

CURRICULUM VITAE
The Johns Hopkins University School of Medicine

(Signature)
(Typed Name) **Varsha Singh**

Sept 18th2020
(Date of this version)

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Appointments

2019-present: Assistant Professor of Medicine, Johns Hopkins University, Baltimore, MD

Personal Data

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Education and Training

1996-1999 BS, Purvanchal University, U.P, India, Science (Chemistry, Botany and Zoology)

2000-2002 MS, Banaras Hindu University, Varanasi, U.P, India, Science (Biochemistry)

2008 Ph.D Banaras Hindu University, Varanasi-221005.India, Biochemistry

02/ 2009 to 10/2010 Post-Doctoral Research Fellow, Department of Medicine (DDN), UIC, Chicago, USA
Worked on Projects:

- Probiotics: Potential Therapeutic Role in Diarrhea.
- Transcriptional Regulation of Human Intestinal Anion exchanger and Na⁺/H⁺ exchanger

11/2010-04/2014 Post-Doctoral Research Fellow, Johns Hopkins University, School of Medicine, Department of Physiology and Gastroenterology, Baltimore, MD.

Professional Experience

04/ 2014-06/2017 Research Associate, Johns Hopkins University, School of Medicine, Department of Physiology and Gastroenterology, Baltimore, MD.

07/2017-12/2018 Instructor, Johns Hopkins University, School of Medicine, Department of Physiology and Gastroenterology, Baltimore, MD.

01/01/2019-present Assistant Professor of Medicine, Johns Hopkins University, Baltimore, MD

Publications:

1. **V.Singh**, S. Mishra, GRK Rao, A. Kumar Jain, V.K.Dixit, A. K. Gulati, D. Mahajan, M. McClelland and G.Nath, Evaluation of Nested PCR in detection of Helicobacter pylori targeting a highly conserved gene: HSP60 (hsp60) (Helicobacter Feb. 2008 – 13(1)30-34).
2. D. Mahajan, A. Jain, **V. Singh**, AK Jain , GRK Rao, G. Nath, Detection of *H.pylori* using nested PCR in gastric biopsy samples. (Indian Journal of Clinical Biochemistry, 2008 / 23 (3) 243-245)

