

Satish Kumar, Ph.D.

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Education & Training

- 2003 Doctor of Philosophy [Ph.D.]
Department of Anthropology, University of Delhi, Delhi
Dissertation: "Genetic Structure of the Scheduled Tribes of Rajasthan"
- 1996 Masters of Science [M.Sc.]
Anthropology, Specialization Biological Anthropology
Department of Anthropology, University of Delhi, Delhi
- 1994 Bachelors of Science [B.Sc.]
Botany (Honours), Zoology and Chemistry
University of Delhi, Delhi

Research Focus

Dr. Kumar's research focuses on developing and applying innovative induced pluripotent stem cell (iPSC) based methods, genome editing technologies, and *in-vitro* cell models to identify genetic and environmental determinants of human disease risk. Dr. Kumar is developing novel approaches for *in-vitro* modeling and high-throughput multi-omic analysis of cellular models for various human diseases and disorders, including Alzheimer's disease, Parkinson's disease, major depressive disorders, infectious diseases, human cancers, type 2 diabetes, cardiovascular disease, cardiomyopathies, obesity, and fatty liver disease.

He has developed an efficient iPSC reprogramming methodology for cryopreserved lymphoblastoid (immortalized B lymphocytes) cell lines (LCLs). This cost-effective and highly successful method has the potential to have a significant impact in the field, as many sample repositories around the world have banked LCLs that can be utilized for iPSC generation. Using this method and a large LCL repository maintained at the Division of Human Genetics and South Texas Diabetes and Obesity Institute (STDIO), Dr. Kumar has established a large iPSC resource from hundreds of individuals of the STDIO's longitudinal Mexican American Family Study. This stem cell resource is being used in several large genetic and functional genomic studies in the institute, including multi-year multi-million dollar projects funded by the National Institute of Health (NIH) on non-alcoholic fatty liver disease and the study of Genotype×Environment interaction. Dr. Kumar serves as a Multi-Principal Investigator and Project Co-Leader on these projects. In another NIH-funded project, Dr. Kumar has developed iPSC reprogramming and differentiation methodologies for *Monodelphis domestica*, a well-established laboratory-bred marsupial animal model. The generated *M. domestica* iPSCs are the first integration-free and the second ever reprogrammed from a marsupial species. The established *M. domestica* iPSCs are being used by laboratories around the world in comparative biology and biomedical research. More recently, Dr. Kumar has developed a genome-edited model of amyloid beta stress to study the etiology of sporadic late-onset Alzheimer's disease.

Apart from his current endeavor in developing iPSC-based methodologies and cellular models of human disease, Dr. Kumar has had a major role in several large-scale, NIH, and industry-funded human genetics projects, aimed at identifying genes influencing human complex diseases. He also has a strong interest in human phylogenetics, mitochondrial functions, and mitochondrial retrograde regulation and their role in human disease risk.

Publications

1. Aceves M, Granados J, Leandro AC, Peralta J, Glahn DC, Williams-Blangero S, Curran JE, Blangero J, **Kumar S.** (2024) Role of Neurocellular Endoplasmic

Reticulum Stress Response in Alzheimer's Disease and Related Dementias Risk. *Genes* (Basel). 2024 Apr 28;15(5):569. doi: 10.3390/genes15050569. PMID: 38790197; PMCID: PMC11121587.

