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Multisensory Integration and Cerebral Reorganization in Anosmia

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Behavioral and neuroimaging studies have demonstrated that auditory and visual sensory loss leads to neuronal reorganization and promotes enhanced abilities in certain aspects of the remaining sensory modality. In contrast, neuronal reorganization and cross-modal compensation in anosmia (olfactory loss) has obtained very little attention. The sparse existing literature provides mixed results and focuses mainly on performance in, and processing of, the spared chemical senses gustation and the trigeminal sense; the few studies focusing on morphology have use voxel based analysis methods and indicate a minor decrease in gray matter volume within olfactory-associated cerebral areas.
Given the olfactory sense dependence on heterogeneous sensory cerebral areas, a fact that makes pronounced neural reprograming less plausible due to sustained inputs, we hypothesize that loss of olfactory functions might have supra-modal consequences. In this talk, I will provide an overview of findings from our ongoing projects on congenital and acquired anosmia in which we investigate the integration of auditory and visual stimuli via behavior and functional MRI. I will also discuss neuroplastic changes in individuals with acquired and congenital anosmia based on intrinsic connectivity (resting-state fMRI) and morphology (structural MRI) with a focus on cortical areas processing olfactory stimuli and integrating multisensory stimuli.

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