



Life Sciences Seminar

Active zone scaffold proteins tune functional diversity across brain synapses

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Host: Johann Georg Danzl

Recently, high throughput electron microscopy has started to reveal complete wiring diagrams of circuits and whole brain regions, for example in the *Drosophila* olfactory sensory and learning center. However, efficacy, timing, and frequency tuning of synaptic vesicle release are highly diversified across the development of brain circuitry. Systematic knowledge regarding the functional features of synapse types will be required for a satisfactory understanding and functional modeling of neural circuits. Using light superresolution microscopy, we provide evidence that presynaptic active zone scaffold protein diversity controls functional diversity across *Drosophila* brain synapses: distinct patterns of scaffold complexes differentially recruit specific Unc13 isoforms to steer transmission dynamics in a neuron-specific manner by conferring diverse nanometer-precise positioning of vesicle release sites to Ca²⁺ channels. In this manner, a compositional code of such stereotypic release modules diversifies synapse response properties. Our analysis provides nanoscopic molecular fingerprints of synapse types which helps in understanding specific synaptic features in circuit modeling.

Key publications: 1. Fulterer A, Andlauer TFM, Ender A, et al. Active Zone Scaffold Protein Ratios Tune Functional Diversity across Brain Synapses. *Cell reports* 2018;23:1259-74. 2. Bohme MA, Beis C, Reddy-Alla S, et al. Active zone scaffolds differentially accumulate Unc13 isoforms to tune Ca(2+) channel-vesicle coupling. *Nature neuroscience* 2016;19:1311-20.

Wednesday, June 20, 2018 04:00pm - 05:00pm

IST Austria Campus Mondi Seminar Room 2, Central Building



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