Research Summary:

A ‘neuronal population’ is defined as a cluster of neurons that are unified in their molecular expression profiles. The brain is made of thousands of neuronal populations, and each disorder of the brain differentially targets a specific neuronal population. Dr. Small’s lab has been guided by this basic clinical principle, with the belief that in order to understand, diagnose, and ultimately treat any brain disorder the most vulnerable neuronal population needs first to be pinpointed. By improving spatial resolution, Dr. Small’s lab has adapted fMRI (functional magnetic resonance imaging) so that dysfunction in small subregions of the brain can be visualized in living subjects. In so doing, the lab has pinpointed the neuronal populations within the hippocampal formation most vulnerable to normal aging, and has contrasted this anatomical pattern to the earliest stages of Alzheimer’s disease. These findings suggest a way to diagnose Alzheimer’s diseases as early as possible, before the onset dementia. Why should one neuronal population be vulnerable to normal aging while another is vulnerable to Alzheimer’s disease? In order to answer this question, the lab has combined fMRI with microarray, and has begun isolating rogue molecules that cause age-related memory decline versus those that contribute to Alzheimer’s disease. This cellular and molecular information will clarify basic mechanisms of brain dysfunction, and hopefully will lead to novel avenues of treatment.

Selected Publications:

Cocoa flavinol study:


More about Scott A. Small:

Scott A. Small M.D. is the Director of the Alzheimer's Disease Research Center at Columbia University, where he is the Boris and Rose Katz Professor of Neurology. He is appointed in the Departments of Neurology, Radiology, and Psychiatry.
With an expertise in Alzheimer's disease and cognitive aging, Dr. Small's research focuses on the hippocampus, a circuit in the brain targeted by these and other disorders, notably schizophrenia. He has pioneered the development and application of high-resolution functional MRI techniques that can pinpoint parts of the hippocampus most affected by aging and disease. His lab then uses this information to try to identify causes of these disorders. Over the years, his lab has used this 'top-down' approach to isolate pathogenic mechanisms related to Alzheimer's disease, cognitive aging, and schizophrenia. More recently, his lab has used this insight for drug discovery and to develop novel therapeutic interventions, some of which are currently being tested in patients.

Dr. Small has co-authored over 120 articles and his neuroimaging and molecular work has led to 7 patents. Dr. Small is the recipient of numerous awards, including the Beeson Scholar Award in Aging Research from the American Federation on Aging, the McKnight Neuroscience of Brain Disorders Award, the Derek Denny-Brown Young Neurological Scholar Award from the American Neurological Association, and the Lamport Award for Excellence in Clinical Science Research from Columbia University.

http://www.cumc.columbia.edu/dept/sergievsky/fs/small.html

CV

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