Levels of cancer-causing chemicals in smokeless tobacco products influence carcinogen exposure

December 19 2014

Higher levels of cancer-causing chemicals called tobacco-specific nitrosamines in smokeless tobacco products led to greater exposure to these carcinogens even after taking into account how much or how long the product was used, according to a study published in *Cancer Prevention Research*, a journal of the American Association for Cancer Research.

"Our results show that although the pattern of tobacco use—for example, amount of dip and number of dips—can influence the level of smokeless tobacco users' exposure to tobacco-specific nitrosamines, the actual amount of these chemicals in the products also makes a significant difference," said Dorothy K. Hatsukami, PhD, the Forster Family professor in cancer prevention in the Department of Psychiatry at the University of Minnesota in Minneapolis.

"The majority of smokeless tobacco users in the United States are not aware of the levels of cancer-causing chemicals in their smokeless tobacco products or of the tremendous variability in the levels of these chemicals across brands sold in this country," continued Hatsukami. "At a minimum, the FDA [U.S. Food and Drug Administration] should provide smokeless tobacco consumers information about the different levels of cancer-causing chemicals in different brands of smokeless tobacco and, ideally, require levels of tobacco-specific nitrosamines be substantially reduced, if not eliminated, in all products. Levels of these

chemicals in smokeless tobacco products could be readily reduced by changing manufacturing practices."

Levels of exposure to tobacco-specific nitrosamines are associated with disease risk, according to Hatsukami. Prior studies have shown that smokeless tobacco users in the United States experience about two to three times greater risks for oral cancer compared with those who do not use these products, she said. Pancreatic cancer has also been linked to smokeless tobacco use.

"Now that the FDA has the authority to establish product standards—that is, mandate the reduction of harmful and potentially harmful constituents in tobacco products—there has been greater interest in understanding how levels of tobacco-specific nitrosamines in products relate to exposure," said Hatsukami.

To study this, Hatsukami; Stephen Hecht, PhD, the Wallin professor of cancer prevention in the Department of Laboratory Medicine and Pathology at the University of Minnesota; and their colleagues analyzed data from 391 adults from Minneapolis/St. Paul; Eugene, Oregon; and Morgantown, West Virginia, who used smokeless tobacco products daily. The smokeless tobacco brands used by different participants varied in nicotine and tobacco-specific nitrosamine content. Participants could not be current users of other tobacco or nicotine products.

At two assessment sessions, approximately one week apart, demographic information, smokeless tobacco-use history, and urine samples were collected from participants. Urine samples were analyzed for biomarkers of exposure to nicotine and the tobacco-specific nitrosamines N'-nitrosonornictoine (NNN) and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK).

Analysis showed that levels of biomarkers of NNN and NNK in users'

urine samples were independently positively correlated with the number of years of daily smokeless tobacco use, number of tins of smokeless tobacco used each week, mean daily dip duration, and levels of NNN and NNK in the smokeless tobacco products used. For every one unit (µg/g wet weight) increase of NNK and NNN in the smokeless tobacco product used, the estimated increase of the corresponding biomarkers was 32 percent and 12 percent, respectively.

Provided by American Association for Cancer Research