Brain volume loss occurs at rate of normal aging in patients with multiple sclerose who have a 'no evidence of disease activity' status

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Background
Neurodegeneration is the primary determinant of long-term disability multiple sclerosis (MS) but the underlying mechanisms remain incompletely understood. A 'no evidence of disease activity' (NEDA) status implies that patients are free from measurable inflammatory activity. Accelerated brain volume loss (BVL) has recently emerged as magnetic resonance imaging (MRI) marker of neurodegeneration in subjects with MS, correlating with present and future clinical impairment. To date, there are only limited and conflicting data regarding the question whether the rate of BVL in MS patients with a NEDA status actually differs from that of normal ageing.

Methods
We applied a standardized selection procedure on the databases of two Belgian MS units (Universitair Ziekenhuis Brussel and Nationaal MS Center Melsbroek) to identify all patients under second-line disease-modifying treatment (DMT) who (1) have two MRI scans suitable for BVL assessment with a minimum interval of 18 months and (2) obtained a NEDA status during that period. Healthy volunteers who had participated in a previous brain volumetric study were invited for a follow-up MRI to serve as controls for the current project. BVL was assessed using IcoBrain software, only MRI couples with a similarity score of at least 0.15 (internal Icometrix procedure) were retained for final analysis.

Results
Thirty-two MS patients with a NEDA status between two suitable MRI exams were identied. Twenty-seven healthy controls were recruited for comparison. There were no significant differences in median annualized whole brain (-0.22% in the MS patients versus -0.26% in the controls) and total gray matter volume change (-0.26% versus -0.34%, respectively) between both groups, while sex and age were comparable as well.

Conclusion
BVL occurs at the rate of normal aging in patients with MS who have NEDA status. Neurodegeneration may be halted by eradicating inflammatory disease activity, advocating for a more early introduction of high-efficacy DMT.