



SAINTS-PÈRES
Paris Institute for
the Neurosciences

UMR-S 1124
Toxicology, Pharmacology and Cell Signaling

Saints Pères Neuroscience Seminar Series

Friday, October 15th, 2021 at 11:30

Salle des Conférences (R229)

Centre Universitaire des Saints-Pères

45 rue des Saints-Pères, 75006 Paris

German Sumbre

Ecole Normale Supérieure, Paris, France

Principles of functional circuit connectivity: Insights from the zebrafish optic tectum

Spontaneous neuronal activity in sensory brain regions is spatiotemporally structured, suggesting that this ongoing activity may have a functional role. Nevertheless, the neuronal interactions underlying these spontaneous activity patterns, and their biological relevance, remain elusive. We addressed these questions using two-photon and light-sheet Ca^{2+} imaging of intact zebrafish larvae to monitor the fine structure of the spontaneous activity in the zebrafish optic tectum (the fish's main visual center). We observed that the spontaneous activity was organized in topographically compact assemblies, grouping functionally similar neurons rather than merely neighboring ones, reflecting the tectal retinotopic map. Assemblies represent all-or-none-like sub-networks shaped by competitive dynamics, mechanisms advantageous for visual detection in noisy natural environments. Furthermore, the spontaneous activity structure also emerged in "naive" tecta (tectal of enucleated larvae before the retina connected to the tectum). We thus suggest that the formation of the tectal network circuitry is genetically prone for its functional role. This capability is an advantageous developmental strategy for the prompt execution of vital behaviors, such as escaping predators or catching prey, without requiring prior visual experience.

*Mutant zebrafish larvae for the *mecp2* gene display an abnormal spontaneous tectal activity, thus representing an ideal control to shed light on the biological relevance of the tectal functional connectivity. We found that the tectal assemblies limit the span of the visual responses, probably improving visual spatial resolution.*

Those interested in meeting with the speaker please contact

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