Annie Kathuria, Ph.D.

Titles & Department

Assistant Professor of Biomedical Engineering

Specialization Areas

Crafting cerebral and cortical organoids to study disorders such as autism, schizophrenia, and Alzheimer's disease, as well as retinal, liver, and lung organoids for high-throughput drug and toxicological screening

Summary of Research & Work

Dr. Kathuria's laboratory is spearheading breakthroughs in organoid tissue engineering, leveraging the regenerative capacities of pluripotent stem cells to craft highly detailed 3D tissue models or "organoids." These constructs mirror the complex micro-architecture of actual organs, standing as a revolutionary instrument in biomedical research. The focal point of the lab's endeavor is the development of cerebral organoids, inclusive of vascularized iterations and cortical spheroids, offering a deeper dive into the molecular foundations of several neurological disorders such as Autism, Schizophrenia and Alzheimer's disease. This pivotal work facilitates a more granulated understanding of these ailments, paving the avenue towards targeted treatment options. In conjunction with this, the lab utilizes a multi-modal research paradigm that integrates multi-electrode arrays and high-throughput imaging, fostering an environment conducive to high-throughput drug and toxicological screening. This approach holds substantial promise not just in the pharmaceutical realm but extends to food nutrition analysis and nicotine tobacco screening, opening up avenues for collaboration with industries keen on exploring the effects of various substances at a cellular level, thus broadening the horizon of potential applications and partnerships.

Publications

- Kathuria A, Lopez-Lengowski K, Watmuff B, McPhie D, Cohen BM, Karmacharya R. Synaptic deficits in iPSC-derived cortical interneurons in schizophrenia are mediated by NLGN2 and rescued by N-acetylcysteine. Transl Psychiatry. 2019 11 28; 9(1):321. PMID: 31780643.
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- Kathuria A, Lopez-Lengowski K, Jagtap SS, McPhie D, Perlis RH, Cohen BM, Karmacharya R. Transcriptomic Landscape and Functional Characterization of Induced Pluripotent Stem Cell-DerivedCerebral Organoids in Schizophrenia. JAMA Psychiatry. 2020 07 01; 77(7):745-754. PMID: 32186681.

- Kathuria A, Lopez-Lengowski K, Watmuff B, Karmacharya R. Comparative Transcriptomic Analysis of Cerebral Organoids and Cortical Neuron Cultures Derived from Human Induced Pluripotent Stem Cells. Stem Cells Dev. 2020 11 01; 29(21):1370-1381. PMID: 32862797.
- Annie Kathuria, Kara Lopez-Lengowski, Joshua L. Roffman, Rakesh Karmacharya, Distinct effects of interleukin-6 and interferon-γ on differentiating human cortical neurons, Brain, Behavior, and Immunity, 2022,ISSN 0889-1591.
- Kathuria, A., Lopez-Lengowski, K., McPhie, D. et al. Disease-specific differences in gene expression, mitochondrial function and mitochondria-endoplasmic reticulum interactions in iPSC-derived cerebral organoids and cortical neurons in schizophrenia and bipolar disorder. Discov Ment Health 3, 8 (2023).
- Kathuria A, Lopez-Lengowski K, Karmacharya, R. Phosphoproteomic profiling and ultrastructural investigations of stem cell-derived cortical spheroids in bipolar disorder. International Society for Bipolar Disorders. 2022 Samuel Gershon Junior Investigator Awards, Awarded.
- Kathuria A, Lopez-Lengowski K, Watmuff B, Karmacharya R et al. Comparative spine analysis of schizophrenia cortical neurons derived from human induced pluripotent stem cell. Genome Medicine, June 2023 Accepted.