3. S.Mishra ,**V. Singh**, GRK. Rao, A. K. Jain , V. K.Dixit, A.K. Gulati and G.Nath., Comparative evaluation Nested PCR targeting hsp60 gene and Enzyme immunoassay based specific antigen detection of *Helicobacter pylori* in stool specimens from patients with peptic ulcer pre and post eradication therapy (J Infect Developing Countries May 2008;2(3)206-210)
4. S. Mishra, **V.Singh**, V, Dixit, V.K., AK Jain ,G.R.K. Rao, G.Nath, G. Prevalence of *Helicobacter pylori* in asymptomatic subjects-A nested PCR based study (Infect Genet Evol 2008;8:815-9)
5. **V. Singh**, S.Mishra,, P.Maurya, G.R.K.Rao, V.K.Dixit, AK Jain ,G. Nath. Drug resistance pattern and clonality in *H. pylori* strains (*J Infect Developing Countries* 2009; 3(2):130-136.)
6. G. Raheja, **V.Singh**, Ke Ma, A.Borthakur, R K. Gill, S Saksena, W A. Alrefai, K Ramaswamy, and P. K. Dudeja *Lactobacillus acidophilus* stimulates the expression of SLC26A3 via a transcriptional mechanism. (Am J Physiol Gastrointest Liver Physiol.2010; 298: G395-G401)
7. A. Borthakur, A N Anbazhagan, A. Kumar, G Raheja, **V. Singh**, K. Ramaswamy, and PK. Dudeja. Probiotics reverse TNF-a mediated down-regulation of SLC5A8 expression and function. (Am J Physiol Gastrointest Liver Physiol. 2010 Oct;299(4):G928-34. Epub 2010 Jul 29).
8. S. Saksena, S. Goyal, G.Raheja, **V. Singh**, M. Akhtar, TM. Nazir , WA. Alrefai, RK. Gill and P K. Dudeja, Probiotics Stimulate P-Glycoprotein Expression in Intestinal Epithelial Cells (Am J Physiol Gastrointest Liver Physiol. 2011 Jun;300(6):G1115-23. Epub 2011 Feb 24.
9. **V.Singh**, G.Raheja, A. Borthakur, A Kumar, RK. Gill, A Alakkam, J Malakooti, and PK. Dudeja *Lactobacillus acidophilus* Upregulates Intestinal NHE3 Expression and Function (Am J Physiol Gastrointest Liver Physiol. 2012 Dec 15;303(12):G1393-401.doi:10.1152/ajpgi.00345.2012. Epub 2012 Oct 18)
10. R Gill, A Kumar, P Malhotra, D Maher,**V. Singh**, PK Dudeja, W Alrefai, and S Saksena "Regulation of intestinal serotonin transporter (SERT) expression via epigenetic mechanisms: Role of HDAC2" (Am J Physiol Cell Physiol. 2012 Nov 28. [Epub ahead of print])
11. J.Yang, **V. Singh**, R.Sarker, S Jin, G H. Patterson, O Kovbasnjuk, M Donowitz "NHERF2 is anchored to microvilli by its unique C-terminus which is required for its function in NHE3 regulation" (J Biol Chem. 2013 Jun 7;288(23):16960-74)
12. **Singh V**, Yang J, Chen TE, Zachos NC, Kovbasnjuk O, Verkman AS, Donowitz M. Translating molecular physiology of intestinal transport into pharmacologic treatment of diarrhea: stimulation of Na⁺ absorption. Clin Gastroenterol Hepatol. 2014 Jan;12(1):27-31. doi: 10.1016/j.cgh.2013.10.020. Epub 2013 Oct 31
13. **Singh V**, Lin R, Yang J, Cha B, Sarker R, Tse CM, Donowitz M. AKT and GSK-3 are Necessary for Direct Ezrin Binding to NHE3 as Part of a C-Terminal Stimulatory Complex: Role of a Novel Ser-Rich NHE3 C-terminal Motif in NHE3 Activity and Trafficking. J Biol Chem. 2014 Feb 28;289(9):5449-61.
14. Yang J, **Singh V**, Chen TE, Sarker R, Xiong L, Cha B, Jin S, Li X, Tse CM, Zachos NC, Donowitz M. NHERF2/NHERF3 protein heterodimerization and macrocomplex formation are required for the inhibition of NHE3 activity by carbachol. J Biol Chem. 2014 Jul 18;289(29):20039-53.
15. **Singh V**, Kumar A, Raheja G, Anbazhagan AN, Priyamvada S, Saksena S, Jhandier MN, Gill RK, Alrefai WA, Borthakur A, Dudeja PK. *Lactobacillus acidophilus* attenuates downregulation of DRA function and expression in inflammatory models. Am J Physiol Gastrointest Liver Physiol. 2014 Sep 15;307(6):G623-31.
16. Chen T, Kocinsky HS, Cha B, Murtazina R, Yang J, Tse CM, **Singh V**, Cole R, Aronson PS, de Jonge H, Sarker R, Donowitz M. Cyclic GMP kinase II (cGKII) inhibits NHE3 by altering its trafficking and

phosphorylating NHE3 at three required sites: identification of a multifunctional phosphorylation site. *J Biol Chem*. 2015 Jan 23;290(4):1952-65.