2. **Kumar S**, Granados J, Aceves M, Peralta J, Leandro AC, Thomas J, Williams-Blangero S, Curran JE, Blangero J (2024). Pre-Infection Innate Immunity Attenuates SARS-CoV-2 Infection and Viral Load in iPSC-Derived Alveolar Epithelial Type 2 Cells. *Cells*. 2024 Feb 21;13(5):369. doi: 10.3390/cells13050369. PMID: 38474333; PMCID: PMC10931100.
3. Howard T, Almeida M, Diego V, Viel K, Luu B, Haack K, Raja R, Ameri A, Chitlur M, Rydz N, Lillicrap D, Watts R, Kessler C, Ramsey C, Dinh L, Kim B, Powell J, Peralta J, Bouls R, Abraham S, Shen YM, Murillo C, Mead H, Lehmann P, Fine E, Escobar M, **Kumar S**, Williams-Blangero S, Kasper C, Almasy L, Cole S, Blangero J, Konkle B. (2023) A Scan of Pleiotropic Immune Mediated Disease Genes Identifies Novel Determinants of Baseline FVIII Inhibitor Status in Hemophilia-A. *Res Sq [Preprint]*. 2023 Oct 18:rs.3.rs-3371095. doi: 10.21203/rs.3.rs-3371095/v1. PMID: 37886476; PMCID: PMC10602130.
4. Mathias SR, Knowles EEM, Mollon J, Rodrigue AL, Woolsey MK, Hernandez AM, Garret AS, Fox PT, Olvera RL, Peralta JM, **Kumar S**, Goring HHH, Duggirala R, Curran JE, Blangero J, Glahn DC. (2023) Cocktail-party listening and cognitive abilities show strong pleiotropy. *Front Neurol*. 2023;14:1071766. Epub 2023/03/28. doi: 10.3389/fneur.2023.1071766. PubMed PMID: 36970519; PMCID: PMC10035755.
5. **Kumar S**, De Leon EM, Granados J, Whitworth DJ, VandeBerg JL. (2022) Monodelphis domestica Induced Pluripotent Stem Cells Reveal Metatherian Pluripotency Architecture. *Int J Mol Sci*. 2022;23(20). Epub 2022/10/28. doi: 10.3390/ijms232012623. PubMed PMID: 36293487; PMCID: PMC9604385.
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7. Blackburn NB, Meikle PJ, Peralta JM, **Kumar S**, Leandro AC, Bellinger MA, Giles C, Huynh K, Mahaney MC, Göring HHH, VandeBerg JL, Williams-Blangero S, Glahn DC, Duggirala R, Blangero J, Michael LF, Curran JE (2021). Identifying the Lipidomic Effects of a Rare Loss-of-Function Deletion in *ANGPTL3*. *Circ Genom Precis Med*. 2021 Apr 22. doi: 10.1161/CIRCGEN.120.003232. Epub ahead of print. PMID: 33887960.
8. **Kumar S**, Curran JE, Williams-Blangero S, Blangero J (2021). Efficient Generation of Functional Hepatocytes from Human Induced Pluripotent Stem Cells for Disease Modeling and Disease Gene Discovery. *Methods Mol Biol*. 2021 Mar 27. doi: 10.1007/7651_2021_375. Epub ahead of print. PMID: 33772461.
9. **Kumar S**, Curran JE, Kumar K, DeLeon E, Leandro AC, Peralta J, Williams-Blangero S, Blangero J (2021). Disease Modeling and Disease Gene Discovery in

Cardiomyopathies: A Molecular Study of Induced Pluripotent Stem Cell Generated Cardiomyocytes. *Int J Mol Sci.* 2021 Mar 24;22(7):3311. doi: 10.3390/ijms22073311. PMID: 33805011.

10. Morales LD, Cromack DT, Tripathy D, Fourcaudot M, **Kumar S**, Curran JE, Carless M, Göring HHH, Hu SL, Lopez-Alvarenga JC, Garske KM, Pajukanta P, Small KS, Glastonbury CA, Das SK, Langefeld C, Hanson RL, Hsueh WC, Norton L, Arya R, Mummidi S, Blangero J, DeFronzo RA, Duggirala R, Jenkinson CP (2021). Further evidence supporting a potential role for ADH1B in obesity. *Sci Rep.*, 11(1):1932. doi: 10.1038/s41598-020-80563-z. PMID: 33479282; PMCID: PMC7820614.
11. **Kumar S**, Curran JE, DeLeon E, Leandro AC, Howard TE, Lehman DM, Williams-Blangero S, Glahn DC, Blangero J (2020). Role of miRNA-mRNA interaction in neural stem cell differentiation of induced pluripotent stem cells. *Int J Mol Sci.* 2020;21(19). Epub 2020/09/27. doi: 10.3390/ijms21196980. PubMed PMID: 32977388.
12. **Kumar S**, Curran JE, Espinosa EC, Glahn DC, Blangero J (2020). Highly efficient induced pluripotent stem cell reprogramming of cryopreserved Lymphoblastoid cell lines. *J. Biol. Methods.*, 7(1): e124. doi: 10.14440/jbm.2020.296
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14. **Kumar S**, Espinosa EC, Leandro AC, Curran JE, Blangero J (2019). microRNA and mRNA interactions in induced pluripotent stem cell reprogramming of lymphoblastoid cell lines. *Am. J. Stem Cells.*, 8(2):28-37. Epub 2019/09/17. PubMed PMID: 31523484; PMCID: PMC6737382.
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16. Blackburn NB, Michael LF, Meikle PJ, Peralta JM, Mosior M, McAhren S, Bui HH, Bellinger MA, Giles C, **Kumar S**, Leandro AC, Almeida M, Weir JM, Mahaney MC, Dyer TD, Almasy L, VandeBerg JL, Williams-Blangero S, Glahn DC, Duggirala R, Kowala M, Blangero J, Curran JE (2019). Rare DEGS1 variant significantly alters de novo ceramide synthesis pathway. *J. Lipid Res.*, 60(9):1630-9. Epub 2019/06/23. doi: 10.1194/jlr.P094433. PubMed PMID: 31227640; PMCID: PMC6718439.

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