

This Week in The Journal

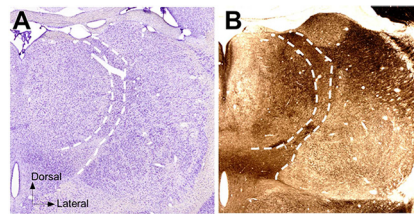
Insights into How Deep Brain Stimulation Restores Arousal and Awareness

Paulo L. A. G. Morais, Pablo Rubio-Garrido, Ruthnaldo M. de Lima, Angélica Córdoba-Claros, Expedito S. de Nascimento Jr., et al.

(see pages 7812–7821)

Deep brain stimulation (DBS) of the central thalamus of humans and nonhuman primates alike significantly alters consciousness and awareness, even in brain-damaged patients with low levels of consciousness. However, very little is known about the neural mechanisms underlying these effects. To investigate the circuit mechanisms mediating DBS facilitation of consciousness and arousal, Morais et al. labeled the axons of neurons in the central thalamus (CT) in marmosets of both sexes and analyzed their extensions into the cerebral cortex and striatum. They found that some CT neurons targeted frontal, posterior parietal, and cingulate cortices, while others targeted primarily the dorsal striatum. Thus, CT houses neuronal subtypes that engage nodes of the brain regulating attention, executive control, and working-memory networks. This work stands in support of

previous findings demonstrating that activity in these networks is required for consciousness and strengthens our understanding of why DBS of CT can effectively treat some brain-damaged individuals.



A multilabeling technique was used to delineate thalamic nuclei in the marmoset. **A, B**, These images display coronal sections containing the injection deposit of an axon tracer targeting the CT (indicated within the dashed lines) stained with either cresyl violet (**A**) or acetylcholinesterase (**B**). CT neuron axons extend into the cerebral cortex and striatum. See Figure 1 for more information.

Alzheimer's and Aging Separately Contribute to Brain Network Damage

Ziwei Zhang, Micaela Y. Chan, Liang Han, Claudia A. Carreno, Ezra Winter-Nelson and Gagan S. Wig

(see pages 7879–7892)

Cognitive dysfunction that occurs due to Alzheimer's disease (AD) is thought to be a consequence of large-scale brain network damage. But aging in and of itself can contribute to brain network alterations. Even among those suffering from AD, dementia severity and its impact are highly variable. Herein, Zhang et al. analyzed brain images of 275 cognitively impaired AD individuals and 326 control subjects to evaluate whether brain network damage due to AD and age is distinguishable or overlapping. They found that while there is some overlap, the two are indeed dissociable: aging altered brain networks enabling higher-order cognitive abilities, and dementia severity impacted not only those networks but also sensory and motor networks. Interestingly, they also found that dementia-related changes were observed even in the absence of amyloid, which is a protein that contributes to AD when it builds up and creates plaques. This suggests that network functionality is independent of this AD marker. These findings refine our current understanding of AD-related and AD-unrelated brain network damage.

This Week in The Journal was written by Paige McKeon
<https://doi.org/10.1523/JNEUROSCI.twij.43.46.2023>