



**Area of Interest:**  
Understanding cognitive and affective processes in decision

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**Area of interest:** Synaptic plasticity and neurodegeneration.

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**Valence processing and decision-making deficit in rodent Iowa Gambling task: Understanding the link between PFC-atrophy and age-related cognitive decline.**

**Research problem:** Although valence processing is critical to everyday functioning across all developmental ages, the decline of prefrontal cortex (PFC)-based decision making is widely observed across aging-related neurodegenerative disorders. Interestingly, neither the PFC-functional decline nor the cognitive behavioural deficit shows uniformity in various neurodegenerative disorders. For instance, frontal atrophy is associated with decision making deficit in the frontotemporal variant of dementia, whereas the parietal-temporal atrophy contributes to the same deficit in the Dementia of Alzheimer's type. Valence-based decision making is contingent on learning phase of positive and negative reinforcements as well as on the brain areas implicated in the process (e.g., lateral orbitofrontal cortex (OFC) is predominantly involved in punishment, whereas medial OFC is in reward behaviour. In mild dementia of Alzheimer's type, the deficit is pronounced in the earlier phase of ambiguity in reward-punishment tasks than in the later phase of known outcomes, however the factors accounting for this phase-specific differences remain unexamined. Identifying aging-related atrophy in PFC sub regions and assessing its impact on valence processing and decision making will offer insights into neural mechanisms associated with aging induced cognitive decline.

**Objective:** To study the impact of aging-induced atrophy in the sub regions of the PFC (ventromedial vs. dorsolateral PFC) and its effect on valence processing during decision making in rats. Interdisciplinary approach: Applying lesioning protocols in animal model of various ages during cognitive tasks (including learning & memory), we plan to study aging associated changes in PFC regions involved in valence processing in rodent decision-making.