Chronic cocaine use may speed up aging of brain

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New research by scientists at the University of Cambridge suggests that chronic cocaine abuse accelerates the process of brain ageing. The study, published today 25 April in *Molecular Psychiatry*, found that age-related loss of grey matter in the brain is greater in people who are dependent on cocaine than in the healthy population.

For the study, the researchers scanned the brains of 120 people with similar age, gender and verbal IQ. Half of the individuals had a dependence on cocaine while the other 60 had no history of substance abuse disorders.

The researchers found that the rate of age-related grey matter volume loss in cocaine-dependent individuals was significantly greater than in healthy volunteers. The cocaine users lost about 3.08 ml brain volume per year, which is almost twice the rate of healthy volunteers (who only lost about 1.69 ml per year). The accelerated age-related decline in brain volume was most prominent in the prefrontal and temporal cortex, important regions of the brain which are associated with attention, decision-making, and self-regulation as well as memory.

Previous studies have shown that psychological and physiological changes typically associated with old age such as cognitive decline, brain atrophy and immunodeficiency are also seen in middle-aged cocaine-dependent individuals. However, this is the first time that premature ageing of the brain has been associated with chronic cocaine abuse.

Dr Karen Ersche, of the Behavioural and Clinical Neuroscience Institute (BCNI) at the University of Cambridge, said: "As we age, we all lose grey matter. However, what we have seen is that chronic cocaine users lose grey matter at a significantly faster rate ,which could be a sign of premature ageing. Our findings therefore provide new insight into why the cognitive deficits typically seen in old age have frequently been observed in middle aged chronic users of cocaine."

The scientists also highlight concerns that premature ageing in chronic cocaine users is an emerging public health concern. The United Nations Office on Drugs and Crime estimates that cocaine is used by up to 21 million individuals worldwide, with approximately 1 per cent of these individuals becoming dependent.

Dr Ersche said: "Our findings clearly highlight the need for preventative strategies to address the risk of premature ageing associated with cocaine abuse. Young people taking cocaine today need to be educated about the long-term risk of ageing prematurely."

The concern of accelerated ageing is not limited to young people but also affects older adults who have been abusing drugs such as cocaine since early adulthood.

Dr Ersche added: "Our findings shed light on the largely neglected problem of the growing number of older drug users, whose needs are not so well catered for in drug treatment services. It is timely for heath care providers to understand and recognise the needs of older drug users in order to design and administer age-appropriate treatments."

More information: 'Cocaine dependence: A fast-track for brain ageing?' is scheduled for publication in the journal *Molecular Psychiatry* on 25 April. Authors include: Karen D. Ersche, P. Simon Jones, Guy B. Williams, Trevor W. Robbins, and Edward T. Bullmore.

Provided by University of Cambridge