Increased activity of Nucleus Basalis of Meynert neurons in mild cognitive impairment

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We previously found apolipoprotein (APOE) ε4-dependent lower metabolic activity in nucleus basalis of Meynert (NBM) neurons in Alzheimer's disease (AD; Braak V-VI)[2] and cognitively intact control subjects (Braak 0-II)[1], indicating that APOE ε4 may act by a lower neuronal metabolism as a risk factor for cognitive impairment in normal aging and early prodromal AD. In the present study we examined the metabolic activity of NBM neurons in *post-mortem* brain material of 22 subjects that were clinically diagnosed as mild cognitively impaired (MCI; 7), cognitively intact (C; 10) and subjects with probable Alzheimer's disease (AD; 5). The subjects were categorized according to their clinical diagnosis, but also according to their AD pathology (Braak stage I-VI). We used the Golgi apparatus (GA) size as a measure of neuronal metabolic activity.
The MCI subjects showed increased neuronal metabolism; they had significantly more neurons with larger GA sizes as compared to the C subjects and AD patients. At the transition of MCI to AD, metabolism strongly reduces; despite of Braak stage (I-VI) the AD patients showed many neurons with extreme small GA sizes. C subjects with more AD pathology (Braak III-IV) showed significantly more neurons with larger GA sizes compared to the C subjects with less AD pathology (Braak I-II), but they showed no difference with the MCI subjects with more AD pathology (Braak III-IV).
Our data suggest that the start of AD pathology in cognitively intact C subjects with Braak I-II[1], and Braak III-IV, and in MCI subjects (Braak III-IV) is accompanied by enhanced NBM metabolism, possibly as a compensation mechanism.
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(1) Dubelaar EJG et al. (2004) JNEN
(2) Salehi et al. (1998) PNAS

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