17. **Singh V**, Yang J, Cha B, Chen TE, Sarker R, Yin J, Avula LR, Tse M, Donowitz M. Sorting nexin 27 regulates basal and stimulated brush border trafficking of NHE3. *Mol Biol Cell*. 2015 Jun 1;26(11):2030-43.
18. Yang J, Sarker R, **Singh V**, Sarker P, Yin J, Chen TE, Chaerkady R, Li X, Tse CM, Donowitz M. The NHERF2 sequence adjacent and upstream of the ERM-binding domain affects NHERF2-ezrin binding and dexamethasone stimulated NHE3 activity. *Biochem J*. 2015 Aug 15;470(1):77-90.
19. Cha B, Yang J, **Singh V**, Zachos NC, Sarker RI, Chen TE, Chakraborty M, Tse CM, Donowitz M. PDZ Domain Dependent Regulation of NHE3 Occurs by Both Internal Class II and C-terminal Class I PDZ Binding Motifs. *J Biol Chem*. 2017 Mar 10.
20. Jianyi Yin, Chung-Ming Tse, Leela Rani Avula, **Varsha Singh**, Jennifer Foulke-Abel, Hugo R. de Jonge, Mark Donowitz. (2018) Molecular Basis and Differentiation-Associated Alterations Anion Secretion in Human Duodenal Enteroid Monolayers. *Cell Mol Gastroenterol Hepatol*. 2018 Feb 9;5(4):591-609
21. **Varsha Singh**⁺, Jianbo Yang, Jianyi Yin, Robert Cole, Ming Tse, Diego E Berman, Scott A Small, Gregory Petsko, Mark Donowitz⁺ Cholera Toxin Stimulates SNX27-PDZ Phosphorylation and Inhibits Retromer-Mediated Delivery of Plasma Membrane Cargo Proteins. (+Co-corresponding author) *Journal of Cell Sciences* 2018 Aug 17;131(16)
22. Tse CM, Yin J, **Singh V**, Sarker R, Lin R, Verkman AS, Turner JR, Donowitz. cAMP Stimulates SLC26A3 Activity in Human Colon by a CFTR-Dependent Mechanism That Does Not Require CFTR Activity. *Mol Cell Gastroenterol Hepatol*. 2019;7(3):641-653. doi: 10.1016/j.jcmgh.2019.01.002. Epub 2019 Jan 17.

Manuscripts under preparation:

1. **Singh V**⁺, Yin J, Kelli Johnson, Lin R, Donowitz. cAMP Constitutive activation of epithelial inflammasome contribute to altered stem cell differentiation and reduced mucus secretion in colonoids isolated from patients with Ulcerative colitis. (+Corresponding author)
2. Hong Yang, Tse CM, Lin R, Sarker R, Donowitz, **Singh V**⁺. Membrane lipid regulate *SLC26A3*(DRA) activity (+Corresponding author)
3. **Singh V**⁺, Tse CM, Lin R, Donowitz. Sorting nexin-27 regulate *SLC26A3*(DRA) activity by enhancing polarization of epithelial cells (+Corresponding author)

Other Media [OM] (Videos, Websites, Blogs, Social Media, etc.)

- 12/20/2013 “Can We Treat Diarrhea by Stimulating Na⁺ Absorption,” Kristine Novak, science editor for Gastroenterology and Clinical Gastroenterology and Hepatology AGA Journals Blog (<http://journalsblog.gastro.org/can-we-treat-diarrhea-by-stimulating-na-absorption/>) (Media coverage)
- 05/20/2014 Data on Biological Chemistry Described by Researchers at Johns Hopkins University School of Medicine,” NewsRx, (Media coverage)
- 1/24/2014 “Studies from University of California Further Understanding of Diarrhea,” NewsRx, (Media coverage)
- 08/17/2018 Featured in “First person” column by the *Journal of Cell Science*. First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science.
- 08/17/2018 Research highlight “Cholera Toxin Stimulates SNX27-PDZ Phosphorylation and Inhibits Retromer-Mediated Delivery of Plasma Membrane Cargo Proteins” *J Cell Sci* 2018 131: e1602

CLINICAL ACTIVITIES: N/A

Editorial Activities

Editorial Board appointments

2011-present:	Editorial board member:	Gastroenterology and Hepatology Research,
2014-present:	Editorial board member:	American Journal of Biomedical and Life Sciences,
2014- present:	Editorial board member:	American Journal of Life Sciences,
2014- present:	Editorial board member:	Advances in Biochemistry

Editorial Activities (Ad-Hoc Journal Peer Review)

Chemico-Biological Interactions,
Inflammatory Bowel Disease,
American Journal of Physiology-Cell Physiology,
Journal of Molecular Medicine,
Gastroenterology and Hepatology Research,
American Journal of Biomedical and Life Sciences,
American Journal of Life Sciences,
Advances in Biochemistry,
Case Reports in Clinical Medicine, and
Journal of Biological Chemistry.

OTHER PROFESSIONAL ACCOMPLISHMENTS (*Optional*)

A. Conference presentations

V Singh, S Mishra, GRK Rao, AK Jain, VK Dixit, AK Gulati, D Mahajan, Michael McClelland, Gopal Nath Isolation of *Bordetella broncheseptica* from peptic ulcer disease, paper nominated for 94th Indian Science Congress - Young Scientist Award, presentation (Oct 2006) at Annamalai University, Tamil Nadu India.

