

## Shaky matter: How microRNAs can rejuvenate our dopamine neurons

P. Chmielarz, J. Konovalova, S. Najam and their colleagues led by Dr. Domanskyi and Dr. Vinnikov just published a paper

### "Dicer and microRNAs protect adult dopamine neurons"

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[Full text of the publication](#)

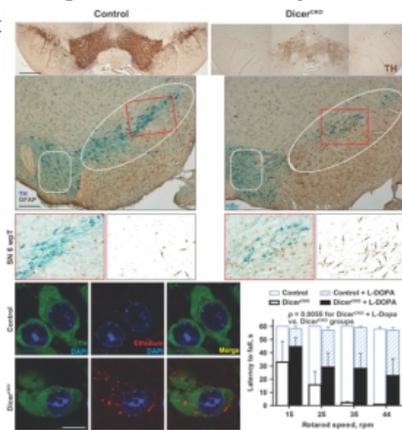


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**Abstract:** MicroRNAs (miRs) are important post-transcriptional regulators of gene expression implicated in neuronal development, differentiation, aging and neurodegenerative diseases, including Parkinson's disease (PD). Several miRs have been linked to PD-associated genes, apoptosis and stress response pathways, suggesting that deregulation of miRs may contribute to the development of the neurodegenerative phenotype. Here, we investigate the cell-autonomous role of miR processing RNase Dicer in

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the functional maintenance of adult dopamine (DA) neurons. We demonstrate a reduction of Dicer in the ventral midbrain and altered miR expression profiles in laser-microdissected DA neurons of aged mice. Using a mouse line expressing tamoxifen-inducible CreERT2 recombinase under control of the DA transporter promoter, we show that a tissue-specific conditional ablation of Dicer in DA neurons of adult mice led to decreased levels of striatal DA and its metabolites without a reduction in neuronal body numbers in hemizygous mice (Dicer<sup>HET</sup>) and to progressive loss of DA neurons with severe locomotor deficits in nullizygous mice (Dicer<sup>CKO</sup>). Moreover, we show that pharmacological stimulation of miR biosynthesis promoted survival of cultured DA neurons and reduced their vulnerability to thapsigargin-induced endoplasmic reticulum stress. Our data demonstrate that Dicer is crucial for maintenance of adult DA neurons, whereas a stimulation of miR production can promote neuronal survival, which may have direct implications for PD treatment.

Since the discovery of [RNA interference](#), microRNAs are firmly established as crucial factors in development of virtually any kind of tissue in eukaryotes. What about terminally differentiated tissues such as neurons in adult or aged animals?

**The authors show for the first time that microRNA pathway is predominantly depleted in aged dopamine neurons**

**Further, they show that this pathway is essential for maintenance of adult dopamine system**

Even moderate down-regulation of the Dicer1 gene function in these neurons such as during aging or upon homozygous genetic inactivation can result in "pre-symptomatic" neurodegenerative phenotypes

Stay tuned to find out whether it is possible to attenuate these phenotypic changes by restoring relevant microRNAs