The striatum, the largest component of the basal ganglia, contains projection neurons and interneurons. Whereas there is considerable agreement that the lateral ganglionic eminence (LGE) is the origin of striatal projection neurons, less is known about the origin of striatal interneurons. Using focal injections of retrovirus into the ventral telencephalon in vitro, we demonstrate that most striatal interneurons tangentially migrate from the medial ganglionic eminence (MGE) or the adjacent preoptic/anterior entopeduncular areas (POa/AEP) and express the NKX2.1 homeodomain protein. Although the majority of striatal interneurons (cholinergic, calretinin(+), and parvalbumin(+)) maintain the expression of NKX2.1 into adulthood, most of the interneurons expressing somatostatin (SOM), neuropeptide Y (NPY), and neural nitric oxide synthase (NOS) appear to downregulate the expression of NKX2.1 as they exit the neuroepithelium. Analysis of striatal development in mice lacking Nkx2.1 suggests that this gene is required for the specification of nearly all striatal interneurons. Similar analysis of mice lacking the Mash1 basic helix-loop-helix (bHLH) or both the Dlx1 and Dlx2 homeodomain transcription factors demonstrates that these genes are required for the differentiation of striatal interneurons. Mash1 mutants primarily have a reduction in early-born striatal interneurons, whereas Dlx1/2 mutants primarily have reduced numbers of late-born striatal interneurons. We also present evidence implicating the Lhx6 and Lhx7 LIM-homeobox genes in the development of distinct interneuron subtypes. Finally, we hypothesize that, within the MGE, radially migrating cells generally become projection neurons, whereas tangentially migrating cells mainly form interneurons of the striatum and cerebral cortex [1)].

1)

Marin O, Anderson SA, Rubenstein JL. Origin and molecular specification of striatal interneurons. J Neurosci. 2000 Aug 15;20(16):6063-76. PubMed PMID: 10934256.