Abstract:

Three patients with the clinical diagnosis of Wallenberg's syndrome caused by acute unilateral ischemic infarctions, which included the vestibular nucleus in the medullary brain stem and afferent vestibular pathways, were examined by positron emission tomography (PET) during caloric vestibular stimulation. They all had typical signs of vestibular dysfunction such as transient rotatory vertigo with vomiting at the onset, ipsiversive body and ocular lateropulsion, and a complete ocular tilt reaction with tilts of the subjective visual vertical. Compared with healthy volunteers, who show activation in a network of temporoparietal vestibular areas within both hemispheres, especially in the posterior insula and retroinsular region that contains the human homologue of the parietoinsular vestibular cortex (PIVC) in monkeys, the activation pattern of the patients with Wallenberg's syndrome was typically changed. During caloric irrigation of the ear ipsilateral to the side of the lesion, they showed no or significantly reduced activation in the contralateral hemisphere, whereas the activation pattern in the ipsilateral hemisphere appeared "normal." These results are compatible with bilateral ascending vestibular pathways from the vestibular nuclei to the vestibular cortex. The novel finding in all three patients was that the activation patterns were compatible with the
assumption that only the crossing fibers from the medial vestibular subnucleus to the contralateral medial longitudinal fascicle were affected, but the ipsilateral vestibular thalamocortical projections via the superior vestibular subnucleus were spared. Thus, the activation pattern in the PET study may reflect the vestibular tonic imbalance within the vestibular nuclei circuitry at the cortical level.