In the brain microRNAs confer robustness to specific developmental processes and contribute to the maturation of neuronal circuits. Differentiation of dopaminergic neurons requires concerted action of morphogens and transcription factors acting in a precise and well-defined time window and very little is known about the potential role of microRNAs in this event. By performing a microRNA-mRNA paired microarray screening, we identified microRNAs able to promote cell cycle exit facilitating dopaminergic differentiation. MicroRNAs have been also proposed as a versatile tool to achieve differentiation of fibroblasts into specific subtypes of mature neurons (Vierbuchen et al., 2010) and are considered a very promising instrument to boost therapeutic approaches for regenerative medicine and modeling human diseases. Transdifferentiation of dopaminergic neurons have been achieved by combinatorial expression of early and late mDA transcription factors (Caiazzo et al., 2011). By combining microRNAs with the transcription factors ASCL1 and NURR1, we are able to improve transdifferentiation efficiency by generating Induced dopaminergic (iDA) cells able to synthesize dopamine, that show spontaneous electrical activity, reversibly blocked by tetrodotoxin, consistent with the electrophysiological properties featured by brain dopaminergic neurons. These findings suggest that the achievement of functional mesencephalic dopaminergic neurons requires the control over time of different stimuli that are essential during early progenitors differentiation. Thus microRNAs could intervene in this process by regulating specific pathways and promote dopaminergic differentiation. It will be then compelling to attain their identification in order to further understand the process of DA differentiation and increase the overall yield of dopaminergic neurons as well as to improve their features in term of both molecular and physiological properties.