

* The evaluation of a rhythmic exercise program for PD

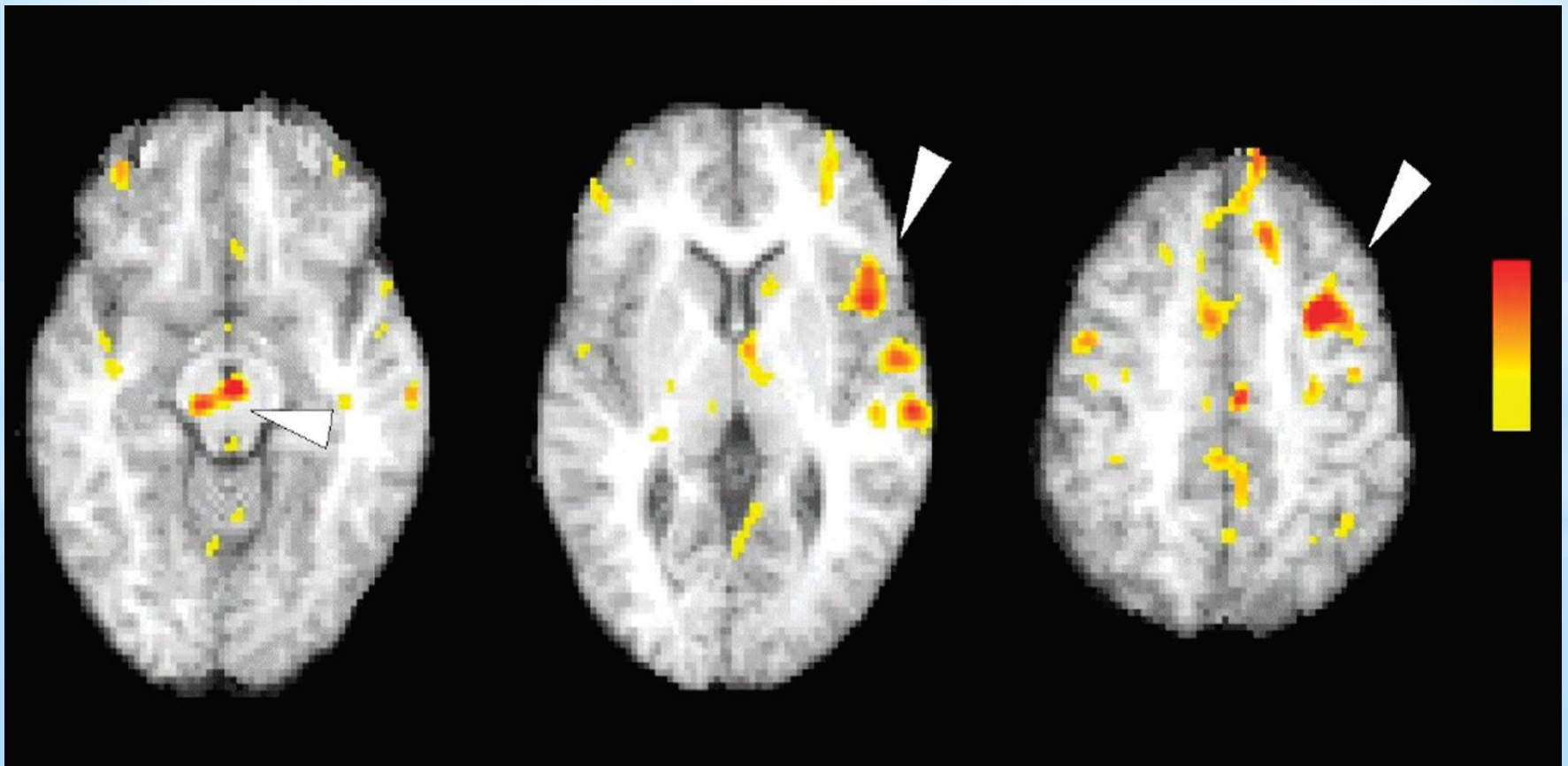
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* Rhythmic music: Regulate attention, sensory involvement (Myskja, 2012)



