Cigarettes made from tobacco with less nicotine may help smokers quit

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(Medical Xpress) -- Smokers can begin loosening the tight grip of nicotine addiction by smoking low-nicotine cigarettes, without lighting up any more than they usually do, according to recent research.

In a small, controlled study of 135 smokers between the ages of 18 and 70, smokers who switched to cigarettes with tobacco that contains less nicotine did not compensate by smoking more cigarettes and inhaling more tar and toxins.

“The idea is to reduce people’s nicotine intake, so that they get used to the lower levels, and eventually get to the point where smoking is no longer satisfying,” said UCSF nicotine researcher Neal Benowitz, who led the study.

The new study results differ greatly from those obtained in studies conducted years earlier by Benowitz and others on previous generations of so-called low-nicotine delivery cigarettes.

UCSF has long been a leader in exploring strategies for smoking cessation, in exposing tobacco industry marketing practices, in designing public health programs related to tobacco, and in conducting biological research aimed at better understanding tobacco addiction and susceptibility. UCSF also is home to the Tobacco Control Archives —a wealth of legal documents and other materials.

FDA May Regulate Nicotine Content of Cigarettes

The U.S. Food and Drug Administration (FDA) has the authority to regulate the nicotine content of cigarettes sold in the United States, but has not yet moved to do so. According to Benowitz, a member of the agency's Tobacco Products Scientific Advisory Committee, there is hesitation to act in the absence of more scientific evidence.

However, recent groundbreaking studies by Benowitz and others have raised hopes that a new type of low-nicotine cigarette could help smokers quit and prevent nicotine addiction among youthful tobacco experimenters. The FDA, along with the National Institutes of Health (NIH) now has allocated funds for larger studies — not yet begun — to further explore the strategy.

Smokers' nicotine intake declined progressively as the nicotine content of the cigarettes was reduced, Benowitz and colleagues concluded in their most recently published analysis of the study data, which appeared online in February in the journal *Cancer Epidemiology, Biomarkers and Prevention*. The researchers measured levels of cotinine, a metabolic byproduct detectible in blood, as an indicator of nicotine intake.

Even as study participants took in less nicotine, their cigarette consumption and exposure to toxins and carcinogens in smoke, such as carbon monoxide and polycyclic aromatic hydrocarbons, remained stable.

“Reducing the nicotine content of cigarettes does not appear to be harmful to smokers, as evidenced by no increase in cigarettes smoked per day and no increase in exposure to tobacco-smoke combustion products,” Benowitz said.

Nicotine Content Cut 12-Fold

Benowitz wanted to simulate a societal scenario in which the nicotine content of cigarettes would be progressively regulated downward. After a two-week baseline period of smoking as usual, half the smokers in the two-year study were randomly assigned to continue smoking their usual brands. The other half smoked five different cigarettes containing progressively lower amounts of nicotine, starting at 12 milligrams — similar to the amount contained in typical commercial brands — and ending up at just one milligram.

The experimental group switched cigarettes every four weeks until they were smoking the cigarettes containing one milligram of nicotine, which they then smoked for six months. For the last year of the study, Benowitz and colleagues continued to monitor the smokers, but no longer provided them with the research cigarettes. The analysis published in February covers the first six months of the study.

In an earlier, pilot study of just 20 smokers and no control group, Benowitz’s research team reduced nicotine content over just six weeks instead of six months, with similar results. Benowitz says the expectation for any FDA regulation is that nicotine content might be reduced over a period of years.

It is uncertain how much the nicotine content of cigarettes would need to be lowered to optimize the likelihood that smokers would gradually wean themselves from cigarettes entirely, Benowitz said — although he has estimated from earlier nicotine studies that the target might be about one-half milligram per cigarette.

In new studies researchers will try to determine the level of nicotine in a cigarette that is required to maintain addiction, Benowitz said.

Earlier Low-Nicotine Cigarettes Featured Filters to Lower Intake

In studies of an earlier generation of so-called low-nicotine manufactured, commercial cigarettes, smokers compensated almost 100 percent, taking in much more nicotine and tar than predicted, according to Benowitz.

However, those cigarettes did not actually contain less nicotine, he said. They sported ventilated filters and porous paper to deliver less nicotine and tar. That worked well enough with smoking machines. But human smokers responded by taking larger, faster, more frequent puffs on the cigarettes, which allowed more nicotine and tar to get past the ventilation holes in the filters that were designed to limit intake.

Unlike the older generation, the low-nicotine cigarettes being evaluated in research today do in fact contain less nicotine. The reduction is achieved either by extracting nicotine from the tobacco, or by genetically engineering tobacco to reduce its nicotine content.

In his recent study Benowitz used cigarettes produced and provided by Philip Morris Tobacco Company, in which the paper and filters and weight of tobacco were similar to that of a Marlboros, and in which low-

nicotine tobacco obtained via chemical extraction was blended with tobacco containing normal amounts of nicotine. Seventeen smokers quickly quit the study because they disliked the flavor of the research cigarettes in comparison to their usual brands.

The Philip Morris low-nicotine research cigarettes are no longer available to academic researchers, Benowitz said. Instead scientists anticipate that the FDA will approve the experimental use of low-nicotine cigarettes made from genetically engineered tobacco by the 22nd Century Group, based in Clarence, NY.

Having the FDA step in to regulate the nicotine content of cigarettes sold commercially might prove less expensive than waging anti-smoking campaigns, according to Benowitz. “Measures to reduce smoking now have been effective but are very costly and time intensive,” he said.

Smoking Rates Continue to Fall, But Smoking Causes One in Five Deaths

However, he added, there also is a need to examine potential negative consequences of nicotine regulation, including black market sales of conventional cigarettes. In addition, FDA officials might also be driven to limit levels of other tobacco components and cigarette additives if research demonstrates that these chemicals strengthen addiction among smokers.

According to the U.S. Centers for Disease Control and Prevention (CDC), the percentage of U.S. adults who smoke fell from 24.7 percent in 1997 to 18.9 percent in 2011. Smoking is the cause of one in five U.S. deaths, according to the CDC.

“If we could get the smoking rate below 10 percent for the whole

country, that would be a great success," Benowitz said.

Provided by University of California, San Francisco

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