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REPORT CARD



**AUDITORY
ELECTROPHYSIOLOGY
PART 1 - BASIC CONCEPTS**

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AUDITORY ELECTROPHYSIOLOGY

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Electrophysiology is the study of the electrical properties of cells and tissues. Electrophysiology is a science within the area of neuroscience and physiology which involves the measurement of ion flow, more specifically, the electrical potentials of neurons.

Neurons communicate through synapses. Communication between neurons does not occur through direct contact between one neuron and another; rather, communication takes place between neurons in a space called

the synaptic space, synaptic cleft, or intersynaptic space (figure 1). A neuron releases neurotransmitters - chemical messengers - that pass on information across the synapse to the next neuron. Synapses can take two different forms: electrical synapses or chemical synapses.

THE ELECTRICAL SYNAPSE

works by communicating local currents. The information transmitted by a neuron is passed on fully to the next neuron, so there is no loss of information. The electrical synapse allows information to be passed on quickly, almost instantly; however, if there is to be no risk of information loss, the quality of the

presynaptic neuron is extremely important. Briefly, the effectiveness of the electrical synapse is related to the quality of the presynaptic neuron, the speed of transmission of neuronal information, as well as the unimpaired participation of neurotransmitters.

THE CHEMICAL SYNAPSE

operates by communicating neurotransmitters that are responsible for transmitting information. A characteristic of this synapse model is that it is based on the most active neurons, that is, information will be transmitted faster in the most active synapses. Consequently, there is a memory of this synaptic response and, thus, the nervous system starts to privilege the activated pathway in the next stimulations. Briefly, the chemical synapse response depends on the frequency of neuron activation, the intensity of activation, as well as the effective participation of neurotransmitters.



Figure 1: Representation of communication between neurons

Electrophysiology is based on measuring neuronal responses. Electrophysiology is widely used in various fields of health science, such as **cardiology, neurology, ophthalmology and audiology.**



This bulletin is devoted to the electrophysiology of hearing, whose first reports appear at the end of the 18th century.

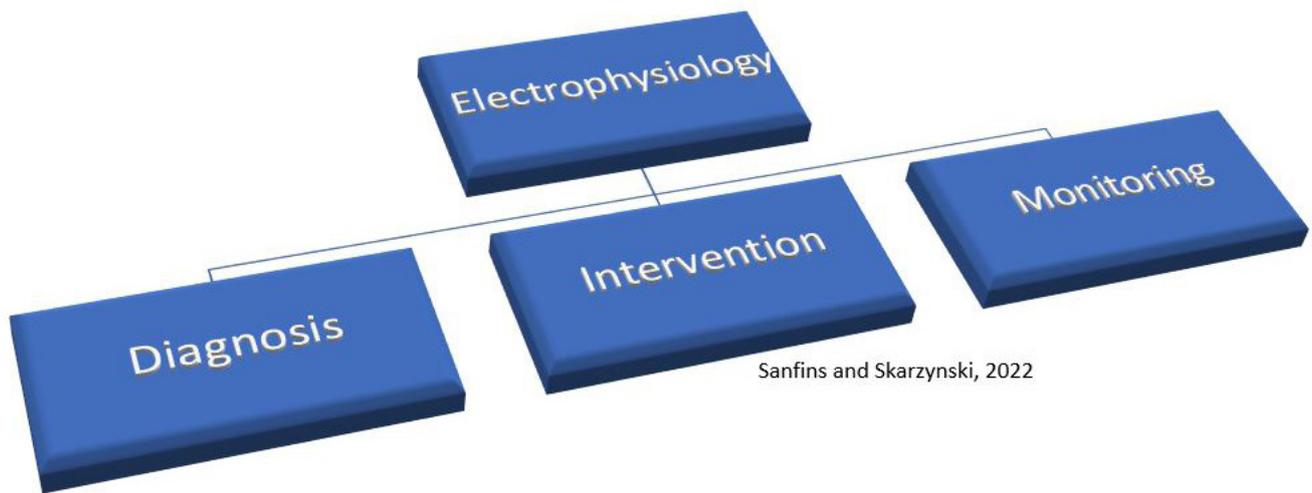
Technological advances and the cheapening of computer systems due to production on an industrial scale made it possible for electrophysiological assessments to be available not only in university centers but also in diagnostic clinics and, thus, their use is now widespread.