* Different types of music involve different brain regions (Thaut, 2009)



- *Vaynman S, Gomez-Pinilla F. License to run: exercise impacts functional plasticity in the intact and injured central nervous system by using neurotrophins. *Neurorehabilitation Neural Repair* 2005;19:283-95.
- *Li F et al. Tai Chi and Postural Stability in Patients with Parkinson's Disease. *N Engl J Med* 2012; 366:511-519.

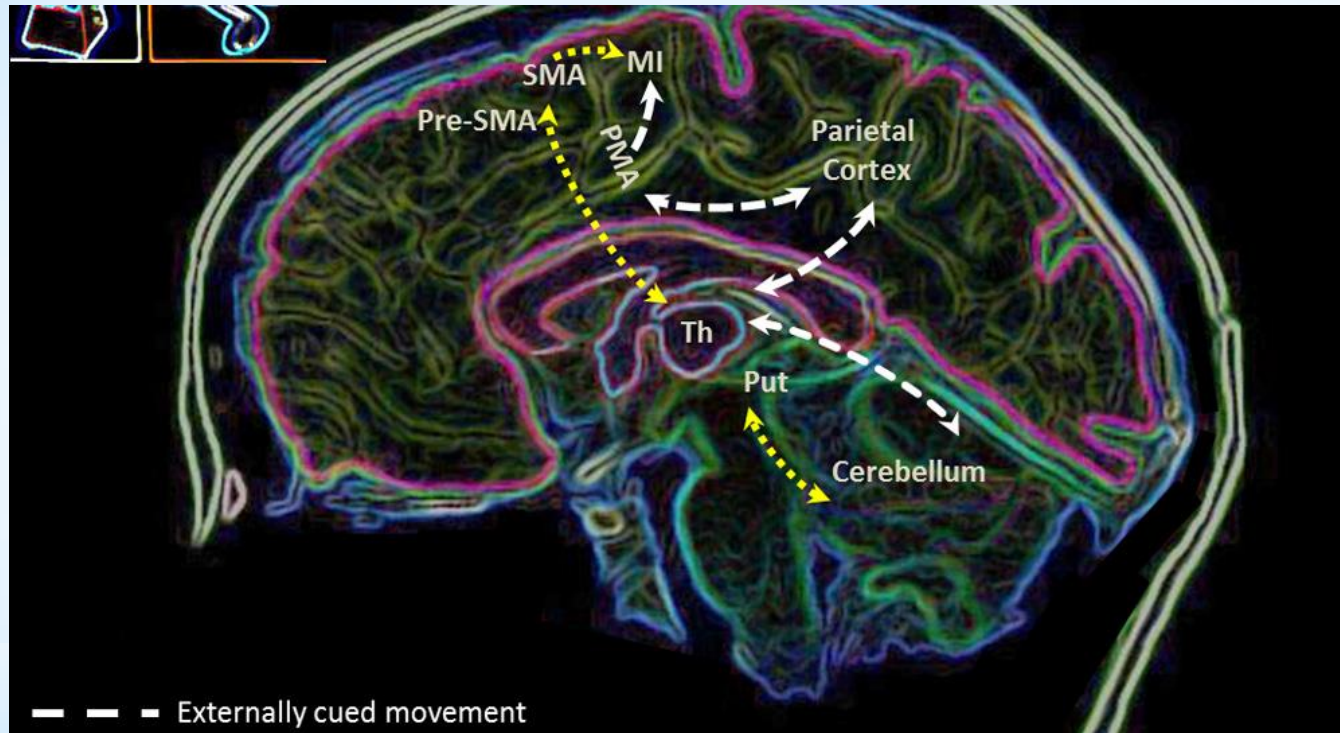
***Exercise - research**

- * Rossignol S, Melvill-Jones G (1976). Audio-spinal influences in man studied by the H-reflex and its possible role in rhythmic movement synchronized to sound. *Electroencephalography and Clinical Neurophysiology*, 41, 83-92.
- * Thaut, M. H. (2006). Rhythm, music and the brain - scientific foundations and clinical applications. New York: Routledge.

