The brain is actively engaged in the prediction of sensory events. Here we examined the effect of aging on sensory prediction, using a paradigm of sensorimotor attenuation.

The sensory consequences of voluntary actions are typically perceived as weaker than the same sensory events that are externally generated. This is because the predicted sensory signal is believed to be removed from the perceived sensation following one’s own action.

Attenuation is proposed to rely on brain signals related to action preparation, originating from areas upstream of M1. The impact of aging on these areas for sensorimotor attenuation was examined in a large population-representative cohort.

**Q1)** How does sensorimotor attenuation change with aging?

**Q2)** What are the structural brain correlates of attenuation and its changes with aging?

**Methods**

**Subjects**

n=305, aged 18-89 years (55±18)

**MRI**

Siemens Trio 3T

MPRAGE; 1 mm isotropic for Voxel-Based Morphometry with SPM8

**Force Matching**

Direct Slider

Voxel-Based Morphometry with SPM8

MPRAGE; 1 mm isotropic for Siemens Trio 3T

*all p<0.05, FWE corrected

*all p<0.05, FWE cluster corrected

**Results – Behavioural**

Typical individual subject data

Key behavioural variables:

Mean over-compensation

Slope

Intercept

Overall mean over-compensation across conditions

Condition

f_p≤0.01, p<0.001

No correlation across conditions (r=0.08, p=0.28)

**Results – Structural Imaging**

Negative association between Direct over-compensation and GM

Changes in GM with aging in relation to Direct over-compensation

**Conclusions**

**Q1)** Functional changes in attenuation with aging

- The enhanced Direct over-compensation with aging suggests compromised integration of prediction signals with sensory information for the perception of one’s actions.

**Q2)** Structural correlates of attenuation and its changes in aging

- Changes in grey matter in pre-SMA, mesolimbic areas and cerebellum are related to variability in sensorimotor prediction.

- Aging might affect the mechanisms for sensorimotor prediction, including reversal of the structure-function correlations in a motor network of cerebellum, thalamus and cingulate cortex.

Altered sensorimotor prediction in aging is related to age-related changes in subcortical and cortical grey matter

**References**

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nw305@medschl.cam.ac.uk

www.neuroscience.cam.ac.uk/directory/profile.php?nw305

www.cam-can.org

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