

### Burst and Tonic Firing, Summary

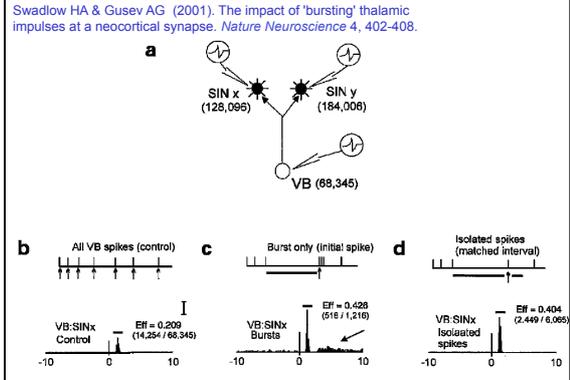
- Thalamic Relay Cells can have two distinct modes of firing: Tonic and Burst.
- The firing mode is dependent upon membrane potential, and burst firing depends critically upon  $I_T$ .
- The membrane potential can be affected by various modulators (e.g. Ach).
- This affects ongoing activity (EEG) and responses to driver inputs.

**A wake up call** UCL

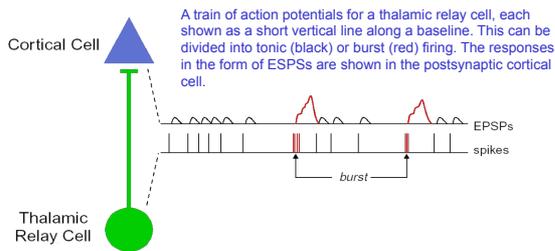
The role of thalamic burst firing in normal behaviour has been controversial. However, new evidence suggests that bursting may serve as a wake-up call to the cortex.

Swadlow HA & Gusev AG (2001). The impact of 'bursting' thalamic impulses at a neocortical synapse. *Nature Neuroscience* 4, 402-408.  
 Sherman, S.M. 2001. A Wake-up Call From the Thalamus. *Nature Neuroscience* 4, 344- 346.

**Swadlow HA & Gusev AG (2001). The impact of 'bursting' thalamic impulses at a neocortical synapse.** UCL

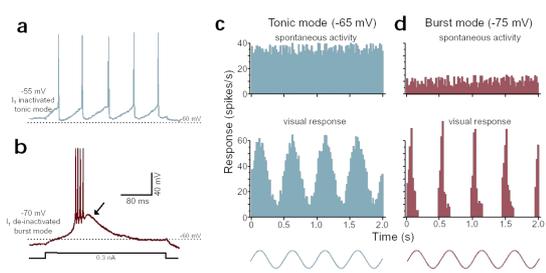


**Schematic interpretation of results of Swadlow & Gusev** UCL

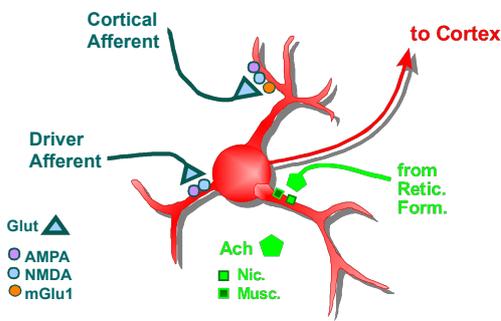


- Note that the responses to bursts (red EPSPs) are larger than those to tonic firing (black EPSPs).
- The increased amplitude of the burst-evoked EPSPs are due to both a larger initial EPSP and temporal summation.

