

Tracing the Axonal Projection of a Single LEC-projecting SNc Dopaminergic Neuron

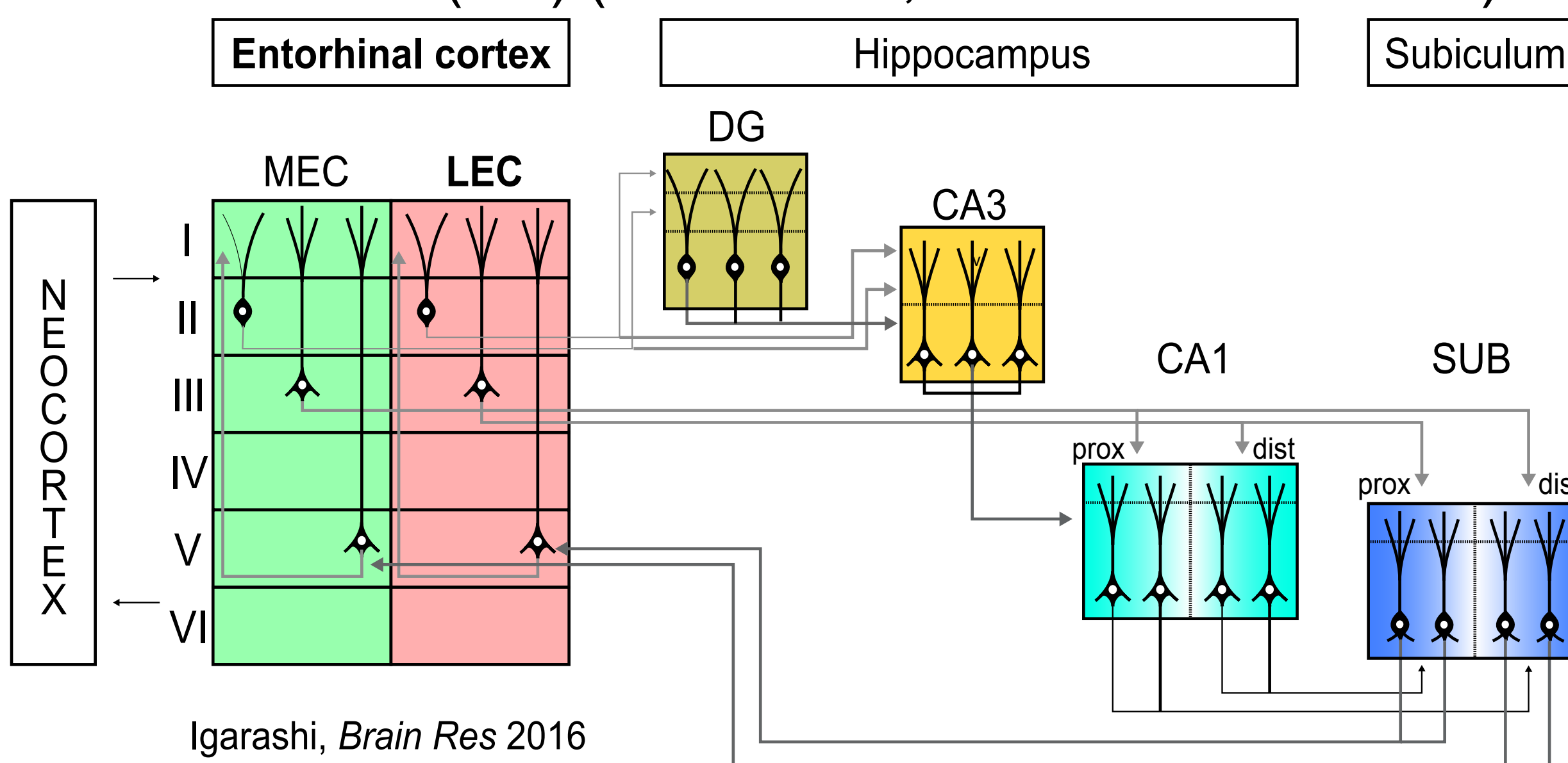