* Rhythmic music-based exercise

- * Nombelaa C et al. Can rhythm influence Parkinson's disease? Neuroscience and Biobehavioral Reviews 2013
- * Arias P. Cudeiro J. Effect of rhythmic auditory stimulation on gait in Parkinsonian patients with and without freezing of gait. PLOS One 2010

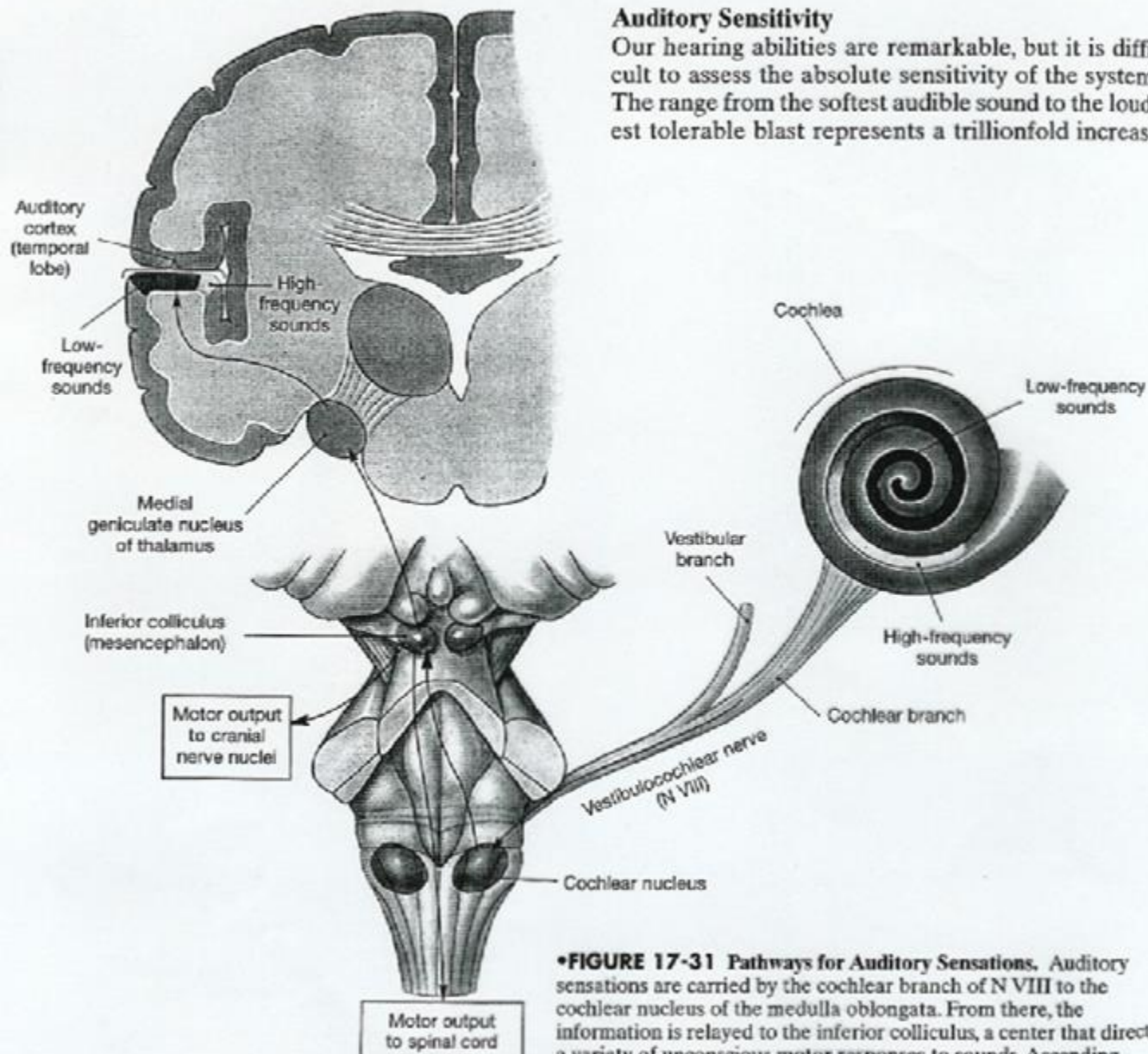
