Summary

During development, various signals pattern the neural tube into different progenitor domains, arranged along the dorso-ventral axis. The different progenitor domains generate different neuron types. The transcription factor Lbx1 is expressed in post-mitotic neurons of the alar plate of the rhombencephalon (hindbrain) and the spinal cord. The expression of Lbx1 can be used to distinguish two classes of neuron in the alar plate. Class A neurons do not express Lbx1 and are generated dorsally, while class B neurons express Lbx1 and are generated in the ventral portion of the alar plate. Lbx1 is required for the correct differentiation of class B neurons. In Lbx1 mutant embryos, class B neurons are misspecified and adopt characteristics of class A neurons, i.e. they express the same profile of transcription factors and differentiate in a similar manner. In the rhomencephalon of Lbx1 mutants, the inferior olive, the *nucleus solitarius* and the noradrenergic nuclei (A1/C1 and A2/C2) are enlarged, while GABA-ergic neurons of the *nucleus solitarius* and parts of the sensory nuclei of the *nervus trigeminus* are missing. Lbx1 thus controls the specification of neurons in the hindbrain which are required for vital reflexes, such as the control of breathing rhythm or heart rate. In Lbx1 mutant animals, the altered neurons are born at incorrect locations, but reach their final destination correctly. Therefore, there is some plasticity in the development of the hindbrain, whereby mechanisms exist which permit neurons mechanism exist which permit neurons born at the wrong place to reach their final destination correctly. Through aanalysis of the expression of transcription factors in the individual rhombomeres and the alterations in the neuronal specification in Lbx1 mutant animals, I have been able to assign rhombomeres to specific groups, which in turn, can be directly correlated with the anatomy of adult hindbrain.