

## Oral 21-1

### TEMPORAL AND ENTRAINMENT RESPONSE PROPERTIES OF ANTEROVENTRAL COCHLEAR NUCLEUS NEURONS TO INTRA COCHLEAR ELECTRICAL STIMULATION IN THE CAT

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Frequency coding within the central auditory system involves both spatial and temporal components. The temporal coding of sound is based on the phase or time locked neural response seen to low frequency acoustic stimuli. The ability of neurons to respond in a sustained time locked manner will determine the degree of encoded temporal frequency information. Single unit electrophysiological studies have shown that the degree of response synchrony to charge-balanced biphasic electrical stimuli is far greater than that seen to acoustic stimuli. Understanding temporal coding to electrical stimulation in cochlear implant patients is important for the development of speech processing strategies. This study has therefore investigated the temporal and entrainment response properties of single units in the anteroventral cochlear nucleus (AVCN) in the cat to rates of electrical stimulation between 200 and 800 pulses/s (pps). Six adult cats were anaesthetised with pentobarbital sodium (Nembutal; 45 mg/kg) I.P. and maintained with supplemental doses I.V. Following a dorsal exposure of the AVCN, animals were unilaterally implanted with a feline version of the Melbourne/Cochlear scala tympani electrode array. Single unit responses were recorded through KCl filled micropipettes advanced dorsoventrally through the AVCN. Following acoustic characterisation of isolated units, the responses to electrical stimuli at 200, 400, 600 and 800 pps over a 0 to 34 dB (re 1  $\mu$ A) intensity range were recorded. Input-output functions at set intervals throughout the 50ms burst of biphasic stimuli for 12 primary like units with characteristic frequencies between 0.4 and 20.0 kHz revealed a sharp decrement in response rate with increased stimulus rate from the onset time of each burst. This decrease in the response entrainment was also accompanied by a change in the temporal response synchrony. These data suggest a possible decrease or loss in the coding of temporal information for implant patients receiving high rate electrical stimulation.



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