

Spatiotemporal expression profiling and molecular characterisation of miR-344b and miR-344c in the developing mouse brain

ABSTRACT

MicroRNAs are small non-coding RNAs of about 22 nucleotides that regulate gene expression through inhibition or repression processes during post-transcriptional or translational stages. Studies have shown that miRNAs play a crucial role in spatiotemporal regulation of the brain development. A recent study had shown that miR-344 is expressed in a developing mouse brain. In this study, we focused to characterise the spatiotemporal expression of miR-344b and miR-344c during the development of mouse brain. Out in situ hybridisation studies have shown that both miR-344b and miR-344c were strongly expressed in the germinal layer during the early stages of mouse brain development. Postnatally, expression of miR-344b was not detectable in P1 and adult brains. In contrast, miR-344c was expressed globally in P1 brain and was expressed exclusively in the olfactory bulb and granular cell layer of the cerebellum in the adult mouse brain. A subsequent stemloop RT-qPCR analysis showed that expression of the miR-344b and miR-344c was increased from E11.5 and peaked at E15.5. Postnatally, expression level of the miR-344b was reduced while miR-344c continued to express until adulthood. We further investigated the expression of miR-344b and miR-344c in adult mouse multiple organs and the pancreas showed the highest expression for both miRNAs. Subsequent bioinformatics analysis predicted that miR-344b and miR-344c were found to target a total of 1540 and 863 downstream target genes respectively. Genes associated with transcription regulation and nervous system development were subjected to further screening. We found that *Olig2* and *Otx2* were predicted as the potential downstream target gene for miR-344b and miR-344c respectively. However, luciferase protein suppression assay showed that the expression of *Olig2* and *Otx2* were not suppressed by overexpression of miR-344b and miR-344c. In conclusion, miR-344b and miR-344c were expressed in the developing mouse brain and may play a role during early mouse brain development although not directly targeting *Olig2* and *Otx2*.