

Does the desire to consume alcohol and tobacco come from our genetic makeup?

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Alcohol and smoking can be harmful, if not deadly. While the desire for these substances can be due to environmental cues, genomic factors also play an important role. The etiology of these desires is multifactorial and a result of complex interactions with the environment. Adoption and twin studies have shown that the use of these substances is likely to be inherited. Such studies have provided evidence that one's sex can influence the genetic factors for alcohol and tobacco use.

In an attempt to find the genomic determinants underlying alcohol and tobacco use, researchers examined 120 families (approximately 900 individuals). The researchers identified an area relating to alcohol and tobacco use on chromosome 1. They found another area relating to alcohol on chromosome 3. On chromosome 4, they uncovered an area relating to smoking and found sex-specific loci inside some of these areas.

The results are based on the study entitled, "Genome-wide Scan for Genomic Determinants of Alcohol and Tobacco Use in French Canadian Families." It was conducted by Majid Nikpay, O. Seda, Johanne Tremblay and Pavel Hamet, of the Research Centre CHUM, University of Montreal; Ettore Merlo, École Polytechnique de Montréal, Montréal; D. Gaudet, Department of Medicine, University of Montreal Community Genomic Medicine Center and Lipid Clinic, Chicoutimi, CN; and Theodore Kotchen and Alan Cowley, of the Department of Physiology, Medical College of Wisconsin, Milwaukee. Mr. Nikpay will discuss his team's work at the conference, Sex and Gender in

Cardiovascular-Renal Physiology and Pathophysiology. The meeting, sponsored by the American Physiological Society, is being held August 9-12, 2007 at the Hyatt Regency Austin on Town Lake, Austin, TX.

The researchers investigated the genomic factors underlying alcohol and tobacco use in a cohort of 120 families with at least one sibling pair was affected by hypertension (high blood pressure) and dyslipidemia (high lipids levels in the blood). (These variables were important because the excessive use of alcohol and tobacco may cause cardiovascular disorders like hypertension, so finding the genomic determinants behind alcohol and tobacco use may point to novel mechanisms for blood pressure modification by these substances.) The volunteers were from the Saguenay-Lac-St. Jean region of Quebec, Canada. The locale, which is relatively isolated, somewhat genetically homogenous, and has kept genealogical records of its citizens since the 17th-century, makes the study of complex genomic traits like these easier.

Phenotyping for alcohol and tobacco use was conducted using questionnaires. The researchers used a dense map (three haplotypes per cM; $r^2 > 0.4$), generated by merging 58000 SNPs (single nucleotide polymorphisms) and 437 microsatellite markers, to identify sex-specific and non-specific linked and associated areas.

Summary of Results

The researchers reported the following results:

-- using the information from the questionnaires, the researchers found sex differences in prevalence of alcohol (17.3% in females and 38.3% in males) and tobacco (22.2% in females and 28% in males) use

-- a common locus (an identifiable location on a chromosome) for alcohol and tobacco was found on chromosome (chr) 1. Also on chr 1, in

an area believed to be involved with diastolic blood pressure (DBP), they found a locus for smoking.

-- on chr 3, in the area identified as being involved with pre-math stress DBP, they found a locus for alcohol

-- on chr 4, inside gene GRID2, researchers found linked and associated SNPs for smoking moreover they found associated SNPs inside these gene for alcohol in males

-- female-specific candidate SNPs were found inside the HTR2C gene for smoking.

According to Mr. Nikpay, the lead author of the research, “We have found evidence of linkage and association for several genomic regions harboring genes with potential pathophysiological functions relating to alcohol and smoking. Our sex specific findings may also play a role in the sex differences related to alcohol and tobacco use.”

Source: American Physiological Society

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