Fine tuning of olfactory bulb interneuron generation by non-coding RNAs

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Generation of neurons in rodents is not a purely embryonic process but continues throughout life. For example, pre-determined and regionalized neural stem cells (NSCs) in the postnatal and adult ventricular/subventricular zone (V/SVZ) generate permanently new neuronal precursors. These perform long distance migration into the olfactory bulb where they are added to the pre-existing circuitry as various types of inhibitory interneurons.

The precise regulation of neurogenesis depends on the existence of molecular mechanisms that determine the onset, duration and termination of specific neurogenic steps, as well as the phenotype of the resulting neurons. Indeed, over the past decades a wide spectrum of factors and signaling cascades have been identified, including the Notch and FGF signaling pathways, cell cycle proteins and various transcription factors. Despite such important examples, the current information about the molecular regulation of the neuron production process remains fragmentary and does not explain the precision of the neuron generation process.

We investigate the role of posttranscriptional control mechanisms implicating microRNAs (miRNAs) and long non-coding RNAs (lncRNAs). Based on high resolution expression screens and in vivo functional studies in mice we identified a network of transcription factors and regulatory non-coding RNAs that control interneuron generation and identity.