

SFB 35 Colloquia in Membrane Transport

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"Understanding Dopamine Transmission through Protein-Protein Interactions"

Our research group focuses on how neurons in the brain regulate dopamine homeostasis and the role of neurotransmitter transporters. Transmitter re-uptake through plasma membrane transporters is crucial in terminating synaptic transmission and ensuring that vesicular pools of transmitter are available for subsequent release. The dopamine transporter (DAT) is the main target site for major psychostimulants and for drugs used to treat mental illnesses. We have revealed the critical role of protein-protein interactions in the cell biology of DAT. These findings included the role of the PDZ synaptic protein PICK1 in targeting DAT to presynaptic terminals; the role of the adaptor protein Hic-5 in DAT trafficking; and the identification of a domain involved in DAT oligomerization. Recently, we have discovered a physical and functional link between DAT and synaptic vesicles through an interaction with the synaptic vesicle protein synaptogyrin-3. Our findings suggest that this novel interaction facilitates synaptic vesicle docking at the plasma membrane near DAT to provide efficient vesicle loading of extracellular dopamine during the reuptake process. These findings may represent a novel target for the actions of psychostimulants.