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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.\*<sup>1</sup>** ; Racca, C.<sup>1</sup> ; Buhl, E. H.<sup>1</sup> ; Henderson, Z.<sup>1</sup>  
<sup>1</sup>Sch. 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 ( $120 \text{ mg.kg}^{-1}$ , i.p.). The animals were transcardially perfused with ~ 25ml of modified ACSF and rapidly decapitated. Longitudinal slices ( $450 \mu\text{m}$ ) were placed in an interface recording chamber and maintained at  $32^\circ\text{C}$ . Persistent theta oscillations were induced by bath application of  $100 \text{ nM}$  kainate. Carbenoxolone was bath applied to stabilized kainate induced activity at a concentration of  $100 \mu\text{M}$  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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