KCC2 is a key target of oxytocin in the first-postanal life and is potentially involved in the pathogenesis of neurodevelopmental disorders.

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Oxytocin (Oxt) and its receptor (Oxtr), play a pivotal role in social behavior[1] and have been implicated, in the perinatal period, in the transition of neuronal GABA neurotransmission from excitatory to inhibitory, a developmental process known as the GABA switch[2,3].
However, the molecular events involved in Oxt regulation of the GABA switch were unknown.
The aim of the study was to elucidate how Oxt modulates the GABA switch and neuronal excitability in the first post-natal life, a critical period for neuronal maturation.
We investigated the GABA switch in WT and *Oxtr* null mice (*Oxtr*$^{-/-}$), an animal model that we previously described to display an autistic-like phenotype which includes social and cognitive deficits and increased susceptibility to seizures, compatible with an altered E/I balance[4]. The timing of the GABA switch in WT and *Oxtr*$^{-/-}$ hippocampal neurons was monitored during development by measuring GABA-induced Ca^{2+} responses, together with morphological, biochemical and electrophysiological analysis.
Our data showed that: i) Oxtr deficits cause the down-regulation of chloride transporter KCC2, causing a delayed excitatory-to-inhibitory GABA switch ii) Oxt actions on KCC2 are restricted to an early and narrow time window when the Oxtr directly modulates the functional activity of KCC2 by promoting its phosphorylation and insertion/stabilization at the neuronal surface; iii) in the absence of Oxtr, long-lasting electrophysiological alterations are recorded in neurons[5].
Our results indicated that Oxtr is essential for the proper developmental increase of KCC2 and for the consequent switch in GABA activity in hippocampal neurons, with long-lasting effects on neuronal excitability that could influence the E/I balance in mature neurons.

The identification of KCC2 as an Oxt target provides a better understanding of the role and therapeutic potential of Oxt for the treatment of neurodevelopmental disorders.