

PONS

Although other regions are involved in REM sleep generation and control, the pons is clearly the brain region most critical for REM sleep control (see Figure 1; see also REM SLEEP MECHANISMS AND NEUROANATOMY). The pons is defined by a bulge at the bottom of the brainstem called the basilar pons, which contains the main connection between the brainstem and the cerebellum (a brain region that helps to control movement and posture). The brain substance within the midbrain, pons, and medulla is called *reticular formation*, meaning a net of neuronal cell bodies and axons (output fibers from neuronal cell bodies). Within the reticular formation of the pons are a number of clusters of neuronal cell bodies called *nuclei*.

Intense research interest in the pons has resulted in a very detailed naming scheme for its parts. The main pontine nuclei are called the nucleus reticularis pontis oralis (RPO; i.e., the pontine reticular region nearer the mouth) and the nucleus reticularis pontis caudalis (RPC; i.e., the pontine reticular region nearer the tail).

At the top of the pons is a pigmented region called the locus coeruleus ("blue place"). The locus coeruleus contains neurons that have the neurotransmitter norepinephrine, similar to adrenalin. Regions just below this area (the sub-coeruleus) also contain norepinephrine. On the midline of the pons, as well as the midbrain and medulla, are the raphe (Greek for "seam") nuclei. These cells contain the neurotransmitter serotonin.

Just lateral to the locus coeruleus is the brachium conjunctivum. This is a major connection between the cerebellum and the rest of the brain. The areas around the brachium and medial to it contain concentrations of cells containing the transmitters acetylcholine and glutamate.

The interaction of these cell groups and transmitters, particularly norepinephrine, serotonin, acetylcholine, and glutamate, is believed to play

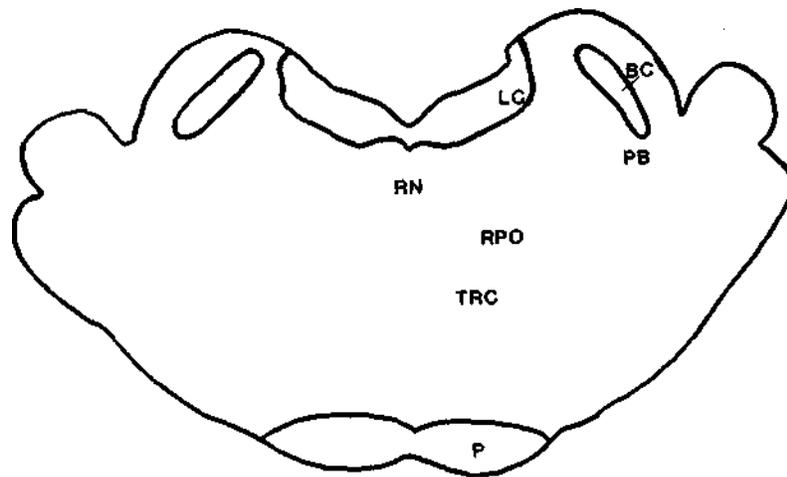


Figure 1. A cross section of the pons. BC, brachium conjunctivum; LG, locus coeruleus; P, pyramidal tract; PB, parabrachial nucleus; RPO, nucleus reticularis pontis oralis—just behind this level (towards the spinal cord) is the nucleus reticularis pontis caudalis; TRC, tegmental reticular nucleus, central division.

a major role in the generation of REM sleep and to control the level of arousal in waking (see REM SLEEP MECHANISMS AND NEUROANATOMY).

REFERENCE

Siegel JM. 1989. Brainstem mechanisms generating REM sleep. In Kryger MH, Roth T, Dement WC, eds. *Principles and practice of sleep medicine*, pp 104-121. Philadelphia: Saunders.

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