

VINESH VINAYACHANDRAN, Ph.D.

Assistant Professor of Medicine, School of Medicine, Case Western Reserve University,
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RESEARCH INTEREST

Pioneering genomic approaches for querying transcriptional regulation in perturbed metazoan systems. My focus is on to identify the role of chromatin, chromatin remodelers, and cis as well as the trans modifiers in transcription and epigenetics upon physiological stress. Integrating multidisciplinary approaches involving biochemistry, molecular biology, and cell biology, along with next generation sequencing and bioinformatics.

EDUCATION

Ph.D. in Life Sciences, Center for Cellular and Molecular Biology 2005 -2011

Hyderabad, India

Dissertation: **Role of chromatin and terminator in transcription of Yeast SNR6**

MS in Plant Physiology, University of Agricultural Sciences 2002-2004

Bengaluru, India

Thesis: **Transcriptome analysis in salt stressed roots of *Eleusine coracana***

BS in Agricultural Sciences, Kerala agricultural University 1997-2001

Vellayani, India

Internship: **Rural Agricultural Work Experience (RAWE)**

RESEARCH EXPERIENCE

Assistant Professor, School of Medicine,

Case Western Reserve University,

Assistant Director of Research, cardiology, University Hospitals

2019-

Project: **Studying the impact of physiological stresses in endothelial cells by looking into chromatin structures and transcription factor dynamics**

Research Scientist, The Johns Hopkins University, Bloomberg School of Public Health,

2017-2019

Project: **Probing epigenomic changes upon environmental exposures in metazoans**

To identify the epigenomic changes upon environmental exposure using PM 2.5 particles and conditions for its reversal.

Research Associate, The Pennsylvania State University

2016 -2017

Faculty PI: Prof. Benjamin Franklin Pugh, Center for Eukaryotic Gene Regulation, Dept. of Biochemistry and Molecular Biology

Project: **Transcriptional dynamics under physiological perturbations in yeast**

Identified the mechanisms and the interplay between transcription factors during heat shock using the near base pair resolution ChIP-Exo assay. The fine grain mapping of PIC forming rulers, SAGA and TFIID provide us with a comprehensive and specific binding map of these factors genome wide and elucidate the mechanism of transcriptional regulation during heat shock.

Post-Doctoral Fellow, The Pennsylvania State University

2011- 2016

Faculty PI: Prof. Benjamin Franklin Pugh, Center for Eukaryotic Gene Regulation, Dept. of Biochemistry and Molecular Biology

Project: **Role of chromatin remodeler family Ino80/Swr1 in transcription**

Dissected the mechanism of how precisely the histone variant H2AZ specific chromatin remodelers (Swr1/Ino80) binds nucleosome free regions in genome and facilitates the histone exchange.

Graduate research, Center for Cellular and Molecular Biology

2005-2011

Faculty PI: Prof. Purnima Bhargava, Hyderabad, India

Thesis: **Role of chromatin and terminator in transcription of Yeast SNR6**

We identified that in a gene locus, nucleosome positions are primarily facilitated by DNA sequences. These provide a pool of nucleosomal positional possibilities, from which the specific chromatin remodelers and transcription factors depending on the physiological status of the organism select the preferred DNA sequences.

Masters research, University of Agricultural Sciences

2002-2004

Faculty PI: Prof. M Udayakumar, University of Agricultural Sciences, Bengaluru, India

Thesis: **Transcriptome analysis in salt stressed roots of *Eleusine coracana***

From cDNA library of salinity stressed and ABA treated finger millet roots the differentially expressed genes in finger millet were identified using subtractive hybridization and sequencing. The first differential transcriptome in salt stress in *Eleusine coracana*.

HONORS AND AWARDS

Council of Scientific and Industrial Research and University Grant Commission, India government fellowship to pursue Ph.D.	2005-2010
Indian Council of Agricultural Research, research fellowship National fellowship awarded through a competitive national level exam to pursue master's degree	2002-2004
Gold medalist for master's in plant Physiology. University of Agricultural Sciences, Bengaluru, India. The highest honor given to university topper	2004
Gold medalist for Best thesis in Plant Physiology. University of Agricultural Sciences, Bengaluru, India. The highest honor given by university for best master's thesis	2004

