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## **Skin color clue to nicotine dependence**

Higher concentrations of melanin -- the color pigment in skin and hair -- may be placing darker pigmented smokers at increased susceptibility to nicotine dependence and tobacco-related carcinogens than lighter skinned smokers, according to scientists.

"We have found that the concentration of melanin is directly related to the number of cigarettes smoked daily, levels of nicotine dependence, and nicotine exposure among African Americans," said Gary King, professor of biobehavioral health, Penn State.

King states that previous research shows that nicotine has a biochemical affinity for melanin. Conceivably, this association could result in an accumulation of the addictive agent in melanin-containing tissues of smokers with greater amounts of skin pigmentation.

"The point of the study is that, if in fact, nicotine does bind to melanin, populations with high levels of melanin could indicate certain types of smoking behavior, dependence, and health outcomes that will be different from those in less pigmented populations," explained King. "And the addiction process may very well be longer and more severe."

The team's findings appear in the June issue of the journal *Pharmacology, Biochemistry and Behavior*.

To investigate the factors linking tobacco use, nicotine exposure, and skin pigmentation, the researchers recruited 150 adult African American smokers from three sites in inner city Harrisburg during summer 2007. Participants provided researchers with the average number of cigarettes smoked each day and answered a questionnaire that measured nicotine dependence -- the Fagerstrom Test of Nicotine Dependence (FTND).

Researchers also measured the smokers' cotinine levels. Cotinine is a metabolic byproduct of nicotine that can be used as a biomarker for tobacco use. King and colleagues surmise that

nicotine's half-life may, along with tobacco toxicants, be extended due to the accumulation in melanin-containing tissues.

Statistical analyses of data on the three measures of smoking -- cigarettes per day, FTND score, and cotinine levels -- along with a host of other variables including age, education and social demographics of the smokers, reveal that facultative melanin -- the total amount of melanin acquired genetically plus the amount from the tanning effect of sunlight -- is significantly linked to the number of cigarettes smoked per day as well as the FTND score. This link was not observed with constitutive melanin, which is the amount of melanin solely acquired genetically.

However, the Penn State researcher cautions that additional studies with larger samples of smokers with varying levels of skin pigmentation will be required to provide a clearer picture of the link between skin color and nicotine addiction.

"We also think that studies conducted at different times of the year and in different geographic regions would help avoid seasonal variations such as the effect of tanning during summer," King explained. "Additionally, nicotine levels could also be influenced by factors such as consumption of alcohol, amount of exercise, diet, body fat and stress. Future studies will have to control for these factors as well."

According to King, findings from the study could have potential health implications for African American smokers, who tend to have darker skin, are disproportionately burdened with tobacco-related diseases, and report greater difficulty quitting smoking.

"One of the questions we want to address is why African Americans have lower quit rates than whites," King said. "This avenue of research may help us explore that question more definitively."

Previous studies indicate that even though African Americans smoke fewer cigarettes than some other groups, they have a higher intake of nicotine from each cigarette.

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Other researchers on the paper include Valerie B. Yerger, Assistant Adjunct Professor, University of California, San Francisco; Guy-Lucien Whembolua, recent doctoral graduate, Penn State; Robert B. Bendel, biostatistician, Washington State University; Rick Kittles, geneticist, University of Chicago; and Eric T. Moolchan, research physician, Alkermes, Inc. (formerly of the National Institute of Drug Abuse).

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