestinal tract.

Ongoing Research Projects:

R21 AI163503 Gosain (Contact PI), Pierre (MPI) 06/2021-05/2023
Modeling Host-Fungal Interactions in Hirschsprung-Associated Enterocolitis: This proposal will define the role of aberrant mucosal immune responses to fungal pathobionts in the pathophysiology of HAEC.

R01 DK125047 Gosain (PI) 04/2020-01/2025
Dysbiosis in Hirschsprung Associated Enterocolitis Pathogenesis: This proposal will define the role of dysbiosis in the pathophysiology of HAEC and test novel therapeutic approaches for prevention or treatment of HAEC.

R01 AA029270 Rao (PI) (Gosain Co-I) 03/2022-02/2027
Defining the Role of Calcium Channels in Alcohol-Induced Endotoxemia and Systemic Response: This proposal will define the mechanisms by which TRPV6 and $Ca_V1.3$ channels drive alcohol-induced endotoxemia and liver damage by enforcing intestinal epithelial TJ disruption and barrier dysfunction.

U01 AI170019 Rao (PI) (Gosain Co-I) 08/2022-05/2027
Radiation-induced Paneth cell dysfunction: This proposal will define the impact of radiation on Wnt signaling, TCF4, and alpha-defensins in Paneth cells and define the ability of human defensin 5 and *Akkermansia muciniphila* to mitigate or rescue radiation-induced damage.

U01 AI172991 Rao (PI) (Gosain Co-I) 12/2022-11/2027
Mitigation of GI-ARS by *Lactobacillus* species: This proposal will define the ability of *L. casei* and *L. plantarum* to mitigate radiation-induced intestinal mucosal barrier dysfunction and subsequent systemic effects by distinct cellular mechanisms.

Recently Completed Research Projects (pertinent to this project):

R01 HD099344 Raval (PI) (Gosain Co-I) 07/2019–06/2024

Clinical Trial of ENhancing Recovery in CHildren Undergoing Surgery - ENRICH-US: The ENRICH-US study will implement an enhanced recovery protocol for children undergoing gastrointestinal surgery in 18 US hospitals to evaluate whether it improves clinical outcomes.

REACHirschsprung's Foundation Award Lewit (PI) (Gosain Mentor) 07/2020-12/2022
Improving the Clinical Diagnosis of Hirschsprung-Associated Enterocolitis: The goal of this study is to create and validate a standardized definition of HAEC that is supported by readily testable, specific biomarker.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2023 -	Professor and Chief, Division of Pediatric Surgery, Department of Surgery, University of Colorado School of Medicine, Aurora, CO
2023 -	Dr. David R. and Kiku Akers Endowed Chair in Pediatric Surgery, Department of Pediatric Surgery, Children's Hospital of Colorado, Aurora, CO
2021 - 2022	Professor with Tenure, Departments of Surgery and Pediatrics, University of Tennessee Health Science Center, Memphis, TN
2021 - 2022	Vice Chair for Academic Affairs, Department of Surgery, University of Tennessee Health Science Center, Memphis, TN
2020 - 2022	Senior Surgical Advisor for Quality & Safety, Le Bonheur Children's Hospital, Memphis, TN
2016 - 2022	Director of Surgical Research, Children's Foundation Research Institute, Le Bonheur Children's Hospital, Memphis, TN
2015 - 2021	Associate Professor with Tenure, Departments of Surgery and Pediatrics, University of Tennessee Health Sciences Center, Memphis, TN
2015 - 2022	Associate Physician, Department of Surgery, St. Jude Children's Research Hospital, Memphis, TN
2010 - 2015	Assistant Professor of Surgery, Pediatrics and Neuroscience, University of Wisconsin School of Medicine and Public Health, Madison, WI

