

PRESS RELEASE

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BRAIN SWITCH CLUES TO DRUG ADDICTION

In the quest to find the biological route of drug addiction, research at Cambridge University, UK, is revealing what makes some people more vulnerable than others. Speaking at Europe's major neuroscience conference in Geneva today (Monday 14 July), Professor Barry Everitt described what they now believe causes the switch from occasional, 'recreational' use to a compulsive habit.

Professor Everitt and researchers in the Cambridge lab have discovered there is a shift in the control of drug seeking behaviour in the brain. Taking drugs – for example, cocaine – generates reinforcing or 'rewarding' effects mediated by the ventral striatum of the brain. In some people, however, drug taking escalates to become a strong habit, difficult to relinquish, and which is eventually controlled by the dorsal striatum, a region of the brain associated with habit learning.

"We also needed to find out why some people are vulnerable to this switch from one brain region to another," said Professor Everitt. "People who are addicted to drugs tend to be impulsive, a characteristic which may have a genetic, as well as an environmental basis."

Brain imaging studies in the Cambridge lab have revealed that impulsive rats have low levels of dopamine D2/3 receptors in the ventral striatum which greatly escalates their cocaine intake when given access to the drug. Dopamine is a neurotransmitter (a chemical messenger) involved with the brain's reward systems and plays a major role in addiction. Drugs such as cocaine bind to dopamine receptors and stimulate the response.

Compulsive drug seeking is a key diagnostic feature of addiction and this only emerges after a prolonged drug taking history. Professor

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Everitt's lab has also shown that individuals who were initially impulsive are also eventually vulnerable to take cocaine compulsively. This tendency may be exacerbated by a loss of 'executive' – or higher - control over the drug seeking habit through toxic effects of chronically self-administered drugs on the prefrontal cortex of the brain. Drug seeking can therefore be seen as a complex series of interactions between vulnerability traits and learning mechanisms.

"Impulsivity clearly interacts with chronic drug taking to precipitate the compulsive drug seeking state of addiction. We are beginning to unravel the neural basis of this interaction," said Professor Everitt. The results suggest that future treatments may be those that reduce impulsivity, since they may help to prevent relapse in people who are striving to overcome addiction.

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Notes to Editors

FENS 2008 is hosted by the Swiss Society for Neuroscience and will attract over 5,000 international delegates. The Federation of European Neuroscience Societies, founded in 1998, aims to advance research and education in neuroscience, representing neuroscience research in the European Commission and other granting bodies. FENS is the European partner of the American Society for Neuroscience. FENS represents a large number of national European neuroscience societies and has around 16000 members. <http://fens2008.neurosciences.asso.fr/>