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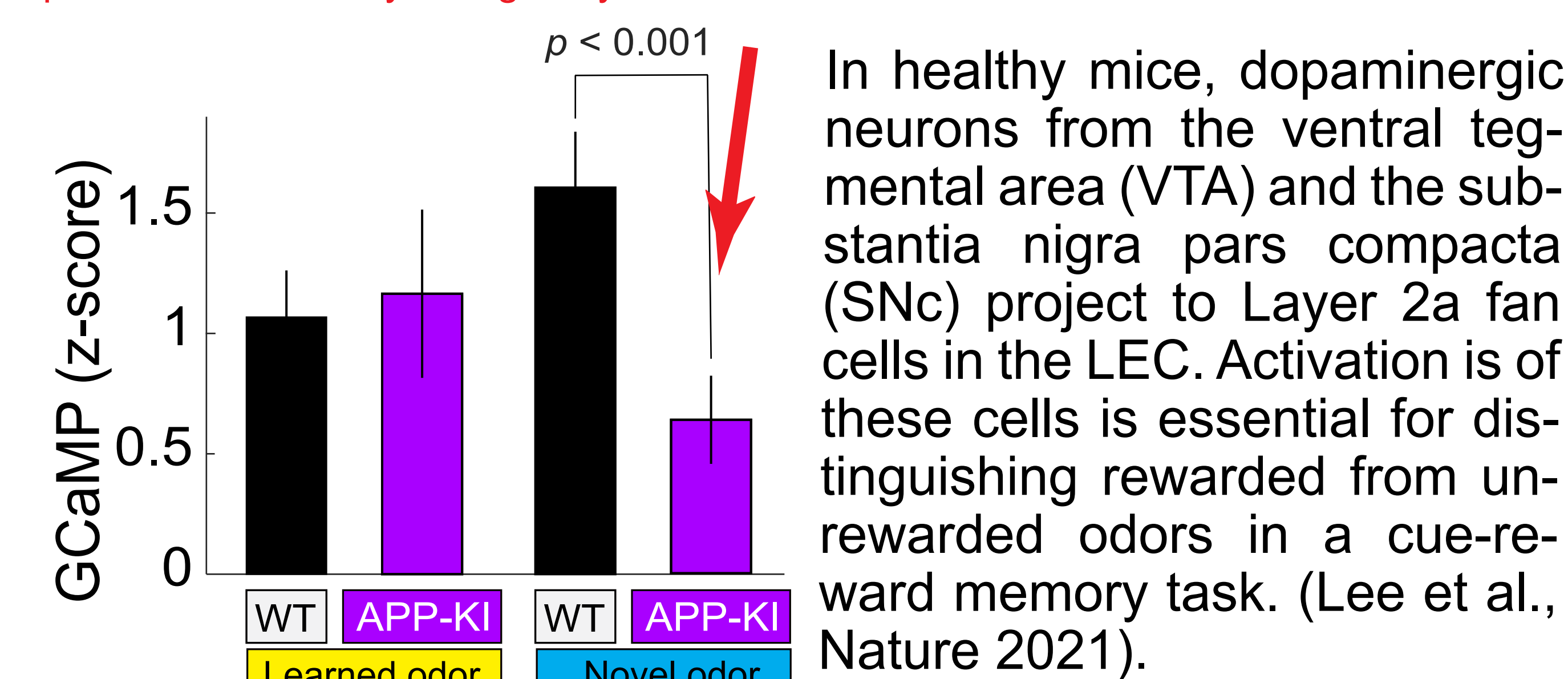


