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Title: Age-related alterations in human neocortical plasticity

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Age-related alterations in human neocortical plasticity

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HIGHLIGHTS

- An *in vivo* comparison of sensory plasticity between young and older adults
- There was no LTP-*like* enhancement of the visually evoked potential for older adults
- Both age groups showed an LTD-*like* shift after repeated low frequency stimulation
- Results suggest a shift in the threshold for LTP, but not LTD, with age

ABSTRACT

Age-related changes in neuroplasticity may be central to the cognitive decline associated with even healthy ageing. Modulated Long-Term Potentiation (LTP) and Long-Term Depression (LTD) have been repeatedly demonstrated in aged rodents, however the translation to human research has been limited by a scarcity of non-invasive methods for doing so. We have previously demonstrated that, following a block of high frequency presentations of a visual stimulus (referred to as a "visual tetanus"), there is a LTP-*like* enhancement of the N1b component of the visually evoked potential (VEP) to subsequent low frequency presentations of the same stimulus. The aims of the current study were, firstly, to use this electroencephalography (EEG) paradigm to assess age group differences in neocortical plasticity in humans, and secondly, to expand on the visual LTP paradigm by examining plasticity in another component of the VEP; the P2a. While a young participant group (*N*= 29, age range= 19-35) demonstrated the expected LTP-*like* enhancement of the N1b immediately following the visual tetanus, an older participant group (*N*= 19, age range= 68-91) did not. However, both age groups demonstrated a positive shift of the P2a component after repeated