

Effects of olivocochlear efferent activation on responses of single inferior colliculus neurons to tones in noise

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The olivocochlear efferent pathway in mammals acts to suppress primary sensory neuron responses to low level sounds and has been shown to improve the responses of these neurons to narrow band signals in the presence of low level background noise. However, central auditory pathways are extremely complex and in addition, the olivocochlear neurons are known to send excitatory collaterals to brainstem neurons. Hence it cannot be assumed that the improvements in signal processing in noise seen for primary neurons are simply translated to higher centres. We have investigated this issue using single neuron recordings in the inferior colliculus of anaesthetized guinea pigs (30mg/kg of intraperitoneal Sodium Pentobarbitone and 0.15ml of intramuscular Hypnorm), with and without electrical stimulation of the olivocochlear efferent system. In many neurons olivocochlear activation causes effect on responses to tones alone that can be simply interpreted as resulting from changes at the primary neuron level. Furthermore, the responses of many inferior colliculus neurons to tones in noise are enhanced by olivocochlear activation as would be predicted on the basis of effects in primary neurons. However, in other neurons, effects could not be so explained, showing either additional suppression, or even marked excitatory effects that must result from a complex interplay between changed afferent input and central circuitry.