1. Background

The lateral entorhinal cortex has been identified as one of the first regions to exhibit the pathological dysfunction of Alzheimer's disease (AD) (Khan et al., Nat. Neurosci. 2014).

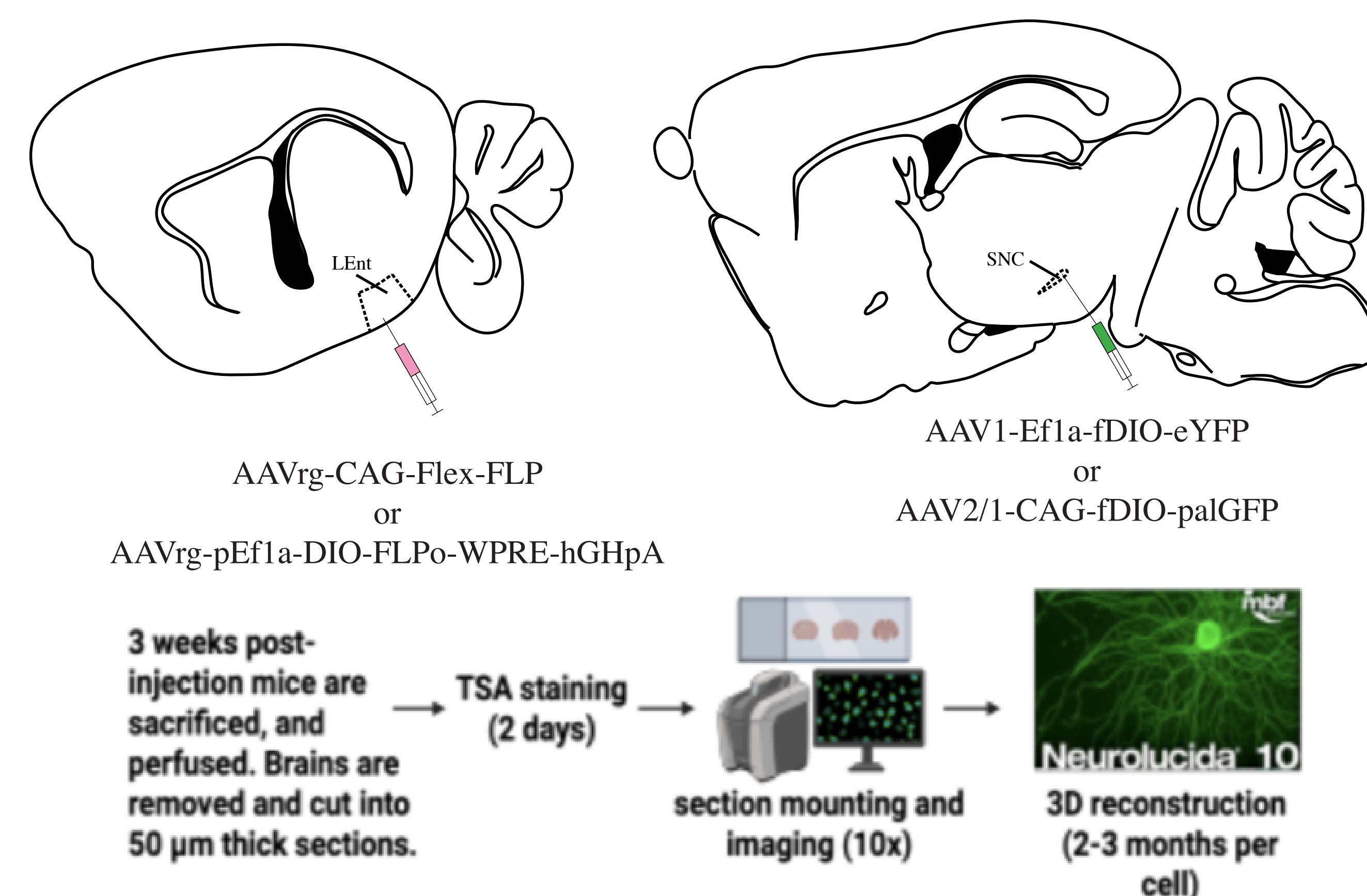


Dopamine axon activity was greatly reduced

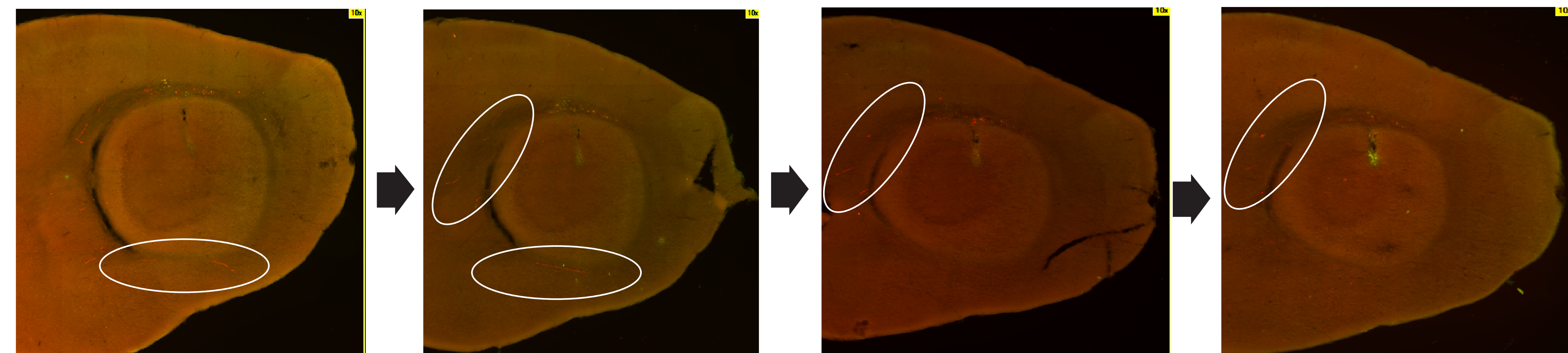


Are these projections from a shared or distinct neuronal population, and what is the full range of brain regions innervated by these LEC-projecting dopamine neurons?

