Limbic Lobe and Limbic System Encyclopedia Article

Limbic Lobe and Limbic System

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Limbic Lobe and Limbic System

The inferior prefrontal areas and perihilar regions of the **brain** cortex of both **cerebral hemispheres** are termed the limbic lobe, or limbic system. The limbic cortex is the oldest part of the **cerebral cortex** and is involved in the neurophysiological processing of emotions, instinctive behavior, and the regulation of **vegetative functions**, such as body temperature, hunger, **thirst**, volume of body fluids, cardiovascular regulation, and the contractibility of smooth muscles. Similar to other cerebral areas, the limbic lobe also presents a modular functional division of subcortical structures such as the portions of the **basal ganglia**, the amygdala, the septum, the anterior nucleus of the **thalamus**, and the paraolfactory, which surround the **hypothalamus**. The limbic cortex involves these subcortical limbic structures in each brain hemisphere and connects this older cortical portion (paleocortex) with the more recent cortex, (neocortex). The hypothalamus and other limbic centers send and receive signals from areas of the brain stem, such as reticular formation and the medial forebrain bundle. The hypothalamus is the main control-center of the limbic system, and is involved in the control of both endocrine and specific vegetative functions of the body, such as cardiovascular regulation, gastrointestinal and feeding regulation, temperature, water (thirst and urine excretion), uterine contractions of labor and birth, and milk ejection from the **breasts**. The hypothalamus also regulates hormonal secretion by the anterior portion of the pituitary gland.

The limbic system structures control behavior-related signals as well, such as satiety and tranquility (ventromedial nucleus), fear, punishment (thin zone of the periventricular nuclei and central gray area of the mesencephalon), and sexual drive (hypothalamus). Some other limbic areas also control reward and punishment sensations. The medial forebrain bundle in the lateral and ventromedial nuclei of the hypothalamus is associated with reward, although over-stimulation of the lateral nucleus can cause rage. The central gray area around the aqueduct of Sylvius and the periventricular zones of the hypothalamus and the **hippocampus** area associated with punishment sensations.