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Special Lectures

Unbiased whole-brain imaging to uncover molecular mechanisms and therapeutic targets for brain disorders

Hitoshi Hashimoto^{1,2,3,4}

¹*Lab. Mol. Neuropharmacol., Grad. Sch. Pharmaceutic. Sci.,* ²*United Grad. Sch. Child Develop.,* ³*Instit. for Datability Sci.,* ⁴*Instit. for Open and Transdisciplinary Res. Initiatives, Osaka Univ.*

Whole-brain imaging and systems analyses of entire brains at subcellular resolution and subsequent processing of the resulting images are prerequisites to investigate anatomical and functional brain networks to understand their function and dysfunction. However, it is still a challenge due to the trade-offs between imaging speed and spatial resolution irrespective of if tissue clearing methods are used. To overcome the issue, we have been attempting to increase the imaging throughput and relieve bottlenecks in the procedure, and have recently developed an automated high-speed imaging system for block-Face Serial microscopy Tomography (termed FAST). By using this system, it became possible to perform quantitative comparisons of whole-brain structures and neuronal activities at the cellular level using the spatial coordinated alphanumeric data of brain cells and pattern recognition methods. The FAST system thus paves the way for imaging analyses of the brain and provides new opportunities for unbiased and hypothesis-free approaches that contributes to investigate molecular mechanisms and therapeutic drug targets for brain disorders.