V Singh, S Mishra, GRK Rao, AK Jain, VK Dixit, AK Gulati, D Mahajan, Michael McClelland, Gopal Nath *Helicobacter pylori* in gastric carcinoma and gastric ulcer”, an oral presentation made in International Integrated meeting with World Federation of Surgical Oncology Societies, India (Sept.2006)

V Singh, S Mishra, GRK Rao, AK Jain, VK Dixit, AK Gulati, D Mahajan, Michael McClelland, Gopal Nath Aero tolerant bacteria in antral biopsy of patient with acid peptic disease”(UP Microcon 2005)

V Singh, D Mahajan, S Mishra, GRK Rao, AK Jain, VK Dixit, AK Gulati, Michael McClelland, Gopal Nath Molecular detection of *H.pylori* specific sequences in the gastrointestinal tract Annual National Conference of Association of Medical Biochemists of India (Nov2004).

B. Conference abstract

1. Rafiquel Sarker, Hong Yang, Varsha Singh, Ruxian Lin, Ming Tse, Mark Donowitz (2020) Slc26a3 (Dra) Is Stimulated By Both Camp And Ca²⁺ Signaling And The Effect Is Synergistic In Intestinal Epithelial Cells By A Process That Requires Irbit *Gastroenterology*, 158
2. Hong Yang, Rafiquel Sarker, Ruxian Lin, Varsha Singh, Ming Tse, Mark Donowitz (2020) Tyrosine Kinase Inhibitors That Target Erbbs Inhibit Dra And Increase Cfr Expression, Contributing To Diarrhea By Reduced Intestinal Nacl Absorption And/Or Increased Cl⁻ Secretion *Gastroenterology*, 158
3. Ming Tse, Hong Yang, Varsha Singh, Jianyi Yin, Rafiquel Sarker, Jianbo Yang, Mark Donowitz (2020) Dynamic Interactions Among Cfr, Nherf4 (Nf4) And Dra (Slc26a3) Are Responsible For Cholera Toxin/Forskolin (Ctx/ Fsk) Stimulation Of Dra Activity And Involve Protein Trafficking And Cfr-Dra Interactions *Gastroenterology*, 158, S-124
4. Varsha Singh, Jianbo Yang, Jianyi Yin, Ming Tse, Mark Donowitz (2019) Endosomal Snx17 Sets The Plasma Membrane Amount Of Nhe3 And Prevents Its Degradation By Binding To The Nhe3 Cterminus *Gastroenterology*, 156, S-13
5. Varsha Singh, Jianbo Yang, Jianyi Yin, Ming Tse, Nicholas C. Zachos, Diego E. Berman, Gregory Petsko, Mark Donowitz (2017) Cholera Toxin Destabilizes Retromer to Inhibit NA⁺/H⁺ Exchanger3 Activity in

Intestinal Epithelial Cells- Possible Therapeutic Role of a Retromer Stabilizer in Treating Diarrhea. *Gastroenterology*, 152, S67