Honors

2022	Elected Membership, American Society for Clinical Investigation
2022	Surgical Leadership Fellow, American Surgical Association
2020	Mid-Career Award, Society of University Surgeons
2020	Elected Membership, Society of Clinical Surgery
2019	Traveling Fellowship to Germany, American College of Surgeons
2019	International Visiting Professorship Award, Association for Academic Surgery & Colombian Surgical Association
2018	Organizing Committee, 5th International Symposium on Development of the Enteric Nervous System
2018	Mike and Faye Yang SAAS Lectureship, Society of Asian Academic Surgeons
2018	Elected Membership, Surgical Biology Club II
2017	International Visiting Professorship Award, Association for Academic Surgery & Royal Australasian College of Surgeons
2017	Postdoctoral Mentor of the Year, University of Tennessee Health Science Center
2016	Elected Membership, Society of University Surgeons
2015	George H.A. Clowes Career Development Award, American College of Surgeons
2013	Scholar Award, American Pediatric Surgery Association Foundation
2012	Turcotte Award, Central Surgical Association Foundation
2012	Young Investigator Award, Enteric Nervous System Development Meeting
2008	21st Annual Traveling Fellowship Award, John L. Keeley Foundation
1996	Provost's Undergraduate Award for Research and Excellence, Johns Hopkins University

C. Contribution to Science

1. Neuro-immune modulation of cutaneous wound healing: Recognizing early in my surgical training that I intended to pursue a career as a Surgeon-Scientist, I took a hiatus from clinical training to pursue graduate training in the laboratories of Dr. Luisa DiPietro and Dr. Richard Gamelli. My work during this period focused on wound healing, specifically investigating the role of sympathetic nervous system catecholamines in modulating innate immune cell function in cutaneous wounds. We found that catecholamine surge following injury results in delayed recruitment of neutrophils and macrophages to wounds. Further, as these cells arrive to the wound, tissue catecholamine levels are rebounding, and these catecholamines further suppress phagocytosis by wound macrophages and neutrophils. These effects are mediated by alpha- and beta-adrenoreceptors, via canonical signaling pathways involving cyclic AMP and protein kinase A. These experiments were among the first to demonstrate this concept of neuro-immune modulation in wounds and spurred my ongoing interest in the intersection between the nervous system and immune system.

    a. Gosain A, Gamelli RL, DiPietro LA. Norepinephrine-mediated suppression of phagocytosis by wound neutrophils. J Surg Res. 2009 Apr;152(2):311-8. PubMed Central PMCID: PMC2683017.
    b. Gosain A, Muthu K, Gamelli RL, DiPietro LA. Norepinephrine suppresses wound macrophage phagocytic efficiency through alpha- and beta-adrenoreceptor dependent pathways. Surgery. 2007 Aug;142(2):170-9. PubMed Central PMCID: PMC2430526.
    c. Gosain A, Matthies AM, Dovi JV, Barbul A, Gamelli RL, DiPietro LA. Exogenous pro-angiogenic stimuli cannot prevent physiologic vessel regression. J Surg Res. 2006 Oct;135(2):218-25. PubMed PMID: 16904692.
    d. Gosain A, Jones SB, Shankar R, Gamelli RL, DiPietro LA. Norepinephrine modulates the inflammatory and proliferative phases of wound healing. J Trauma. 2006 Apr;60(4):736-44. PubMed PMID: 16612292.

2. Pathogenesis of Hirschsprung-Associated Enterocolitis (HAEC). My clinical training in pediatric surgery exposed me to neonates and children with Hirschsprung Disease. During my initial faculty appointment at the University of Wisconsin-Madison, I worked in the laboratories of Dr. Miles Epstein (Neuroscience) and Dr. Ken Kudsk (Mucosal Immunology), combining their mentorship to continue my investigations of neuro-immune interactions. I have utilized Hirschsprung disease as a model system for investigating the interactions between the enteric nervous system and gastrointestinal mucosal immune system during development and disease. I have begun to dissect the mechanisms contributing to the development of HAEC. We have identified that animals with Hirschsprung disease develop dysbiosis of the intestinal microbiome prior to the development of enterocolitis. Additionally, these animals have defects in mucosal barrier function, innate immune defense mechanisms, adaptive immune response, and luminal secretory IgA, thereby modeling neonatal Hirschsprung-associated enterocolitis.

