Inhibition in the lateral vestibular nucleus

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The lateral vestibular nucleus (LVN) projects to all regions of spinal cord for innervation of axial and limb muscles to maintain posture and balance. The LVN consists predominantly of large Deiters' neurons. Inhibition of Deiters' neurons arises predominantly from cerebellar Purkinje cells and is GABAergic in origin. A recent study has shown a glycinergic projection from fastigial nucleus. This study investigates inhibition onto large Deiters' neurons and interneurons of the LVN.

Immunofluorescence: Mice (approx. 3 weeks old) were anaesthetized with Ketamine (100mg/kg) and transcardially perfused with saline, followed by 4% paraformaldehyde. Brains were removed and postfixed for 1 hour. Immunolabelling of $GABA_A$, glycine receptors, and anchoring protein, gephyrin, showed immunofluorescence in LVN.

Electrophysiology: Mice were anaesthetized as above and decapitated. Brains were removed and the region containing the LVN was sectioned (300 μm). Approximately 73% of Deiters' neurons are tonically active, and have comparable discharge rate (mean 9.69 Hz, n = 6) to nearby medial vestibular nucleus neurons (mean 9.71 Hz, n = 27). $GABA_A$ergic and glycinergic mIPSCs were recorded in the presence of TTX (1 μm) and CNQX (10 μm) and their respective antagonists, strychnine (1 μm) and bicuculline (10 μm). Recordings from 45 neurons showed a differential inhibitory input to Deiters' and interneurons. Deiters' neurons received predominantly $GABA_A$ergic inhibitory input, of very high frequency (mean frequency = 13.25 Hz, n=7), while interneurons received both $GABA_A$ergic and glycinergic inputs. Preliminary results also show a rostrocaudal difference in the degree of $GABA_A$ergic and glycinergic input onto Deiters' neurons.