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Integration of omics data to understand Alzheimer's disease

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We have developed a multi-omics platform–Alzheimer's DataLens that enables researchers to mine and visualize results of large-scale omics analysis of public datasets, as well as proprietary compound screening against "Alzheimer's in a dish" 3D cell matrix, artificial neurites engineered from reprogrammed fibroblasts. Firstly, we analyzed over 50 publicly available human gene expression datasets, both RNA-Seq and microarrays, spanning 19 different brain regions and encompassing four separate cohorts; we then developed novel query and visualization tools to explore the results. Secondly, we developed an interactive Manhattan and LocusZoom plot of the International Genomics of Alzheimer's Project (IGAP), Stage 1 meta-analysis results of genome-wide association studies (GWAS) of 7,055,881 SNPs, either genotyped or imputed in at least 40% of the Alzheimer's disease (AD) cases and 40% of the control samples, across all datasets for genome-wide association with AD (17,008 cases and 37,154 controls) in individuals of European ancestry. Then, we investigated co-expression networks that were differently regulated in Alzheimer's disease. Finally, we integrated the genetic association data with the expression and other omics data to identify important genes in the pathophysiology of AD. Our platform for integrating multi-omics data is aimed at an effort to discover novel molecular targets in Alzheimer disease therapeutics.

Biography

Sudeshna Das, PhD is an Assistant Professor in Neurology at the Harvard Medical School, Assistant in Neuroscience at the Massachusetts General Hospital (MGH) and Director of the MGH Biomedical Informatics Core. She has directed the development of several data-analytic platforms at MGH. She has worked with leading Alzheimer's disease (AD) researchers and co-authored high-profile publications with them. Her current research interests include development of scientific communities, semantic web technologies, neuro-informatics and computational analysis of complex biomedical data using statistical and data-mining techniques to understand complex, neuro-degenerative diseases.

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Notes:

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