    a. Medrano G, Cailleux F, Guan P, Kuruvilla K, Barlow-Anacker AJ, Gosain A. B-lymphocyte-intrinsic and -extrinsic defects in secretory immunoglobulin A production in the neural crest-conditional deletion of endothelin receptor B model of Hirschsprung-associated enterocolitis. FASEB J. 2019 Jun;33(6):7615-7624. PubMed Central PMCID: PMC6529339.
    b. Gosain A, Barlow-Anacker AJ, Erickson CS, Pierre JF, Heneghan AF, Epstein ML, Kudsk KA. Impaired Cellular Immunity in the Murine Neural Crest Conditional Deletion of Endothelin Receptor-B Model of Hirschsprung's Disease. PLoS One. 2015;10(6):e0128822. PubMed Central PMCID: PMC4465674.
    c. Pierre JF, Barlow-Anacker AJ, Erickson CS, Heneghan AF, Leverson GE, Dowd SE, Epstein ML, Kudsk KA, Gosain A. Intestinal dysbiosis and bacterial enteroinvasion in a murine model of Hirschsprung's disease. J Pediatr Surg. 2014 Aug;49(8):1242-51. PubMed Central PMCID: PMC4122863.
    d. Heneghan AF, Pierre JF, Gosain A, Kudsk KA. IL-25 improves luminal innate immunity and barrier function during parenteral nutrition. Ann Surg. 2014 Feb;259(2):394-400. PubMed Central PMCID: PMC3661688.

3. Mechanisms of Enteric Nervous System Development: Based on our findings in Hirschsprung-associated enterocolitis and utilizing the formal training in developmental neuroscience I received during my K08 award period, I identified that aberrant enteric nervous system formation and dysmotility appear to be upstream of the post-natal findings. We have identified that the proximal, ganglionated bowel, in Hirschsprung’s disease

displays abnormal neurotransmitter density and phenotypes, likely contributing to clinically observed bowel dysfunction. I have begun focusing efforts on dissecting the mechanisms of enteric nervous system development with translational approaches in mind.

a. Fu M, Barlow-Anacker AJ, Kuruvilla KP, Bowlin GL, Seidel CW, Trainor PA, Gosain A. 37/67-laminin receptor facilitates neural crest cell migration during enteric nervous system development. FASEB J. 2020 Aug;34(8):10931-10947. PubMed Central PMCID: PMC7759089.
b. Johnson CD, Barlow-Anacker AJ, Pierre JF, Touw K, Erickson CS, Furness JB, Epstein ML, Gosain A. Deletion of choline acetyltransferase in enteric neurons results in postnatal intestinal dysmotility and dysbiosis. FASEB J. 2018 Sep;32(9):4744-4752. PubMed Central PMCID: PMC6103169.
c. Erickson CS, Lee SJ, Barlow-Anacker AJ, Druckenbrod NR, Epstein ML, Gosain A. Appearance of cholinergic myenteric neurons during enteric nervous system development: comparison of different ChAT fluorescent mouse reporter lines. Neurogastroenterol Motil. 2014 Jun;26(6):874-84. PubMed Central PMCID: PMC4037379.
d. Zaitoun I, Erickson CS, Barlow AJ, Klein TR, Heneghan AF, Pierre JF, Epstein ML, Gosain A. Altered neuronal density and neurotransmitter expression in the ganglionated region of Ednrb null mice: implications for Hirschsprung's disease. Neurogastroenterol Motil. 2013 Mar;25(3):e233-44. PubMed Central PMCID: PMC3578114.