* Rhythmic auditory stimulation



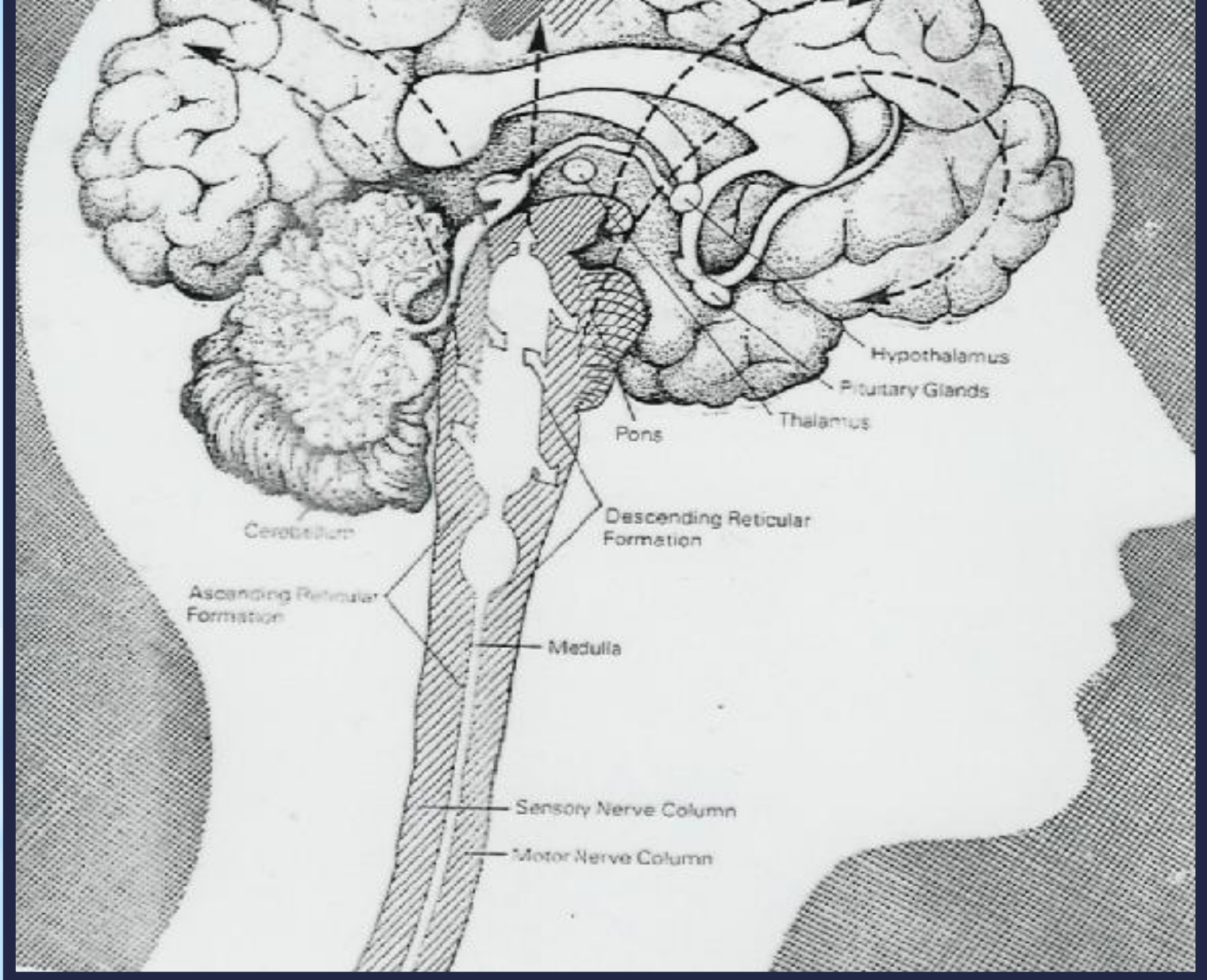
* Cueing: Auditory-motor pathways

Auditory Sensitivity

Our hearing abilities are remarkable, but it is difficult to assess the absolute sensitivity of the system. The range from the softest audible sound to the loudest tolerable blast represents a trillionfold increase

