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EDITORIAL

EEG-EKG, or when 1 + 1 is more than 2

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Although the principles of human electrophysiology were set up by the end of the XIX century, the recording of electrophysiological signals for diagnostic purposes started some decades later. In 1924, Hans Berger discovered the electroencephalography (EEG), while Einthoven was being recognized with the Nobel Prize for the development of the electrocardiogram (EKG). Capturing and recording the spontaneous electrical activity of the cerebral cortex noninvasively from the surface with skin electrodes was developed and widely used thereafter, being epilepsy diagnosis its most frequent application, particularly after the pioneer works of Gibbs & Gibbs.

The inclusion of basic, 2-lead EKG recording in routine EEG studies was initially devoted to help identify some spiky artifacts due to the capture of cardiac signals by cranial electrodes. Gradually, the value of analyzing the covariation of both signals and their clinical correlates aroused the interest of the community of both clinicians and researchers. A sudden and significant increase in the heart rate (HR) during an ictal episode was reported to correlate with an epileptic *versus* psychogenic nature[1], while the lateralizing value of ictal tachycardia or bradycardia has never been fully demonstrated[2,3].

More recently[4], ictal bradycardia and asystole have been described in a subset of refractory epilepsy patients, where the recruitment of autonomic networks by the propagating epileptic discharge stops the heart, and the consequent hemodynamic fall shuts down the seizing activity, finally relieving the central autonomic nervous system from its harmful influence and, in most cases, regaining normal cardiac activity and then, consciousness. This phenomenon, diagnosed on the basis of a simple ictal EEG-EKG co-registration, allows for both new diagnostic and therapeutic decisions.

Finally, understanding the covariation and mutual influence of brain and heart activity regained a prominent position in epilepsy research in the context of sudden unexpected death in epilepsy (SUDEP), an increasingly recognized entity.

Technological advances, from a higher number of recording channels in the EEG equipment to digitalization and post-processing software, were hallmarks in the evolution of multimodal recordings. As the awareness of new challenges to be faced is developed, simple, "old" tools should not be forgotten; it may just be the place for one's ability to pose the proper questions and to review their own beliefs, which may lead to new answers and solutions.

In the following article[5], the additional relevance of a multidisciplinary approach is highlighted, in this case through a more systematic analysis of EKG derived from the interictal simultaneous EEG-EKG recording in epilepsy patients.

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