Ion channels in the axon: their role in short- and long-term plasticity

**Summary:**
Synaptic transmission generally depends on action potentials in an all-or-none digital fashion. Recent studies indicate however that subthreshold modulation of voltage in the presynaptic neuron facilitates spike-evoked transmission, thus creating an analog-digital mode of synaptic modification.

We will discuss how transmission at CA3-CA3 synapses can be regulated by presynaptic voltage that alters biophysical state of voltage-gated ion channels in the axon and subsequently modulates presynaptic spike waveform (Debanne et al., 2013; Bialowas et al., in press).

Axons are also involved in long-term plasticity of intrinsic neuronal excitability (review in Debanne et al., 2011). In the second part of my talk, we will discuss how voltage-gated potassium channels contribute to stabilization of intrinsic excitability in pyramidal cells (Cudmore et al., 2010) and GABAergic interneurons (Campanac et al., 2013).

**Relevant publications:**