PUBLICATIONS

1. **Vinesh Vinayachandran**, Rohit Reja, Bongsoo Park, Matthew J. Rossi, Chitvan Mittal, Lila Riber, Shaun Mahoni and B. Franklin Pugh 2018. Widespread and precise epigenomic reprogramming in response to heat shock. *Genome Res.* 28: 357-366
2. Varinia García-Molinero, José García-Martinez, Rohit Reja, Pedro Furió-Tarí, Oreto Antúnez, **Vinesh Vinayachandran**, Ana Conesa, B. Franklin Pugh, José E. Pérez-Ortín and Susana Rodríguez-Navarro 2018. The SAGA/TREX-2 subunit Sus1 binds widely to transcribed genes and affects mRNA turnover globally. *Epigenetics & Chromatin.* 11:13
3. Yen K*, **Vinayachandran Vinesh***, Pugh BF. 2013. SWR-C and INO80 chromatin remodelers recognize nucleosome-free regions near +1 nucleosomes. *Cell* 154(6): 1246-56. (**Authors contributed equally*)
4. Yen K, **Vinayachandran Vinesh**, Batta K, Koerber RT, Pugh BF. 2012. Genome-wide nucleosome specificity and directionality of chromatin remodelers. *Cell* 149(7): 1461-73.
5. Maren Schneider, Doris Hellerschmied, Tobias Schubert, Stefan Amlacher, **Vinesh Vinayachandran**, Rohit Reja, B. Franklin Pugh, Tim Clausen, Alwin Kohler. 2015. The Nuclear Pore-Associated TREX-2 Complex Employs Mediator to Regulate Gene Expression. *Cell* 162(5): 1016-1028

6. S. Branden Van Oss, Margaret K. Shirra, Alain R. Bataille, Adam D. Wier, Kuangyu Yen, **Vinesh Vinayachandran**, In-Ja L. Byeon, Christine E. Cucinotta, Annie Héroux, Jongcheol Jeon, Jaehoon Kim, Andrew P. VanDemark, B. Franklin Pugh, Karen M. Arndt. 2016. The Histone Modification Domain of Paf1 Complex Subunit Rtf1 Directly Stimulates H2B Ubiquitylation Through an Interaction with Rad6. *Mol. Cell* 64(4): 815–825
7. **Vinesh Vinayachandran**, R-H Pusarla, Purnima Bhargava. 2009. Multiple sequence-directed possibilities provide a pool of nucleosome position choices in different states of activity of a gene. *Epigenetics & Chromatin* 2:4.
8. R-H Pusarla*, **Vinesh Vinayachandran***, Purnima Bhargava. 2007. Nucleosome positioning in relation to nucleosome spacing and DNA sequence-specific binding of a protein. *FEBS Journal* 274:2396–2410. (**Authors contributed equally*)
9. Aguilar-Gurrieri C, Larabi A, **Vinesh Vinayachandran**, Patel NA, Yen K, Reja R, Ebong IO, Svhoehn G, Robinson CV, Pugh BF, Panne D. 2016. Structural evidence for Nap1-dependent H2A-H2B deposition and nucleosome assembly. *EMBO J.* 35(13)1455-82
10. Rohit Reja, **Vinesh Vinayachandran**, Sujana Ghosh, B. Franklin Pugh. 2015. Molecular mechanisms of ribosomal protein gene coregulation. *Genes & Dev.* 29:1942-1954
11. Garam Celine Han, **Vinesh Vinayachandran**, Alain Bataille, Ka Yim Chan-Salis, Cheryl A Keller, Maria Long, Susan Magargee, Shaun Mahony, Ross C Hardison, B. Franklin Pugh. 2015. A High-Resolution Genome-wide binding of GATA1 and TAL1 during Erythroid Development. *Molecular and Cellular Biology* 36:(1)
12. Hermes Reyes-Caballero, Bongsoo Park, Jeffrey Loube, Ian Sanchez, Lisa Valentin, **Vinesh Vinayachandran**, Youngshim Choi, Juhjung Woo, Justin Edwards, Marielle Brinkman, Clifford Watson, Benjamin Blount, Thomas E. Sussan, Wayne Mitzner, Shyam Biswal. 2019. Immune modulation by chronic exposure to waterpipe smoke and immediate-early gene regulation in murine lungs. *Tobacco Control* (accepted manuscript)
13. Roopesh Singh Gangwar, **Vinesh Vinayachandran**, Palanivel Rengasamy, Ricky Chan, Bongsoo Park, Rachel Diamond-Zaluski, Elaine Ann Cara, Anthony Cha, Lopa Das, Courteney Asase, M.A.,¹Andrei Maiseyeu, Jixin Zhong, Wayne Mitzner, Shyam Biswal, and Sanjay Rajagopalan. 2019. Chronic exposure to PM_{2.5} induces recruitment of bone marrow-derived proinflammatory monocytes and macrophages into the lung and modulate the tissue resident alveolar macrophage transcriptome. (**manuscript under revision in Nature commun**)
14. Sanjay Rajagopalan, Bongsoo Park, Palanivel Rengasamy, **Vinesh Vinayachandran**, Roopesh Singh, Jeffrey Deilulis, Lopa Das, Jinhu Yin, Youngshim Choi, Sadeer Al-Kindi,

