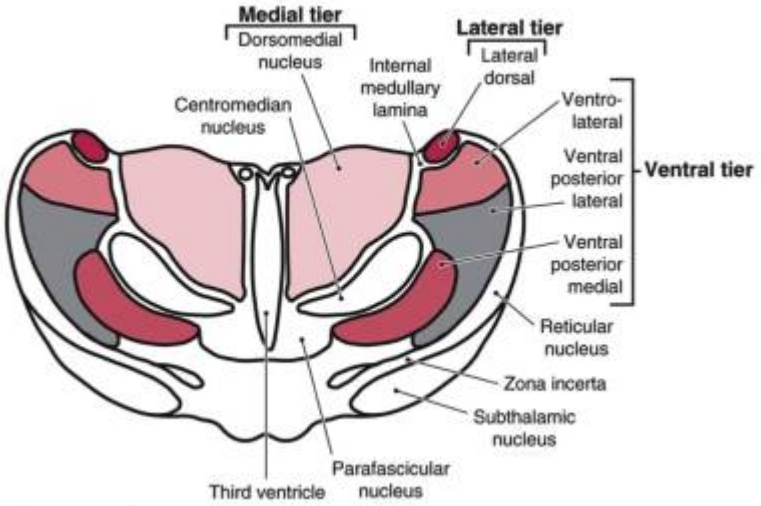
Zona incerta



The zona incerta is a horizontally elongated region of gray matter cells in the subthalamus below the thalamus. Its connections project extensively over the brain from the cerebral cortex down into the spinal cord.

Its function is unknown, though several potential functions related to “limbic–motor integration” have been proposed, such as controlling visceral activity and pain; gating sensory input and synchronizing cortical and subcortical brain rhythms. Its dysfunction may play a role in central pain syndrome. It has also been identified as a promising deep brain stimulation therapy target for treating Parkinsons Disease.

The existence of the zona incerta was first described by Auguste Forel in 1877 as a “region of which nothing certain can be said”.

A hundred and thirty years later in 2007, Nadia Urbain and Martin Deschênes of Université Laval noted that the “zona incerta is among the least studied regions of the brain; its name does not even appear in the index of many textbooks.

Noninvasive detection of the ZI and surrounding region could be critical to further our understanding of this widely connected but poorly understood deep brain region and could contribute to the development and optimization of neuromodulatory therapies.

Lau et al. demonstrated that high resolution (submillimetric) longitudinal (T1) relaxometry measurements at high magnetic field strength (7 T) can be used to delineate the ZI from surrounding white matter structures, specifically the fasciculus cerebellothalamicus, fields of Forel (fasciculus lenticularis, fasciculus thalamicus, and field H), and medial lemniscus. Using this approach, they successfully derived in vivo estimates of the size, shape, location, and tissue characteristics of substructures in the ZI region, confirming observations only previously possible through histological evaluation that this region is not just a space between structures but contains distinct morphological entities that should be considered separately. Our findings pave the way for increasingly detailed in vivo study and provide a structural foundation for precise functional and neuromodulatory

investigation [1].

Zona incerta stimulation

see Zona incerta stimulation.

1)
Lau JC, Xiao Y, Haast RAM, et al. Direct visualization and characterization of the human zona incerta and surrounding structures [published online ahead of print, 2020 Jul 17]. Hum Brain Mapp. 2020;10.1002/hbm.25137. doi:10.1002/hbm.25137