Efferent control in mammalian hearing

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The mammalian auditory sense organ, the cochlea, receives an array of descending inputs originating in the brainstem superior olivary complex. This so-called olivocochlear pathway, first described in the mid 1900's (Rasmussen, 1946; Galambos, 1956) receives synaptic inputs from ascending auditory afferents and from descending tracts arising from a number of cortical and subcortical locations (Robertson & Gummer, 1985; Mulders & Robertson, 2000). The olivocochlear pathways have been shown to utilize a variety of neurotransmitter systems to alter the function of receptor cells and primary afferent neurons, but despite many years of study, their functional role in hearing is still much debated. Suggested functions have included feedback regulation of cochlear physiology, in particular micromechanical gain and afferent spontaneous firing rates (Patuzzi, 2002), protection from damaging effects of loud sounds (Cody & Johnstone, 1982; Rajan, 1995), interaural sensitivity adjustment associated with sound localization processes (Darrow *et al.*, 2006), and enhanced signal discrimination in noise (Winslow & Sachs, 1988). The evidence for these various roles in both human and animal experiments is inconclusive, but recent work on human subjects lacking selected intracochlear targets of the efferents, supports the signal discrimination in noise hypothesis.

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