

Receptor architectonic mapping of the macaque monkey brain

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Abstract: Neurotransmitters and their receptors mediate signal transduction in the brain and thus constitute the bridge between its structural and functional segregation. Receptors for classical neurotransmitters are expressed at varying intensities throughout the macaque monkey brain, with specific regional and laminar distribution patterns. Importantly, the heterogeneous distribution patterns of neurotransmitter receptors not only reveal borders between cortical areas or subcortical nuclei, but also highlight organizational principles in the brain. The term "receptor fingerprint" was coined to describe the unique co-distribution pattern of multiple receptor types within a given brain region. Differences in the size and/or shape of receptor fingerprints segregate phylogenetically older from more recently developed areas, unimodal from multimodal and association areas, as well as areas belonging to different functional networks. Additionally, receptor fingerprints have also been shown to reflect hierarchical processing levels within a given functional system. Crucial for the advance of translational neuroscience, these organizational principles could be demonstrated not only for macaques, but also for humans, and facilitate the determination of homologies between the brains of these two species.

The content of this talk will enable participants to learn about how the simultaneous analysis of multiple receptors in the macaque brain enables the identification of borders between architectonically distinct areas and establishment of a neurochemically informative map. They will also learn how analysis of the ensuing receptor fingerprints in combination with data from functional imaging studies confirms the hypothesis that similarities in the size and/or shape of receptor fingerprints constitute the molecular underpinning of functional networks.