**Burst and Tonic Firing and Visual Responses** UCL



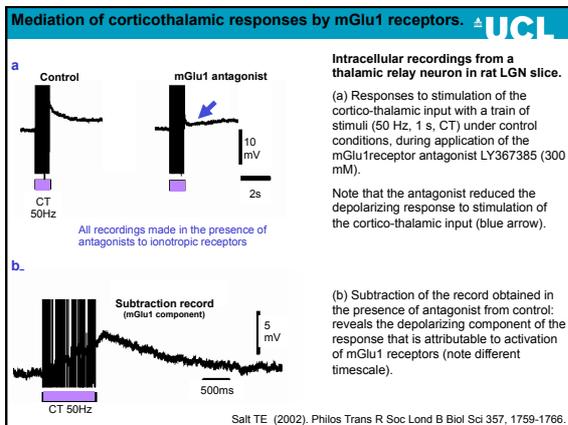
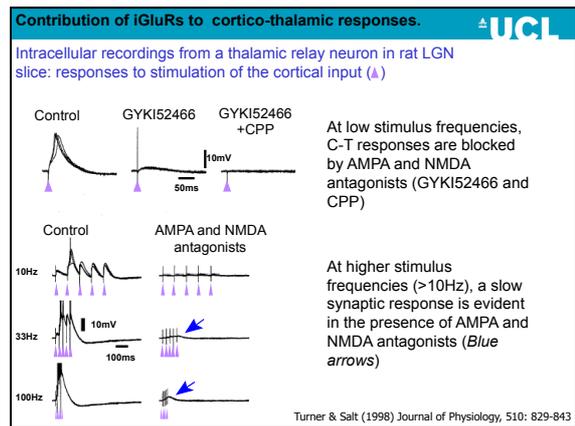
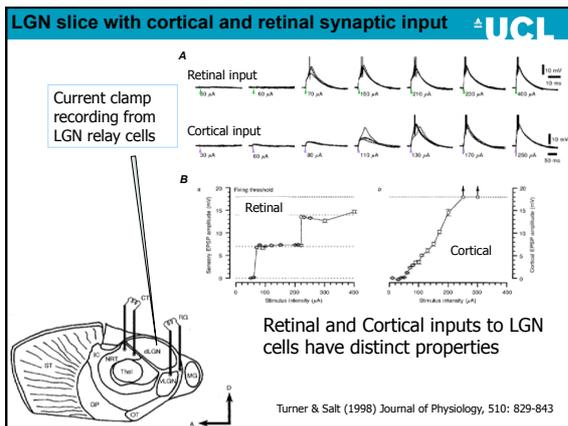
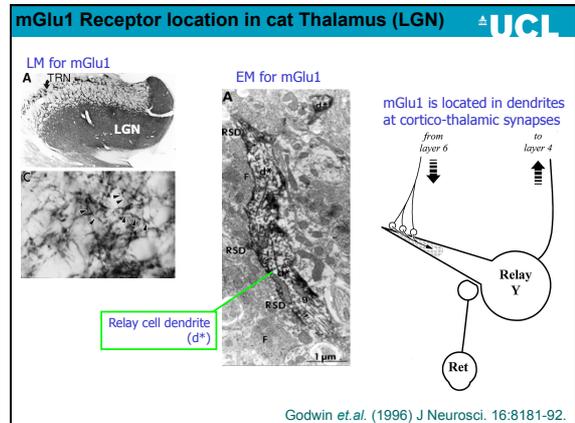
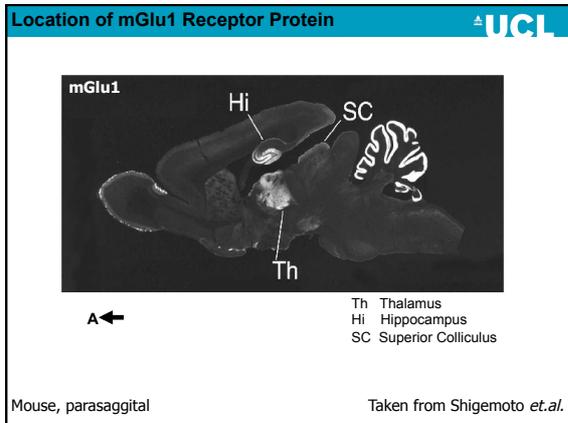
**Synaptic Inputs to Thalamic Relay Cell** UCL



**Functions of the cortico-thalamic system?** UCL

*Remember*

- Corticothalamic inputs outweigh sensory inputs
- In relay nuclei (e.g. LGN), Cortical Layer 6 provides the major corticofugal input
- Corticofugal input is glutamatergic (excitatory).



### Are mGlu1 Receptors in the LGN activated under physiological conditions?

