

## Notes of markers for neural differentiation.

(N. Coufal)

### Nestin & Sox1 & Sox2

Markers for NPC. All the NPC markers should turn off with differentiation (Sox1, sox2, nestin). However, human markers take a long time to down regulate (in mouse NPCs, it's 2 days, in human it takes several weeks of differentiation).

### Map2a+2b

#### Tuj1, B-III-Tub

general neuronal. map2 is more in the cell soma, tuj1/beta III tubulin is more in the processes. map2 is generally a more mature marker than Tuj1.

**Doublecortin** is an early neuronal marker (while cells are still proliferating but committed to a neuronal fate), then neuroD1 comes on a little bit later. Then tuj1, then map2a+b (both of those are post-proliferation)

### GFAP

astrocyte marker in differentiated cells cultures. radial glia and very slowly growing progenitors also express GFAP, although you only see that during embryonic development (radial glial) and then very rarely in adult neurogenic zones (slowly dividing progenitors in the dentate gyrus or subventricular zone). In a differentiated neuronal culture GFAP is only in astrocytes.

### GABA, Gad65

GABA is a mature neuronal marker expressed in GABAergic interneurons (inhibitor neurons which are generally interneurons in the brain). GABA is the neurotransmitter released by these neurons. GAD65/67 are two enzymes which are involved in GABA synthesis, so are also a mature marker of GABAergic interneurons.

### TH

Tyrosine hydroxylase (TH) is an enzyme involved in the synthesis of dopamine and norepinephrine (NE). Generally it's used in the field as a marker for dopaminergic neurons (those which die in parkinson's disease). However, it can also be found in some forebrain neurons which make NE (NE is a precursor to dopamine)

### ChAT

ChAT is choline acetyltransferase and is one of the enzymes involved in the synthesis of the neurotransmitter acetylcholine. Therefore, it's a marker for differentiated cholinergic neurons. Motor neurons also release acetylcholine, so it's a marker for motor neurons (a pretty mature one). Most people use HB9 as an early marker for cholinergic neurons (while they're still proliferating) and then ChAT as the mature marker.