The heterogeneity of the dorsal premotor cortex characterized by multimodal parcellation and behavioral functional characterization

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More than one century after Brodmann seminal’s map of the human brain, the brain structural and functional organization, as well as the behavioral characterization of brain regions are not yet comprehensively modeled and understood. One challenging region in this respect is the dorsal premotor cortex (PMd), being an interface between prefrontal and motors regions, it showed rostro-caudal organization as well as functional inferior-superior differentiation and a diverse profile of associated behavioral functions. In two recent studies, we capitalized on connectivity-based parcellation (CBP) with three distinct connectivity modalities to robustly identify a topographical organization of this region into subregions. We thus examined subdivision patterns among the PMd voxels as driven by i) co-activation of these voxels across a range of behavioral tasks (with meta-analytic connectivity modeling, MACM), ii) resting-state functional connectivity (RSFC) and iii) structural connectivity estimated with probabilistic diffusion tractography (PDT). We further functionally characterized the derived subregions by their functional connectivity fingerprints with MACM and RSFC and by their associated behavioral functions with quantitative decoding across the Brainmap database. In this talk, I will illustrate how this multimodal approach allowed identifying robust organization pattern that were consistent across modalities and hemispheres (as well as hemispheric differences) and integrating the diverse previous findings in the PMd organization and behavioral characterization.