MedicalXpress

Could brain abnormality predict drug addiction?

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(PhysOrg.com) -- Scientists at The University of Nottingham are to use MRI technology to discover whether abnormalities in the decision-making part of the brain could make some people more likely to become addicted to drugs.

In a three-year study, funded with £360,000 from the Medical Research Council, Dr Lee Hogarth in the University's School of Psychology will study the impact that an abnormal frontal cortex can have in people's risk of becoming dependant upon drugs such as tobacco, alcohol, cannabis or heroin.

Dr Hogarth said: "Evidence suggests that a large percentage of the population try drugs but only a small proportion of experimental users — roughly about 15 per cent — will make the transition to full-blown addiction.

"Our study will move us a step closer to understanding why some people can use drugs recreationally without becoming hooked, while others will go on to develop clinical dependence."

The research will focus on the frontal cortex, the area of the brain which is involved in decision-making and which allows us to weigh up short term gain with potential long term negative consequences. The researchers believe that some people may have a biological predisposition to becoming addicted because this portion of their brain is malfunctioning, preventing them from appreciating risks adequately,

leading them to make poor choices in relation to drug abuse.

Young people may be particularly affected by this as the frontal cortex is not yet fully developed, which may explain many risk-taking behaviours in adolescents.

The research will compare students who report social versus daily smoking, and adult smokers who are dependant on nicotine versus those who are not. These four groups will allow researchers to trace the transition to dependence across the lifetime of drug use.

In the experiments, volunteers will first learn to earn cigarettes before this behaviour is punished with an unpleasant noise. The question is whether nicotine dependence is associated with a persistence in cigarette seeking despite the negative consequence of this behaviour, which is the clinical hallmark of addiction.

In addition, researchers will use MRI technology to measure abnormal brain activity in participants who persist in drug seeking, despite this behaviour being punished.

Dr Hogarth commented: "The risk of becoming addicted is due to a failure to offset the anticipated pleasure from drug use with knowledge of the long term negative consequences. The frontal cortex carries signals for anticipated pleasure and pain, so we expect to see an abnormality in the integration of these signals in dependent addicts who persist in punished drug seeking behaviour.

"There is currently a debate as to whether addicts are responsible for their addictive behaviour, which has implications for the funding of their healthcare and treatment. If our hypothesis proves correct, we would argue that addicts are intentionally choosing to take drugs, rather than being controlled, like robots, by urges beyond their control. However,

this does not mean that addicts are morally culpable for their choices, because they cannot help being vulnerable to a distortion of the neural system that computes their choices.

"If we identify those who possess this vulnerability, perhaps more can be done to prevent them from making the transition to pathological addiction."

Source: University of Nottingham