MicroRNA-132 and Early growth response-1 in the Nucleus Basalis in Alzheimer

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Research question and background

The cholinergic Nucleus Basalis of Meynert (NBM), important for memory function, shows neuronal activation ('up-phase') during the early stages of Alzheimer's disease (AD) but neurodegeneration ('down-phase') in later stages of AD. The microRNA-132 (miR-132) and the transcription factor early growth response-1 (Egr-1) molecule, which do not only stimulate synaptic activity and plasticity, but are also involved in AD pathology and might affect cholinergic function, were proposed as possible candidates regulating such an up-down activity pattern of NBM during the course of AD, since they both show an up-down pattern of expression in the prefrontal cortex during the course of AD.

Methods and tissues used

We investigated in postmortem NBM the expression of miR-132 and Egr-1 along the entire course of AD as determined by Braak staging, in relation to the expression of amyloid β, hyperphosphorylated-tau, neuronal fibrillary tangles and neuropil threads, apolipoprotein E ε4 and in relation to alterations in choline acetyltransferase (ChAT).

Results and conclusion

We found that the expression of miR-132 and Egr-1 in the NBM was quite stable during the early stages of AD and decreased significantly only during late AD stages. In addition, both molecules showed positive correlations with ChAT expression which was negatively correlated with hyperphosphorylated-tau.

Interpretation: miR-132 and Egr-1 contribute more to the late neurodegeneration of the NBM rather than to is early activation. Their possible role in keeping the cholinergic function intact in early AD stages deserves further study.