Kasper Daniel Hansen and Shyam Biswal. A Comprehensive Transcriptome Map of Real-World Exposure to Particulate Air Pollution (PM2.5) Exposure: Implications for Reversibility and Epigenomic Control (**manuscript under revision**)

15. Rengasamy Palanivel, Vinesh Vinayachandran, Roopesh Singh Gangwar, Bongsoo Park, Elaine Ann Ebreo Cara, Sowmya Ravi, Lopa Das, Jeffrey A Deiullis, Sanjay Rajagopalan. Air Pollution Exposure facilitates Circadian Disruption through Chromatin Dynamics and Epigenetic Writers

CITATIONS

<https://scholar.google.com/citations?user=ISJVXWwAAAAJ&hl=en>

https://www.researchgate.net/profile/Vinesh_Vinayachandran2

RESEARCH MENTORING (The Pennsylvania State University)

Rohit Reja. Ph.D. Thesis title: ***Understanding molecular mechanism of gene regulation using high resolution CHIP-exo*** 2012-2015

Currently working as Bioinformatics Scientist Seven Bridges San Francisco, CA, USA

Reja et al., 2015, *Genes & Dev.* 29:1942-1954

Celine Garam Han. Ph.D. Thesis title: ***Transcriptional regulation of erythropoiesis using high resolution CHIP-exo*** 2013-2015

Currently working as post-doctoral researcher at Dana-Farber Cancer Institute, Harvard Medical School, and The Broad Institute of Harvard & MIT

Han et al., 2015, *Molecular and Cellular Biology* 36:(1)

RESEARCH SUPERVISING (The Pennsylvania State University)

Research technician (currently attending Med-school,
Philadelphia College of Osteopathic Medicine (PCOM)) 2011-2014

Research technician (currently attending Vet-school,
St George University of Veterinary Medicine Grenada, West Indies) 2013-2015

POSTER PRESENTATION

Vinesh Vinayachandran, Rama-Haritha P, and Bhargava P. "Nucleosome Positioning in relation to nucleosome spacing and DNA sequence-specific binding of a protein" 2006, November 26th to 29th, CCMB, Hyderabad, India

Vinesh Vinayachandran, Rama-Haritha P, Bhargava P. "Multiple sequence-directed possibilities provide a pool of nucleosome position choices in different states of activity of a gene", December 11th to 13th 2006, JNCASR, Bangalore, India.

Vinesh Vinayachandran, Kuangyu Yen, B. Franklin Pugh. "Genome-wide structural integration of Swr1-C and Ino80 Chromatin remodelers at +1 Nucleosome, Mechanism of eukaryotic transcription", August 27th to 31st 2013, CSHL, NY, USA.

Vinesh Vinayachandran, Rohit Reja and B. Franklin Pugh. "Genome-wide reprogramming of transcription machinery under physiological perturbation", Epigenetics and chromatin meeting, September 9th to 13th 2014, CSHL, NY, USA.

Vinesh Vinayachandran, Rohit Reja and B. Franklin Pugh. "Genome-wide reprogramming of transcription machinery under physiological perturbation", Chromatin and Epigenetic Regulation of Transcription, July 21th to 24th 2015, PSU, USA.

SCIENTIFIC SERVICES

Editor for the journal: *Annals of Epidemiology and Public Health*

Peer reviewer for: *Oncotarget*

Peer reviewer for: *PloS One*

Peer reviewer for: *International Journal of Current Research and Review*

Represented Center for Eukaryotic Gene Regulation (CEGR), Penn State for Ph.D. and under graduate recruitment (2015-2017)

Graduate student poster session invited judge at The Pennsylvania State University 2017