



Published in final edited form as:

*Tob Control*. 2011 November ; 20(6): . doi:10.1136/tc.2010.037648.

## Major tobacco companies have technology to reduce carcinogen levels but do not apply it to popular smokeless tobacco products

Stephen S. Hecht, Ph.D.<sup>†,\*</sup>, Irina Stepanov, Ph.D.<sup>†</sup>, and Dorothy K. Hatsukami, Ph.D.<sup>†</sup>

<sup>†</sup>Masonic Cancer Center, University of Minnesota, Minneapolis, Minnesota, USA

### Keywords

smokeless tobacco; carcinogens; tobacco-specific nitrosamines

In 2006, Reynolds American Inc (RAI), a major tobacco company, purchased the American Snuff Company, LLC (formerly Conwood Company), manufacturer of the moist snuff products Grizzly and Kodiak. In January 2009, Altria Group, Inc. (the parent company of Philip Morris USA), and one of the world's largest tobacco companies, acquired the United States Smokeless Tobacco Company (USST), manufacturer of the popular moist snuff products Copenhagen and Skoal, sales of which totaled over five hundred and forty million cans in 2009. Smokeless tobacco is carcinogenic to humans, causing oral, pancreatic, and esophageal cancer.<sup>1,2</sup> It has been known since the 1970s that smokeless tobacco products such as Copenhagen and Skoal contain relatively high levels of the carcinogenic tobacco-specific nitrosamines NNN and NNK, themselves considered human carcinogens.<sup>2</sup> The typical 1–10 ppm amounts of both NNN and NNK in these products are hundreds to thousands of times higher than carcinogenic nitrosamine levels in non-tobacco products such as cured meat or beer.<sup>3</sup> No evidence has been found that Conwood and USST took any meaningful steps to reduce the relatively high levels of NNN and NNK in their products.

To determine if NNN and NNK levels in smokeless tobacco have changed since RAI and Altria purchased Conwood and USST, we analyzed selected products. The products analyzed included traditional brands such as Copenhagen, Skoal, Grizzly, and Kodiak, and the newer “spit-less” brands such as Camel Snus and Marlboro Snus, which are sold as small pouches of flavored tobacco with low moisture content. The analysis was performed by a standard validated method<sup>4</sup> (see Table).

The results demonstrate that RAI and Altria possess the technology to reduce NNN and NNK levels in smokeless tobacco. Evidence for this is the substantially reduced NNN and NNK levels found in their “spit-less” smokeless tobacco products Camel Snus, manufactured and heavily promoted by RAI, and Marlboro Snus, manufactured by Altria, and modest reductions in some traditional products.<sup>4,5</sup> The Camel Snus and Marlboro Snus

\*To whom correspondence should be addressed: Masonic Cancer Center, University of Minnesota, MMC 806, 420 Delaware St SE, Minneapolis, MN 55455, USA. phone: (612) 624-7604 fax: (612) 626-5135 hecht002@umn.edu.

**Conflict of Interest Statement.** Stephen S. Hecht is a witness for the plaintiff in a smokeless tobacco case. Dorothy Hatsukami has a grant from Nabi Biopharmaceuticals to conduct a clinical trial for the nicotine vaccine.

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, an exclusive licence (or non-exclusive for government employees) on a worldwide basis to the BMJ Publishing Group Ltd and its Licensees to permit this article (if accepted) to be published in *Tobacco Control* and any other BMJ PGL products to exploit all subsidiary rights, as set out in our licence. <http://group.bmj.com/products/journals/instructions-for-authors/licence-forms>

levels of NNN and NNK are similar to those found in Swedish snus products.<sup>6</sup> It has been known for more than three decades that the type of tobacco chosen; the agricultural, curing, and storage processes used; and other manufacturing processes including pasteurization - introduced for Swedish snus products - have a large effect on NNN and NNK levels.<sup>2,6</sup> Why haven't such modifications been applied fully in the manufacturing of Copenhagen, Skoal, Grizzly, and Kodiak, which collectively command more than 75% of the smokeless tobacco market share in the United States, and have NNN and NNK levels which are 5–8 times as great as those in Camel Snus and Marlboro Snus?

We conclude that RAI and Altria have done relatively little to reduce NNK and NNN levels in their most popular smokeless tobacco brands, in spite of the fact that they have the technology to do so. They aggressively market products such as Camel Snus while quietly profiting from their carcinogen-contaminated popular brands Skoal, Copenhagen, Grizzly and Kodiak – actions which could be described as a “snus-screen”. The public health community and regulatory agencies should take note of this questionable behavior by major purveyors of carcinogenic products.

## Acknowledgments

Our research on smokeless tobacco is supported by grants CA-81301, CA-141531, CA-1135884, and DA-013333 from the U.S. National Institutes of Health. We thank Aleksandar Knezevich for technical assistance.

## Reference List

1. U.S. Department of Health and Human Services. Report on Carcinogens. 11. Research Triangle Park, N.C: 2004.
2. International Agency for Research on Cancer. Smokeless tobacco and tobacco-specific nitrosamines. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; Lyon, FR: IARC; 2007.
3. Hotchkiss JH. Preformed *N*-nitroso compounds in foods and beverages. *Cancer Surv.* 1989; 8:295–321. [PubMed: 2696582]
4. Stepanov I, Jensen J, Hatsukami D, Hecht SS. Tobacco-specific nitrosamines in new tobacco products. *Nicotine Tob Res.* 2006; 8:309–13. [PubMed: 16766423]
5. Richter P, Hodge K, Stanfill S, Zhang L, Watson C. Surveillance of moist snuff: total nicotine, moisture, pH, un-ionized nicotine, and tobacco-specific nitrosamines. *Nicotine Tob Res.* 2008; 10:1645–52. [PubMed: 18988077]
6. Osterdahl BG, Jansson C, Paccou A. Decreased levels of tobacco-specific *N*-nitrosamines in moist snuff on the Swedish market. *J Agric Food Chem.* 2004; 52:5085–8. [PubMed: 15291479]

**What this paper adds**

Recent product analyses provide no evidence that major tobacco companies have attempted to reduce levels of carcinogenic tobacco-specific nitrosamines in their most popular smokeless tobacco products, while heavily promoting “spit-less” products with lower nitrosamine levels.

Table

<b>NNN and NNK in recently purchased smokeless tobacco products<sup>a</sup></b>		
	<b>µg/g dry weight</b>	
<b>Altria brands</b>	<b>NNN</b>	<b>NNK</b>
Copenhagen snuff	4.38	1.19
Copenhagen long cut	3.86	1.89
Copenhagen long cut wintergreen	3.06	1.51
Skoal straight long cut	3.43	1.50
Skoal straight long cut wintergreen	3.61	1.61
Skoal Bandits pouches wintergreen	3.42	1.74
Marlboro snus rich	0.594	0.130
Marlboro snus spearmint	0.699	0.221
Marlboro snus peppermint	0.534	0.220
Marlboro snus mild	0.589	0.191
<b>RAI brands</b>		
Grizzly snuff	8.13	2.94
Kodiak wintergreen	3.36	1.69
Camel snus frost	1.07	0.428
Camel snus mellow	1.19	0.460

<sup>a</sup>Traditional products were purchased in 2010; Marlboro snus and Camel snus were purchased in 2009.