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Neuroscience 2003 Abstract

Presentation Number: 582.10**Abstract Title:** Involvement of electrical signalling in theta frequency oscillations generated in the medial septum/diagonal band of Broca *in vitro*.**Authors:** **Garner, H. L.*¹** ; Racca, C.¹ ; Buhl, E. H.¹ ; Henderson, Z.¹¹Sch. of Biomed. Sci., Univ. of Leeds, Leeds, United Kingdom**Primary Theme and** Synaptic Transmission and Excitability**Topics** - Synaptic Transmission

-- Postsynaptic mechanisms: Inhibitory

Session: 582. Postsynaptic Mechanisms: Inhibitory II
Poster**Presentation Time:** Tuesday, November 11, 2003 9:00 AM-10:00 AM**Location:** Convention Center Exhibit Hall, Poster Board E1**Keywords:** gap junctions, Theta , Medial septum/diagonal band of Broca

Theta frequency (4 – 15 Hz) extracellular field activity can be reliably and repeatedly evoked in the medial septum/diagonal band of Broca (MS/DB) *in vitro* by the application of kainate. We have previously demonstrated a critical role for inhibitory neurotransmission in the maintenance of this activity and presented data that indicates parvalbumin GABAergic neurons are responsible for pacing rhythmic theta activity in the MS/DB. Evidence of functional electrical coupling between GABAergic interneurons has been reported in the hippocampus and neocortex and it has recently become clear that gap junctions may have a significant function in the generation of neuronal population activity. Here we demonstrate that application of the gap-junction uncoupling agent carbenoxolone causes a significant reduction ($P < 0.05$, Paired T test) in the kainate induced activity recorded at theta frequency (spectral integral in 4-15 Hz range) in the MS/DB slice *in vitro*.

MS/DB slices were prepared from male Wistar rats (21 days), which were terminally anaesthetised with pentobarbitone sodium (120 mg.kg⁻¹, i.p.). The animals were transcardially perfused with ~ 25ml of modified ACSF and rapidly decapitated. Longitudinal slices (450 µm) were placed in an interface recording chamber and maintained at 32°C. Persistent theta oscillations were induced by bath application of 100 nM kainate. Carbenoxolone was bath applied to stabilized kainate induced activity at a concentration of 100 µM for 60 minutes. At 60 minutes there was a significant reduction in the theta frequency activity recorded ($56.6\% \pm 2.3$) and in peak amplitude ($n = 6$).

These results indicate a pivotal role for electrical signalling in the theta frequency rhythmic activity induced in the MS/DB upon application of kainate.

Supported by BBSRC, MRC and the Wellcome Trust.

Sample Citation:

[Authors]. [Abstract Title]. Program No. XXX.XX. 2003 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2003. Online.

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