E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

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im Raum W2 1-143, Universität Oldenburg

und im Raum G26.1 – 010, Rechenzentrum
der Universität Magdeburg (per Videoübertragung)

“Stimulus-specific adaptation to frequency and intensity in the auditory thalamus”

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Mismatch negativity (MMN) is a cortical evoked potential associated with changes in sound parameters e.g. frequency, intensity or duration. Stimulus-specific adaptation (SSA), the phenomenon whereby a neuron responds more strongly to a rarely presented (deviant) stimulus than to the same stimulus when it is commonly presented (standard), has been proposed as a neuronal correlate of MMN. Previous studies did not observe SSA to frequency in the auditory thalamus (Ulanovsky et al. 2003, Ulanovsky et al. 2004). However, those thalamic studies used stimuli presented at relatively long repetition rates, and did not specify the recording location within the auditory thalamus. To establish whether these factors obscured thalamic SSA to frequency, we recorded extracellularly from the medial geniculate body (MGB) of the anaesthetised mouse. Recording sites were assigned to each of the three major MGB subdivisions (ventral, dorsal and medial MGB) using posthoc histology. Using sequences of standard (80%) and deviant (20%) tones which differed in frequency by no more than 0.5 octave, and were presented at interstimulus intervals of 400, 500, and 800 ms, we found significant SSA to frequency primarily in the medial MGB, but also to a lesser degree in the ventral MGB. SSA was present at all three stimulus presentation rates. Thalamic frequency SSA was evident from the earliest onset of tone-evoked activity. In addition, since if SSA is related to MMN it would be expected to occur for a range of sound parameters in some central auditory neurons, we tested neurons in the mouse MGB for SSA to sound intensity as well as to frequency. Here, sequences of standard (90%) and deviant (10%) pure tone stimuli (intensity difference <20 dB) or broadband noise (intensity difference <25 dB) were presented at 2 Hz. We did not observe significant SSA to intensity when presenting pure tone stimuli, even in those neurons which showed SSA to frequency. Conversely, when using broadband noise we saw significant SSA to intensity in a small population of MGB neurons (4%, $p<0.01$), even when controlling for the average power of the stimulus (10%, $p<0.01$). These neurons did not necessarily exhibit SSA to frequency. Overall, these results demonstrate that SSA to frequency is present at subcortical levels, primarily in, but not restricted to, the non-lemniscal auditory pathway. SSA in the mouse may also be elicited by intensity deviants suggesting that adaptation mechanisms are sensitive to more detailed stimulus statistics.