

Throwing the micro switch: MicroRNA may link smoking risk gene to neurobiology of addiction

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During the past several years, significant progress has been made in identifying susceptibility genes for nicotine dependence through genetic linkage and association analyses. Although a large number of genes have been associated with tobacco smoking, only a very limited number of genetic variants are considered to be causative. How to find these functional variants and then characterize them remains challenging in the field of human genetics.

In the traditional genetic dogma, DNA codes for RNA and RNA codes for protein. But what about the leftover bits of RNA that do not seem to code for proteins? One type of RNA 'leftovers' is the microRNAs. These small pieces of RNA do not code for proteins. Instead, they influence the extent to which other genes are expressed, i.e., the rate or extent of conversion of DNA to RNA. To date, there have been relatively few examples of the direct involvement of microRNAs in psychiatric disorders.

However, a study scheduled for publication in the April 15th issue of *Biological Psychiatry*, published by Elsevier, has now provided new insights into how variation in the dopamine D1 receptor gene (DRD1) may be linked to the risk for nicotine dependence through microRNA action.

Huang and Li, researchers at the University of Virginia, previously

showed that the DRD1 gene, one of the major receptors in the brain that mediate the actions of the [neurotransmitter dopamine](#), is associated with tobacco dependence, and that two alleles of a variant within this gene are differentially expressed. "In the current study, we demonstrated that such differential expression of DRD1 is regulated by microRNA miR-504," explains Dr. Li.

In other words, this microRNA seems to directly influence how these genetic variations are expressed within the DRD1 gene, thereby influencing ones risk to developing [nicotine dependence](#). John Krystal, M.D., Editor of *Biological Psychiatry*, comments: "This study provides an interesting example of how variation in a gene that contributes to the risk of smoking may do so by throwing a 'micro switch' and thereby increasing the expression of the dopamine 1 receptor gene."

More information: The article is "Differential Allelic Expression of Dopamine D1 Receptor Gene (DRD1) Is Modulated by microRNA miR-504" by Weihua Huang and Ming D. Li. The authors are affiliated with the Departments of Psychiatry and Neurobehavioral Sciences, University of Virginia, Charlottesville, Virginia. The article appears in [Biological Psychiatry](#), Volume 65, Issue 8 (April 15, 2009), published by Elsevier. The authors' disclosures of financial and conflicts of interests are available in the article. <http://www.elsevier.com/locate/biopsychiat>

Source: Elsevier

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