

Topic Page: [electroencephalography](https://search.credoreference.com/content/topic/electroencephalography)

Summary Article: **electroencephalography**

From *The Columbia Encyclopedia*

(*ĒlĕkˈtrōĕnsĕfˈĒlŏgˈrafĕ*), science of recording and analyzing the electrical activity of the brain. Electrodes, placed on or just under the scalp, are linked to an electroencephalograph, which is an amplifier connected to a mechanism that converts electrical impulses into the vertical movement of a pen over a sheet of paper. The recording traced by the pen is called an electroencephalogram (EEG). Readings may be obtained for a particular brain site by coupling a single electrode with an indifferent, or neutral, lead (monopolar technique) or between two areas of the brain through two independent electrodes (bipolar technique). The combination of impulses that are being recorded at any one time is called a montage.

Brainwave Patterns

The electrical activity of the brain was first demonstrated in 1929 by the German psychiatrist Hans Berger. The scientific professions were slow in giving proper attention to Berger's discovery of the brain rhythms he named alpha waves, but since then at least three other standard brainwave patterns have been isolated and identified. Alpha waves are fast, medium-amplitude oscillations, now known to represent the background activity of the brain in the physically and psychologically healthy adult. They are most characteristically visible during dream-sleep or when a subject is relaxing with eyes closed. Delta waves are large, slow-moving, regular waves, typically associated with the deepest levels of sleep. In children up to the age of puberty the appearance of high-amplitude theta waves, having a velocity between those of alpha and delta rhythms, usually signals the onset of emotional stimulation. The presence of theta waves in adults may be a sign of brain damage or of an immature personality. Beta rhythms are small, very fast wave patterns that indicate intense physiological stress, such as that resulting from barbiturate intoxication.

Uses of EEGs

By observing abnormalities in recordings and determining the area of the brain from which they originate, the physician's ability to diagnose and treat such conditions as epilepsy, cerebral tumor, encephalitis, and stroke, is greatly enhanced. Electroencephalograms have also proven valuable in the general study of brain physiology and in the particular study of sleep. Various types of Eastern meditation, e.g., yoga, use techniques that increase alpha and theta wave activity. Because of concomitant physiological changes during meditation, e.g., lessened anxiety, the techniques have recently become popular in the West. Using EEGs to enhance biofeedback, a subject can be taught to monitor and regulate his or her own brain waves; the technique has been used experimentally in control of epilepsy. EEGs are also used to determine brain death (see death).

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