PROGRESS IN NEUROSCIENCE PINS

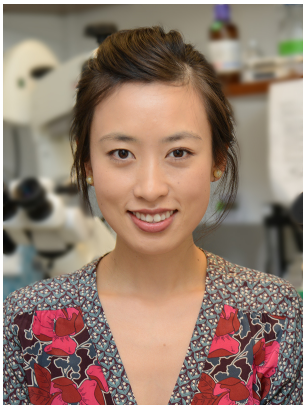
Post-Doc Talks

Seminar Series of the
Brain & Mind Research Institute
Weill Cornell Medical College (WCMC)
&
The Graduate Program in Neuroscience of
WCMC and Sloan Kettering Institute

Thursday, 4/20/17, 4 PM, coffee at 3:45 PM

Weill Auditorium

"Sensory inputs control cell type-specific dynamics in developing cortical networks"
Speaker 1: Alicia Che, Ph.D., Post-Doctoral Associate, Laboratory of Natalia De Marco



Neuronal connectivity and specific circuit configurations are fundamental for proper information processing, and the balance between inhibition and excitation is critical in establishing precise functional circuits. In developing sensory cortices, the interaction between sensory experience and synapse formation is essential for sculpting circuit connectivity. However, how early sensory inputs regulate the proper integration of excitatory cells and inhibitory interneurons into nascent networks is poorly understood. Here we used two-photon in vivo calcium imaging and monosynaptic rabies viral tracing to reveal the source of inputs that control the assembly of neuronal networks in the murine barrel cortex.

Citations: De Marco García, N. V., Priya, R., Tuncdemir, S. N., Fishell, G., & Karayannis, T. (2015). Sensory inputs control the integration of neurogliaform interneurons into cortical circuits. *Nature Neuroscience*, *18*(3), 393–401.

"Regulation of the Outer Retina-Blood barrier by Angiocrine Factors Secreted by Choroid Endothelial Cells"
Speaker 2: Ignacio Benedicto, PhD., Postdoctoral Associate, Department of Ophthalmology, WCM

The function of cone and rod photoreceptors (PRs), the light sensitive cells in the eye, depends on an adjacent support layer, the Retinal Pigment Epithelium (RPE) which forms the outer retina-blood barrier (oRBB), regulating the exchange of nutrients, fluid and waste between the neural retina and the underlying choroid circulation. Vision depends on the highly interconnected physiology of PRs, RPE, choroid circulation and Bruch's membrane (BM), a highly organized basement membrane that separates RPE from the fenestrated choroidal capillaries. During development, the oRBB is established through the coordinated terminal maturation of RPE, BM and choroid blood vessels. Recent work by Dr. Rafii and coworkers has shown that endothelial cells (ECs), beyond their role as blood conduits, are organ-specific and constitute instructive niches for parenchymal cell differentiation, regeneration and function. To extend this concept to the eye, we purified mouse choroid ECs and carried out RNAseq and co-culture experiments with RPE cells to test the hypothesis that angiocrine factors secreted by choroid ECs regulate the oRBB. Our studies indeed support the notion that developmentally regulated factors secreted by choroid ECs regulate BM assembly and RPE barrier function. Ongoing studies suggest, additionally, that choroid ECs play a key role in the maintenance of adult choroid homeostasis and visual function in response to injury. A corollary of our studies is that disruption of the crosstalk between choroid ECs and the retina emerges as a potential factor involved in the pathogenesis of currently incurable retinal diseases such as age-related macular degeneration.

Concerted regulation of retinal pigment epithelium basement membrane and barrier function by angiocrine factors. Benedicto I, Lehmann GL, Ginsberg M, Nolan DJ, Bareja R, Elemento O, Salfati Z, Alam NM, Prusky GT, Llanos P, Rabbany SY, Maminishkis A, Miller SS, Rafii S, Rodriguez-Boulan E. *Nature Communications* 2017 (in press).

Directional Fluid Transport across Organ-Blood Barriers: Physiology and Cell Biology. Caceres PS, Benedicto I, Lehmann GL, Rodriguez-Boulan EJ. *Cold Spring Harb Perspect Biol.* 9, a027847 (2017).

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