4. Translational and Clinical Aspects of Hirschsprung Disease. I have maintained a clinical focus on the patient population that inspires my work. Paralleling my basic science efforts, I have worked to translate our findings to understand and improve care for patients with Hirschsprung disease. I have disseminated our laboratory's findings and synthesized them with the work of others in multiple articles on our evolving understanding of Hirschsprung-associated enterocolitis. Additionally, I have partnered with other experts in the field to generate clinical practice guidelines for the management of common post-operative problems in Hirschsprung disease patients.

a. Lewit RA, Kuruvilla KP, Fu M, Gosain A. Current understanding of Hirschsprung-associated enterocolitis: Pathogenesis, diagnosis and treatment. Semin Pediatr Surg. 2022 Apr;31(2):151162. PubMed Central PMCID: PMC9523686.
b. Veras LV, Arnold M, Avansino JR, Bove K, Cowles RA, Durham MM, Goldstein AM, Krishnan C, Langer JC, Levitt M, Monforte-Munoz H, Rabah R, Reyes-Mugica M, Rollins MD 2nd, Kapur RP, Gosain A. Guidelines for synoptic reporting of surgery and pathology in Hirschsprung disease. J Pediatr Surg. 2019 Oct;54(10):2017-2023. PubMed Central PMCID: PMC6754813.
c. Gosain A, Frykman PK, Cowles RA, Horton J, Levitt M, Rothstein DH, Langer JC, Goldstein AM. Guidelines for the diagnosis and management of Hirschsprung-associated enterocolitis. Pediatr Surg Int. 2017 May;33(5):517-521. PubMed Central PMCID: PMC5395325.
d. Langer JC, Rollins MD, Levitt M, Gosain A, Torre L, Kapur RP, Cowles RA, Horton J, Rothstein DH, Goldstein AM. Guidelines for the management of postoperative obstructive symptoms in children with Hirschsprung disease. Pediatr Surg Int. 2017 May;33(5):523-526. PubMed PMID: 28180937.

5. Understanding the contribution of the microbiome and mycobiome to intestinal homeostasis and extra-intestinal manifestations of disease: Intestinal homeostasis is governed by dynamic communication between the lining of the intestine (epithelium), the “brain of the gut” (enteric nervous system [ENS]), the immune system of the gut (mucosal immune system) and the bacteria that live in the gut (microbiota). I have focused my efforts in this area in understanding how the microbiome and fungal mycobiome develop and contribute to intestinal inflammation and impact the gut-brain axis.

a. Pierre JF, Phillips GJ, Chandra LC, Rendina DN, Thomas-Gosain NF, Lubach GR, Lyte M, Coe CL, Gosain A. Lyticase Facilitates Mycobiome Resolution Without Disrupting Microbiome Fidelity in Primates. J Surg Res. 2021 Nov;267:336-341. PubMed Central PMCID: PMC8678161.
b. Rendina DN, Lubach GR, Lyte M, Phillips GJ, Gosain A, Pierre JF, Vlasova RM, Styner MA, Coe CL. Proteobacteria abundance during nursing predicts physical growth and brain volume at one year of age in young rhesus monkeys. FASEB J. 2021 Jun;35(6):e21682. PubMed PMID: 34042210.

c. Mims TS, Abdallah QA, Stewart JD, Watts SP, White CT, Rousselle TV, Gosain A, Bajwa A, Han JC, Willis KA, Pierre JF. The gut mycobiome of healthy mice is shaped by the environment and correlates with metabolic outcomes in response to diet. Commun Biol. 2021 Mar 5;4(1):281. PubMed Central PMCID: PMC7935979.

d. Johnson CD, Barlow-Anacker AJ, Pierre JF, Touw K, Erickson CS, Furness JB, Epstein ML, Gosain A. Deletion of choline acetyltransferase in enteric neurons results in postnatal intestinal dysmotility and dysbiosis. FASEB J. 2018 Sep;32(9):4744-4752. PubMed Central PMCID: PMC6103169.

Complete list of published works in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/103NGKHPpP_QS/bibliography/public/