

# Acrylamide exposure from smokeless tobacco dwarfed by dietary exposure or smoking

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The first comprehensive assessment of the acrylamide content of smokeless tobacco products (STPs) has shown that exposure to acrylamide through STP use is much smaller than—approximately 1% of—exposure from the diet or from cigarette smoking.

Acrylamide is a chemical that forms when plant matter is exposed to high temperatures, for example when plant-based foods (eg potatoes) are subjected to high cooking temperatures in frying, roasting or baking. Acrylamide is also found in cigarette smoke.

"Our study suggests that although acrylamide is present in STPs, the level is relatively low and may decrease over time," said Kevin McAdam, Senior Principal Scientist at British American Tobacco. "We think the acrylamide may form during production when tobacco is generally heated at lower temperatures but for longer periods than in food production".

Acrylamide causes cancer in animals when they are exposed to high doses. In 2010, the World Health Organisation Expert Committee on Food Additives concluded that acrylamide was a concern for human health. And the US Food and Drug Administration included acrylamide in the list of hazardous or potentially hazardous constituents of tobacco and smoke.

Whilst concern has focused on acrylamide exposure from food, studies also indicate that cigarette smoking is a significant source of acrylamide exposure. Little is known, however, about acrylamide in STPs. This is why researchers from British American Tobacco and the University of Louisville undertook the most comprehensive survey of STPs to date, including measuring acrylamide content.

"We have reported the widest ever survey of STPs, covering two countries, 74 commercial products, and 9 product types," explains David Rushforth, snus specialist at British American Tobacco. The samples, which included Swedish loose and portion snus, and numerous products in the U.S. including snus, chewing tobacco, moist snuff, dry snuff, soft pellet, hard pellet and plug, represented approximately 90% of the smokeless tobacco market in 2010.

Acrylamide was detected in all the STPs tested, but at very low levels. Average levels within most [smokeless tobacco](#) types did not differ significantly. However, for snus\*, there was a wide range corresponding with manufacturer, which may reflect differences in production methods.

Nevertheless, snus and other STPs present a minor source of acrylamide exposure compared with that from diet or cigarette smoking.

The researchers estimated average intake of acrylamide from Swedish snus at 9-27 nanograms (ng) per kilogram (kg) of body weight per day, with similar levels resulting from US moist snus. In contrast, it is generally thought that people consume between 1000 and 4000 nanograms of acrylamide from their diet per kilogram of body weight per day, with similar levels of additional acrylamide exposure from smoking.

Acrylamide is found in various cooked or processed foods, particularly potato chips, fries and bakery products, and levels in many foods remain constant during their shelf life. To assess the effects of processing and aging on acrylamide concentrations in STPs, the researchers manufactured an experimental snus sample. This involved heating a tobacco mixture at 100°C for several hours before cooling. They found that levels of acrylamide

increased from 167ng/g to 522ng/g during manufacture and then decreased significantly over time during subsequent storage at 4-8oC (to 150ng/g after 22 weeks), most likely due to chemical reactions within the product.

"The results of this study suggest that levels of acrylamide in STPs are so low that their use could not contribute in any meaningful way to human exposure," said Professor Brad Rodu of the University of Louisville School of Medicine.

"However, more research is required to further examine the stability of acrylamide in various STP types during their shelf-life," he said.

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