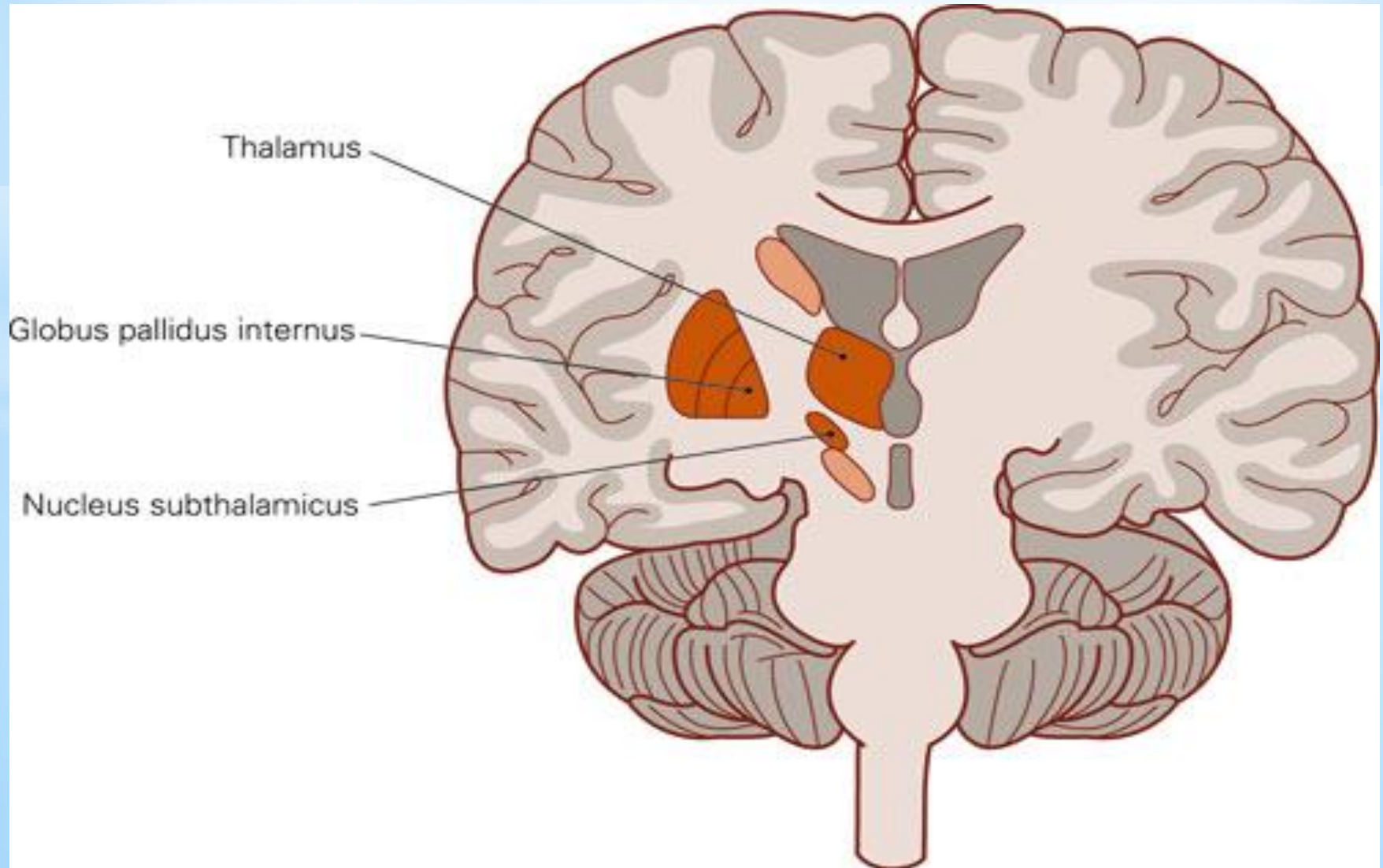


•FIGURE 17-31 Pathways for Auditory Sensations. Auditory sensations are carried by the cochlear branch of N VIII to the cochlear nucleus of the medulla oblongata. From there, the information is relayed to the inferior colliculus, a center that directs a variety of unconscious motor responses to sounds. According



RAS – regulate mood/arousal

* Spinothalamic reflex: E-motion



* Rhythmic exercise program Levanger region, Norway Norwegian Parkinson Union

* 2011-16 (ongoing)

* n=43 2011 Levanger n=20; Oslo region n=23);
n=40 2015 Levanger n=23; Oslo region n=17)

* Age 69.2 yrs (53-83), M/F 63/37 %, 5,7 yrs
since diagnosis (0-26 yrs), H & Y 2.2 mean

* 1 x/w; 1 hr duration

- * Flexible approach to exercise plan: Fixed initial exercise program; dialogic evolution of program:
- * 45 min movements continually less effect, compliance and motivation than movements, voice exercises and relaxation
- * Rhythmic movements (RAS principles) involving large joints, diagonal, sagittal/frontal/transversal plane
- * Series of 14 vertical, 12 horizontal, DVD and instructor

*** Exercise principles**

- *Planned controlled study; attrition of control group
- *Mixed evaluation methods, quantitative and qualitative, 1/yr
- *Quantitative: H & Y, UPDRS (cognitive, motor, ADL), PDQ-39, FES-1, TUG, Senior fitness, MADRS, Herth Hope Index, Motivation self-rating, thorax excursion
