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Neuroscience

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Our group is interested in understanding the underlying genetic and pathophysiological basis of psychiatric and neurodevelopmental disorders. An area of specific interest is the synaptic pathology that is common to several such disorders. For example, longitudinal clinical studies have demonstrated a progressive reduction in cortical thickness in schizophrenia patients as psychosis develops and the disease progresses. Such cortical pathology is more prominent in severe forms of disease such as childhood-onset schizophrenia. Reductions in cortical thickness correlate well with synapse loss, the neuroanatomical correlates of which are restricted to the layers 2 and 3 of the cortex. Recent advances in schizophrenia genetics have also highlighted the role of synaptic pathways thereby attributing a potentially causal role to synaptic deficits.

We are interested in characterizing the synaptic architecture of cortical layers 2/3 in the context of schizophrenia and in understanding the mechanisms underlying the specific synapse loss. We are also interested in extending the findings to other psychiatric and other neurodevelopmental disorders. We have differentiated human induced pluripotent stem cells

(hiPSC) from childhood-onset schizophrenia patients into cortical neurons and forebrain cerebral organoids and are developing them into models to understand the synaptic deficits in disease. Other key areas of interest to us include understanding the role of neuroinflammatory pathways in synaptic pathology as well as understanding the role of different neuronal subtypes and other CNS cell types in the manifestation of genetic risk in the context of psychiatric and neurodevelopmental disorders. Towards that goal, we have successfully generated human microglia and astrocytes like-cells as well as interneurons and plan on developing co-culture systems with forebrain cerebral organoids to study the role of various cell types in synaptic biology.

Selected Publications

A NMDA-receptor calcium influx assay sensitive to stimulation by glutamate and glycine/D-serine. [2]
Guo H, Camargo LM, Yeboah F, Digan ME, Niu H, Pan Y, Reiling S, Soler-Llavina G, Weihofen WA, Wang HR, Shanker YG, Stams T, Bill A
Scientific Reports, 2017 Sep 14;7(1):11608.

Tas1r3, encoding a new candidate taste receptor, is allelic to the sweet responsiveness locus Sac. [3]
Shanker YG*, Max M* (*= equal contribution), Huang L, Rong M, Liu Z, Campagne F, Weinstein H, Damak S, Margolskee RF.
Nature Genetics 2001 May;28(1):58-63.

Click here [4] for additional publications.

Links
[1] https://www.novartis.com/our-science/postdoc-program/research-themes/neurobiology/gopi-shanker-phd
[2] https://www.ncbi.nlm.nih.gov/pubmed/28912557
[3] https://www.ncbi.nlm.nih.gov/pubmed/11326277
[4] https://www.ncbi.nlm.nih.gov/pubmed/?term=shanker+YG