Furthermore, it should be noted that electrophysiological procedures are objective assessments, that is, they do not require, in most cases, the active participation of the patient. Compared to objective assessment methods such as magnetic resonance, computed tomography, and single photon emission computed tomography (SPECT), electrophysiological

assessment is, in financial terms, a more accessible procedure.

Electrophysiological assessment, unlike MRI, CT, and SPECT assessments, depends on the integrity of the molecular systems and membranes that are responsible for axon communication and synaptic transmission. Evaluators must be aware that each methodology has its particularities and, depending on the diagnostic purpose, the most indicated and effective procedure should be chosen.

Electrophysiological tools are fundamental in diagnosis, intervention, and monitoring programs for various pathologies.



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The electrophysiology of hearing enables the analysis of the entire auditory trajectory. Each type of procedure allows the analysis of specific areas of the auditory nervous system, which can contribute to understanding the structures and functions involved in the processing of auditory information.

The electrophysiology of hearing and/or auditory evoked

potential consists of analyzing the electroencephalogram responses to sound stimulation (the eliciting stimulus can be different, such as a click, tone burst, or speech, among others) (figure 2).

Stay tuned for our next newsletters, we will come back to this topic that is so important within audiology.

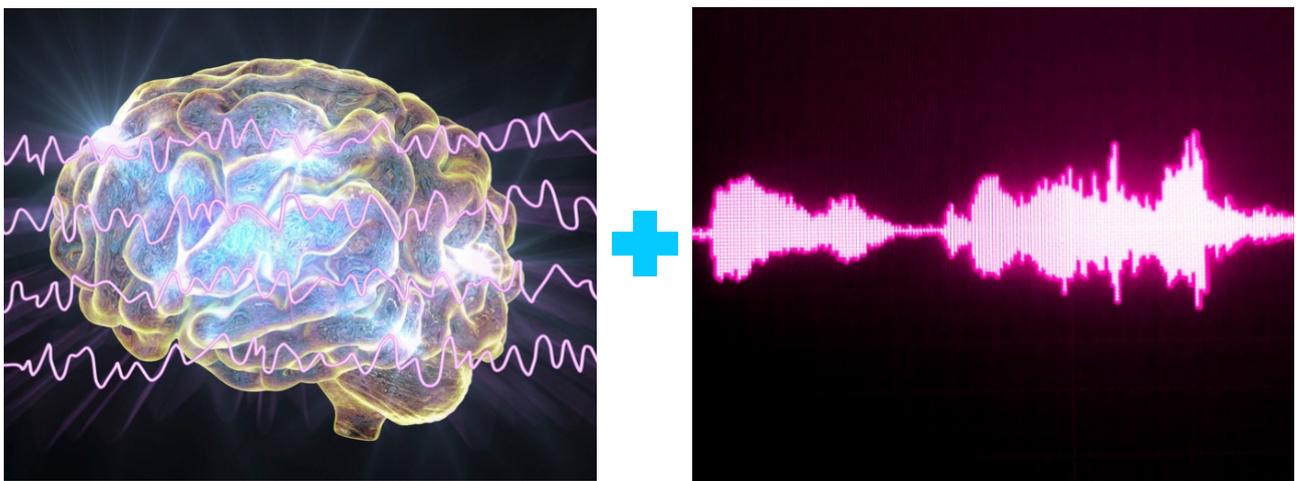


Figure 2: Representation of the electrophysiological assessment of hearing (electroencephalogram + auditory stimulation)

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3) Wikipedia. <https://pt.wikipedia.org/wiki/Eletrofisiologia>. Day of access: 21/01/2022.

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