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REPORT CARD

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The structure called the lateral lemniscus is part of the central auditory nervous system, together with the cochlear nuclei, the superior olivary complex, the inferior colliculus, the medial geniculate body, the subcortex, and the auditory cortex. In this newsletter, the focus is on understanding what we know specifically about the lateral lemniscus.

However, it is worth recalling a bit of anatomical history. What is a lemniscus? The term lemniscus is derived from the Greek word "lēmniskos" which refers to a flattened bundle of fibers.

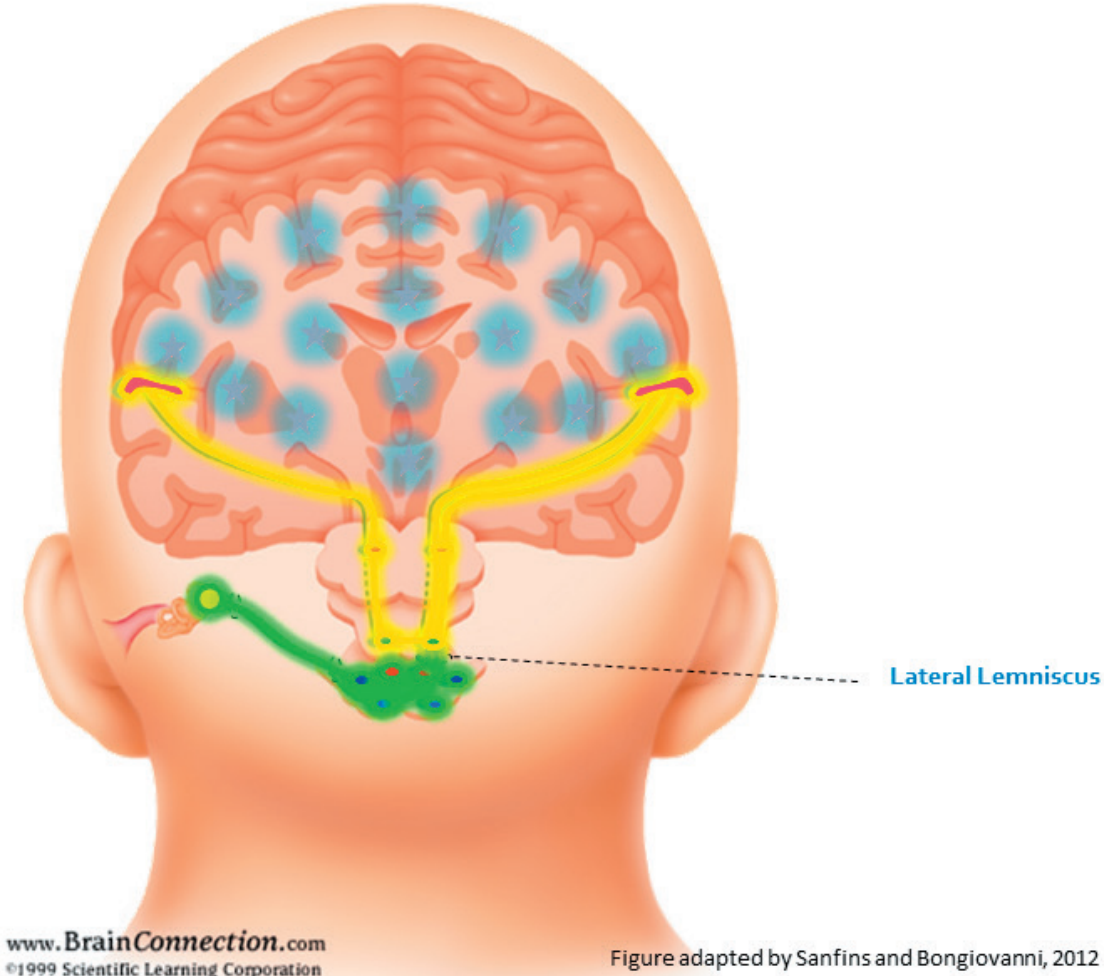

Figure adapted by Sanfins and Bongiovanni, 2012

The lateral lemniscus was first observed and described in the literature around the 18th century, when a structure was identified in the bridge region which was subdivided into three nuclei: (i) the ventral nucleus of the lateral lemniscus (VNLL); (ii) the lateral nucleus of the lateral lemniscus (LNLL); and (iii) the intermediate nucleus of the lateral lemniscus (INLL).

What is the role of the lateral lemniscus? Although there have been many years of study, oddly enough little is known. So far, it has been established that the lateral lemniscus passes on information decoded by preceding structures. Simply put, the lateral lemniscus is a "messenger" which passes information from the anterior to the posterior part with absolute precision.

Sanfins, Pelaquim and Skarzynsky, 2021

Thus, the lateral lemniscus is an important structure that conducts auditory information to the highest point of the central auditory nervous system. There are several theories about the tasks performed by each of the VNLL, LNLL, and INLL. The most accepted are described below.

LATERAL LEMNISCUS NUCLEI		
NVLL	**LNLL**	**INLL**
Processes monaural auditory information	Processes monaural auditory information	Processes monaural auditory information
Largely reflects the frequency tuning of lower-level neurons	Gives a complete tonotopic representation	Largely reflects the frequency tuning of lower-level neurons
Amplifies the perception of different frequencies	Suppresses sound sources in competing environments	Cross-frequency integration
Responds to short-duration stimuli	Responds to short-duration stimuli	Responds to short-duration stimuli
Frequency integration to increase spectral domain accuracy	Acts as a temporal filter able to attenuate interaural time differences	Accurately decodes the start time of a sound stimulus
Transmits intensity and duration information		Transmits intensity and duration information

The lateral lemniscus must be distinguished from the medial lemniscus, even though the two fiber bundles are located in the brainstem region, since they have different functions. Furthermore, a unilateral lesion in the lateral lemniscus often doesn't cause significant hearing loss or other effects, since the tracts are bilateral and the side opposite to the affected one can still function, minimizing the effects of any damage.

Finally, information processed in the lateral lemniscus is forwarded to the inferior colliculus where new assignments and information processing are carried out.
But that's another story for an upcoming newsletter!

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