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Impact of ageing on brain connections mapped in major scan study

Brain connections that play a key role in complex thinking skills show the poorest health with advancing age, new research suggests.

Connections supporting functions such as movement and hearing are relatively well preserved in later life, the findings show.

Scientists carrying out the most comprehensive study to date on ageing and the brain's connections charted subtle ways in which the brain's connections weaken with age.

Knowing how and where connections between brain cells – so-called white matter – decline as we age is important in understanding why some people's brains and thinking skills age better than others.

Worsening brain connections as we age contribute to a decline in thinking skills, such as reasoning, memory and speed of thinking.

Researchers from the University of Edinburgh analysed brain scans from more than 3,500 people aged between 45 and 75 taking part in the UK Biobank study.

Researchers say the data will provide more valuable insights into healthy brain and mental ageing, as well as making contributions to understanding a range of diseases and conditions.

The study was published in *Nature Communications* journal.

Dr Simon Cox, of the University of Edinburgh's Centre for Cognitive Ageing and Cognitive Epidemiology (CCACE), who led the study, said: "By precisely mapping which connections of the brain are most sensitive to age, and comparing different ways of measuring them, we hope to provide a reference point for future brain research in health and disease.

"This is only one of the first of many exciting brain imaging results still to come from this important national health resource."

Professor Ian Deary, Director of CCACE, said: "Until recently, studies of brain scans with this number of people were not possible. Day by day the UK Biobank sample grows, and this

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will make it possible to look carefully at the environmental and genetic factors that are associated with more or less healthy brains in older age.”

Professor Paul Matthews of Imperial College London, Chair of the UK Biobank Expert Working Group, who was not involved in the study, said: “This report provides an early example of the impact that early opening of the growing UK Biobank Imaging Enhancement database for access by researchers world-wide will have.

“The large numbers of subjects in the database has enabled the group to rapidly characterise the ways in which the brain changes with age – and to do so with the confidence that large numbers of observations allow.

“This study highlights the feasibility of defining what is typical, to inform the development of quantitative MRI measures for decision making in the clinic.”

The University of Edinburgh Centre for Cognitive Ageing and Cognitive Epidemiology receives funding from the Medical Research Council (MRC) and the Biotechnology and Biological Sciences Research Council (BBSRC).

UK Biobank was established by the Wellcome Trust, MRC, Department of Health, Scottish Government and the Northwest Regional Development Agency. It has had funding from the Welsh Assembly Government, British Heart Foundation and Diabetes UK. UK Biobank is hosted by the University of Manchester and supported by the NHS.

A video explanation of the research is available at: <http://www.ccace.ed.ac.uk/news-events/latest>

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