- *Qualitative: Interviews (EPICURE; Malterud et al.), video analysis, peer group, professional group

*Design

- * General mobility stable (TUG, PDQ-39, 2 min knee elevation), UPDRS decrease (statistically non-significant)
- * Discrepancy between objective tests and subjective evaluation: Increased fear of falling
- * Reduced pain and fatigue
- * Depression low; improved mental state (MADRS, PDQ-39, Herth; interviews)
- * Voice exercise program stabilizes voice function

*** Preliminary results**

- * Attrition prevented when program individually adjusted, avoiding rigid structure and lack of structure
- * FES1 increased, but not incidence of falls
- * Individually adjusted exercises prevent falls
- * Group participation improves wellbeing, activity and motivation
- * Non-participants rapid progression of symptoms
- * Individual variations in progression linked to degree of home training

*** Points to notice**

- * Rhythmic exercise stabilizes gait (stride length, cadence, symmetry), mobility, and flexibility
- * Rhythmic exercise may decrease pain, fatigue and prevent falls
- * A flexible and dialogic evolution of exercise programs prevents attrition and improves long-term exercise motivation
- * Group training improves long-term exercise motivation and may contribute to coping with long term disease
- * A low incidence of depression and other mental/emotional complaints may be linked to group exercise program

* **Conclusion**