6. Jianbo Yang, Rafiquel Sarker, Prateeti Sarker, Varsha Singh, Jianyi Yin, Tian-e Chen, Boyoung Cha, Ming Tse, and others (2015) NHERF2 Contains a Phosphorylatable Ezrin Binding Regulatory Domain, a Newly Identified Motif. *Gastroenterology*, 148, S-531–S-532
7. Yang, J., Singh, V., Chen, T., Sarker, R., Cha, B., Zachos, N. C., and Donowitz, M. (2014) NHERF2/NHERF3 Hetero-Dimerization Is Required for Carbachol Inhibition of NHE3 Activity That Involves Formation of NHE3 Macro-Complexes, *Gastroenterology* 146, S-651.
8. Singh, V., Yang, J., Sarker, R., Chen, T.-e., Cha, B., Zachos, N. C., and Donowitz, M. (2014) Basal and Stimulated BB NHE3 Activity Requires Intracellular SNX27, a PDZ Domain Containing Binding Partner of NHE3 That Regulates Endosome to Plasma Membrane Trafficking, *Gastroenterology* 146, S-50.
9. Singh, V., Lin, R., Yang, J., Sarker, R., Cha, B., and Donowitz, M. (2013) The NHE3 C-Terminal Stimulatory Complex Acts by Changes in Its Phosphorylation and Dynamic Association With Direct Ezrin Binding, *Gastroenterology* 144, S664-S664.
10. Sarker, R., Singh, V., Yang, J., Murtazina, R., Chen, T. E., Cha, B., Chakraborty, M., Kovbasnjuk, O., Li, X. H., Zachos, N. C., Tse, M., and Donowitz, M. (2013) CK2 Phosphorylation of NHE3 At S719 Is Necessary for the PI3-K/AKT Component of Basal NHE3 Activity and for Carbachol/Ca²⁺but Not cAMP Inhibition-Effects Involving the Lipid Raft Pool of NHE3, *Gastroenterology* 144, S665-S665.
11. Muhammad N. Jhandier, Varsha Singh, Geetu Raheja, Arivarasu Natarajan Anbazhagan, Jaleh Malakooti, Waddah A. Alrefai, Ravinder K. Gill, Pradeep K. Dudeja (2012) Spermidine Upregulates the Function and Expression of Sodium- Hydrogen Exchanger 3 (SLC9A3) in CaCo2 Cells. *Gastroenterology*, 142, S-132.
12. Varsha Singh, Geetu Raheja, Seema Saksena, Ravinder K. Gill, Anas Alakkam, Alip Borthakur, Gail A. Hecht, Waddah A. Alrefai, Pradeep K. Dudeja (2011) Lactobacillus Acidophilus Attenuates Dysregulation of DRA Function and Expression in Inflammatory Models *Gastroenterology* Vol. 140, S-657
13. Ravinder K. Gill, Waddah A. Alrefai, Daniel Maher, Anoop Kumar, Pradeep K. Dudeja, Varsha Singh, Sangeeta Tyagi, Seema Saksena (2011) Butyrate Decreases Intestinal Serotonin Transporter Expression via Epigenetic Mechanisms. *Gastroenterology*, 140, S-657–S-658
14. Varsha Singh, Geetu Raheja, Muhammad Nauman Jhandier, Redouane Boumendjel, Alip Borthakur, Ravinder Gill, Waddah A. Alrefai, Krishnamurthy Ramaswamy, and Pradeep K. Dudeja (2010) Up-regulation of intestinal Cl⁻/OH⁻ exchanger SLC26A3 expression by Lactobacillus species in Caco-2 cells and mouse intestine. *Gastroenterology* 138, S-594
15. Geetu Raheja, Varsha Singh, Muhammad Nauman Jhandier, Redouane Boumendjel, Alip Borthakur, Ravinder Gill, Waddah A. Alrefai, Krishnamurthy Ramaswamy, Jaleh Malakooti and Pradeep K. Dudeja (2010) Sodium-Hydrogen Exchanger 3 (SLC9A3) Expression is Increased by Lactobacillus species both in in vitro and in vivo models. *Gastroenterology* Vol. 138, S-591-S-592
16. Alip Borthakur, Arivarasu Natarajan Anbazhagan, Anoop Kumar, Geetu Raheja, Varsha Singh, Krishnamurthy Ramaswamy, and Pradeep K. Dudeja. (2010) Probiotics reverse TNF- α mediated down-regulation of SLC5A8 expression and function. *Gastroenterology* Vol. 138, S-48
17. Seema Saksena, Geetu Raheja, Varsha Singh, Sonia Goyal, Arivarasu Natarajan Anbazhagan, Ravinder Gill, Waddah A. Alrefai and Pradeep K. Dudeja (2010) Probiotics Stimulate P-Glycoprotein Expression in Intestinal Epithelial Cells *Gastroenterology* Vol. 138, S-746

C. Invited Talk

- Invited speaker at British Pharmacological Society's annual meeting Pharmacology 2017: Membrane Trafficking (11 - 13 December Queen Elizabeth II Conference Centre, London)
- Invited speaker at 15th International Conference on Digestive Disorders and Gastroenterology, July 11-12, 2018 at Sydney, Australia (invitation not accepted)
- Invitation to become Organizing Committee member for World Gastroenterology & Hepatology Conference" on September 10- 12, 2018 Rome, Italy (invitation not accepted)