Introductory Remarks to Symposium 30

Illuminating normal and diseased brain function with in vivo fluorescence imaging

Mark Schnitzer and Arthur Konnerth, München

This symposium presents an overview of how the rapid advances in optical imaging technologies are improving the ability to use photons in the study of normal and diseased nervous systems. Improved techniques for in vivo fluorescence imaging offer new opportunities in systems neuroscience and unprecedented means to monitor and probe the neural dynamics that underlie perception, cognition, and action in live and awake behaving animals. Similarly, these techniques also provide newfound opportunities for uncovering how neural dynamics and brain function go awry in disease states. This symposium will showcase state-of-the-art optical investigations of neural dynamics across multiple mammalian brain systems, both in healthy animals and in animal models of neurodegenerative disease. Research highlights will be drawn from in vivo imaging studies of sensory cortex, cellular and circuit impairments underlying Alzheimer disease, and striatal ensemble neural dynamics in the brains of normal and Parkinsonian mice. Collectively, these studies highlight the extent to which in vivo optical imaging has become an integral tool for both and systems neuroscience and the neurobiology of disease. Speakers will discuss several complementary optical techniques, the novel types of experiments they enable, and the impact on studies of brain diseases. Both the cutting edge optical approaches and the disease applications we present will be diverse:

- Large-scale studies of neural circuit impairments in the brains of Alzheimer model mice (Busche).
- Ensemble neural dynamics of the striatal direct and indirect pathways in freely moving mice, in normal and Parkinsonian states (Schnitzer).
- maging studies of primary sensory cortex and its unexpected role in an anticipatory motor response (Chen).
- Two-photon imaging of cellular morphology and dynamics in live mice; toward uncovering cellular mechanisms of Alzheimer disease (Grutzendler).

Together, the presentations will provide a window onto the broad range of imaging techniques that are impacting research on neuropsychiatric disorders and promise to yield major advances towards understanding both basic brain function and disease mechanisms.

Symposium 30

Friday, March 24, 2017
14:30 – 16:30, Lecture Hall 10

Chairs: Mark Schnitzer and Arthur Konnerth, München

14:30 **Opening Remarks**

14:35 Xiaowei Chen, Chongqing, China
MOUSE AUDITORY CORTEX IS REQUIRED FOR ANTICIPATORY MOTOR RESPONSE (S30-1)

15:00 Mark Schnitzer, Standford, USA
IN VIVO IMAGING STUDIES OF STRIATAL ENSEMBLE NEURAL DYNAMICS IN NORMAL AND PARKINSONIAN STATES (S30-2)

15:25 Jaime Grutzendler, New Haven, USA
EXPLORING THE COMPLEXITY OF DEMENTIA NEUROPATHOLOGY WITH IN VIVO OPTICAL IMAGING (S30-3)

15:50 Aurel Busche, Harvard, USA
RESTORING BRAIN FUNCTION IN ALZHEIMER´S MOUSE MODEL BY BACE INHIBITION (S30-4)

16:15 Antje Birkner, München
DEEP TWO-PHOTON CALCIUM IMAGING IN VIVO (S30-5)

16:25 **Concluding Remarks**

Symposia