

Research reveals why some smokers become addicted with their first cigarette

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New research from The University of Western Ontario reveals how the brain processes the 'rewarding' and addictive properties of nicotine, providing a better understanding of why some people seemingly become hooked with their first smoke. The research, led by Steven Laviolette of the Department of Anatomy and Cell Biology at the Schulich School of Medicine & Dentistry could lead to new therapies to prevent nicotine dependence and to treat nicotine withdrawal when smokers try to quit. The paper is published in the August 6th *Journal of Neuroscience*.

"Nicotine interacts with a variety of neurochemical pathways within the brain to produce its rewarding and addictive effects," explains Laviolette. "However, during the early phase of tobacco exposure, many individuals find nicotine highly unpleasant and aversive, whereas others may become rapidly dependent on nicotine and find it highly rewarding. We wanted to explore that difference."

The researchers found one brain pathway in particular uses the neurotransmitter 'dopamine' to transmit signals related to nicotine's rewarding properties. This pathway is called the 'mesolimbic' dopamine system and is involved in the addictive properties of many drugs of abuse, including cocaine, alcohol and nicotine.

"While much progress has been made in understanding how the brain processes the rewarding effects of nicotine after the dependence is established, very little is known about how the mesolimbic dopamine system may control the initial vulnerability to nicotine; that is, why do

some individuals become quickly addicted to nicotine while others do not, and in some cases, even find nicotine to be highly aversive."

The scientists identified which specific dopamine receptor subtype controlled the brain's initial sensitivity to nicotine's rewarding and addictive properties and were able to manipulate these receptors to control whether the nicotine is processed as rewarding or aversive.

"Importantly, our findings may explain an individual's vulnerability to nicotine addiction, and may point to new pharmacological treatments for the prevention of it, and the treatment of nicotine withdrawal," says Laviolette. The research was funded by the Canadian Institutes of Health Research and the Canadian Psychiatric Research Foundation.

Source: University of Western Ontario

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