

6. Summary

Local protein synthesis in dendrites is thought to play an important role in enduring forms of synaptic plasticity. Arc/Arg3.1 transcription is robustly induced by LTP-producing stimulation and the mRNA is transported to dendrites. Within dendrites Arc/Arg3.1 mRNA can be specifically targeted to stimulated synaptic areas, suggesting that it may be translated on site. Consolidation of long-lasting synaptic plasticity and memories is strongly impaired in Arc/Arg3.1 knockout (ko) animals. To test the functional role of dendritic mRNA transport of Arc/Arg3.1 *in vivo*, we generated a transgenic (tg) mouse line in the ko-background. The tg mouse harbors a P1 derived artificial chromosome (PAC) in which we mutated the sequence required for dendritic mRNA targeting. Surprisingly, in these animals Arc/Arg3.1 protein was still present in dendrites and in postsynapses. However, behavioral studies indicate striking deficits in the formation of intermediate-term but not long-term memories. The results of this thesis provide the basis for a novel model of memory consolidation in mammals.