2.1. Method: Injection & Processing

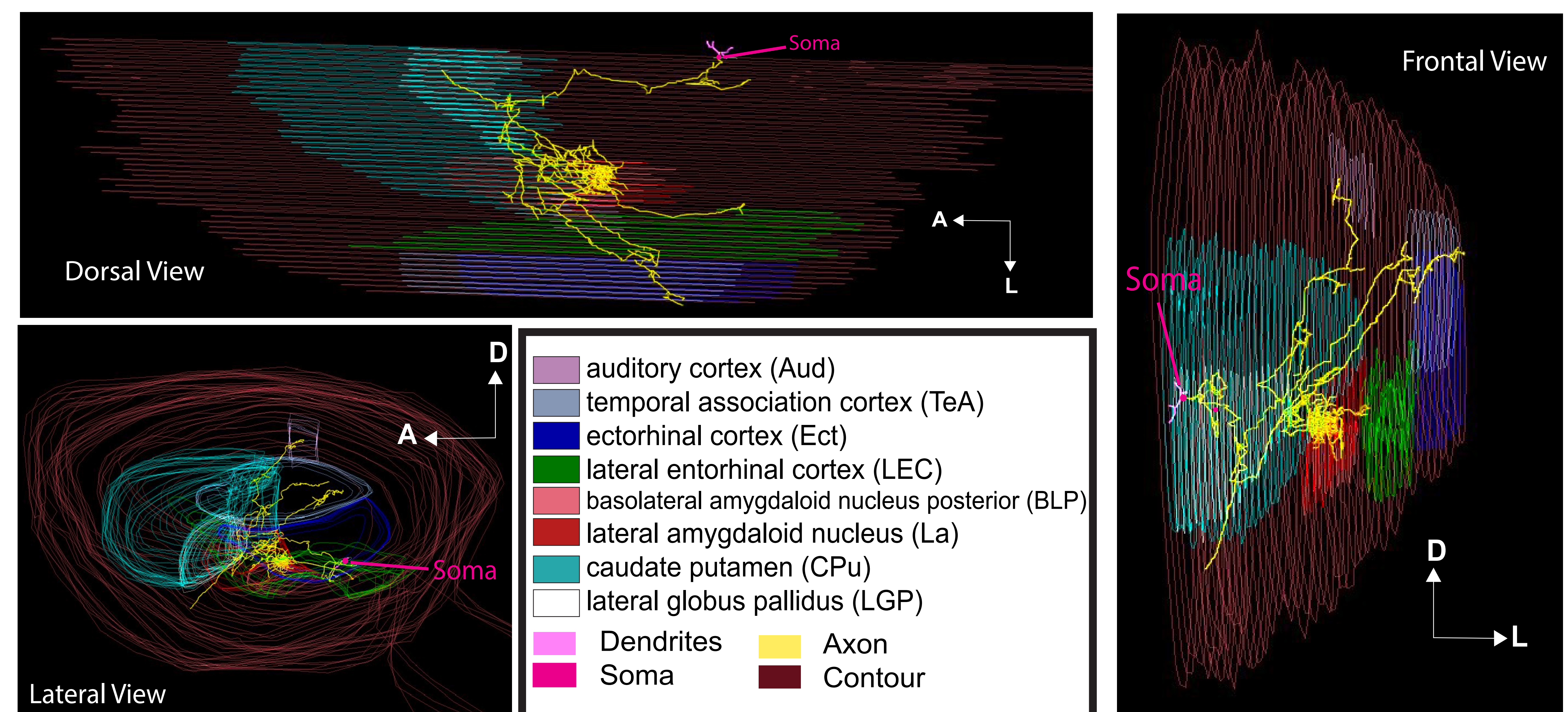


2.2. Method: Reconstruction



Four consecutive brain sections used for the reconstruction are shown. The axons circled in white are segments that were connected together in the tracing.

3. Single cell 3D reconstruction



4. Conclusion and Discussion

- LEC-projecting dopaminergic neurons form extensive pathways through multiple brain regions, suggesting integrative roles in emotion, sensory processing, and associative memory.
- Unlike the classical nigrostriatal motor pathway, these neurons target limbic and cortical areas, implying distinct non-motor functions related to memory and emotional regulation.
- Given the LEC's early involvement in Alzheimer's disease, this pathway may shed light on how dopaminergic dysfunction contributes to cognitive decline and disease progression.
- Ongoing work includes more single cell tracings and in-vivo stimulation in transgenic mice to map and functionally validate the dopaminergic networks projecting to the LEC.