Sample Abstract

Physiological inputs from the inferior colliculus to the cochlear nucleus in Guinea Pig. First A Author*, Second B Author and Third C Author. Department of Neuroscience, University of Manitoba. mnn@sbrc.ca

The inferior colliculus (IC) is an obligatory synaptic station along auditory pathways and is involved in processing both ascending and descending information about sound stimuli. A major segment of the descending auditory pathway from the IC includes projections to the cochlear nucleus (CN). The physiological properties of descending inputs from IC to the CN cells are not known. The objective of the present experiments was to characterize the effects exerted by IC projections onto CN neurons using the in vitro isolated whole brain preparation of the guinea pig. The synaptic responses to electrical stimulation of the inferior colliculi were recorded intracellularly from identified (stained) neurons of the CN (n=28). Stimulation of the ipsilateral (ICi) and contralateral (ICc) inferior colliculus influen-ced a majority of recorded cells (86% and 75% respectively) in all three CN subdivisions (anteroventral, posteroventral and dorsal). Activation of ICi and ICc induced either excitatory (EPSP) or inhibitory (IPSP) synaptic responses, whereas mixed responses were very rare. In addition, ICc stimulation evoked antidromic activation of some neurons. IPSPs were the more frequently observed type of synaptic responses and represented 72% and 80% of responses evoked by ICc and ICi stimulations, respectively. The latencies of synaptic potentials ranged from 3.6 - 10.5 ms, suggesting predominant involvement of di- and trisynaptic pathways. Fastest EPSPs had shorter latencies than fastest IPSPs, possibly indicating more direct excitatory inputs than inhibitory ones. These data suggest that excitatory transmission to CN cells operate through direct IC projections to CN, whereas inhibitory responses could be mediated by indirect IC pathway via periolivary nuclei neurons projecting to CN.
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