Section II
Scientific Section and Presentations

Effects of Smokeless Tobacco and Belching on DMT Breath Alcohol Results

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Mouth alcohol seems to be a very diverse phenomenon. Not only can it arise from exogenous sources such as mouthwash, asthma inhalers and (possibly) smokeless tobacco[1-4], but it has also been claimed that dentures, braces, dental adhesives and mouth jewelry trap alcohol in the mouth. Evidential tests almost universally require a waiting period before a sample is taken to allow the dissipation of mouth alcohol from any possible source[5]. However, it is also commonly alleged that mouth alcohol can arise from alcohol vapors escaping from the stomach during a spontaneous belch or a gastroesophageal reflux episode during the observation period. In Michigan, there are many defendants who have claimed that they belched during this time so quietly and politely that no one noticed; yet this small eructation had a large effect on their test result.

Dental jewelry and appliances have been tested and found not to trap mouth alcohol past the customary observation period[6-8]. There has been little research published on smokeless tobacco and breath tests beyond a 2001 paper by Dr. A.W. Jones that suggests that snuff (dry ground tobacco) has no effect[9]. The effects of gastroesophageal reflux and belching have also been refuted[10, 11], and if the breath test takes place after alcohol is absorbed, any vapors escaping from the stomach will contain no ethanol to contaminate the test [12]. Nonetheless, the "stomach alcohol" defense is so popular that it bears another look.

The Michigan State Police have been conducting validation studies on National Patent Analytical Systems' new breath test device, the Datamaster DMT. Results of those experiments were presented to IACT at the 2009 meeting in Anchorage, and will be published in 2011 in the *Journal of Forensic Sciences*. They demonstrated that mouth alcohol, cell phones, objects in the mouth and RFI had no effect on the test result as long as the proper test protocols were observed[13]. We conducted a short follow-up study to determine the effects of smokeless tobacco and belching on the DMT breath testing device.

Methods

Six male and two female subjects were recruited. All were moderate drinkers and either occasional smokeless tobacco users, or could belch on command. All reported to the study area at 8:30 a.m. At 9:00 a.m. all were verified as having 0.00 g ethanol/210 L breath using a Lifeloc Alcosensor PBT. Over the course of the next hour, they consumed enough ethanol to reach a peak of 0.10–0.12 g/210 L breath. No food was consumed from the start of the study until lunch at noon.

Breath samples were taken on a Datamaster DMT calibrated and configured according to the evidential protocol used by the Michigan State Police [14]. The instrument was set up to request two tests in the following sequence: blank test, internal standard, subject sample, blank test, subject sample, blank test, internal standard. Results were reported to two decimal places, as would occur during an evidential test. If the results of any duplicate tests were more than 0.01 g/210 L apart, the instrument would automatically request a third test.

Subjects gave paired tests in one of two experimental conditions: tobacco or belch. All the tobacco-using subjects were male, and provided their own tobacco. All brands of smokeless tobacco used list ethyl alcohol as an ingredient, although none say at what concentration. Subjects gave the first sample without tobacco present. They then inserted what they considered a typical amount into the mouth before giving the second sample. Most then removed it until the next test sequence. However, after the first test sequence, subject DN left it in and gave the first subsequent sample with tobacco present before removing it for the second of the paired tests.

For the belching experiments, subjects belched as profusely as they were able in the interval between the two tests. One subject belched into the mouthpiece during the second test. It should be noted that all belches were loud and obvious to casual observers.

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Results

All subjects gave tests before the start of drinking with and without tobacco. The presence of tobacco did not contribute any detectable ethanol to the test result. Subject DN did not remove his tobacco after this initial test. He consumed his alcohol with the tobacco still in his mouth, and gave the first subsequent test with tobacco present. The presence of tobacco did not elevate his subsequent test results, indicating that no trapped alcohol remained in the mouth after the conclusion of the drinking period. The results show that the presence of smokeless tobacco did not affect the breath test result for any subject, nor cause any false positive ethanol results.

Tobacco Results

Subject	Time of Test	Result	Tobacco Present	Type of Tobacco
JA	10:14	0.00	No	Skoal Long Cut Wintergreen
	10:17	0.00	Yes	
	11:41	0.09	No	
	11:44	0.09	Yes	
	14:06	0.06	No	
	14:09	0.06	Yes	
DE	10:27	0.00	No	Copenhagen Long Cut
	10:29	0.00	Yes	
	11:33	0.14	No	
	11:36	0.14	Yes	
DN	10:20	0.00	No	Copenhagen Extra Long Cut
	10:24	0.00	Yes	
	11:48	0.08	Yes	Did not remove after 10:24 test
	11:51	0.09	No	

Belching Results

Subject	Time of Test	End of Drinking	Result	Belched	Belch Details
SM	10:06	9:30	0.10	No	
	10:09		0.11	Yes	Belched 2x between tests
	10:13		0.10	No	
	10:15		0.09	Yes	Belched right before 2d test
MG	9:52	9:25	0.09	No	
	9:55		0.09	Yes	Belched 2x between
	9:59		0.09	No	
	10:02		0.09	Yes	Belched into mouthpiece
DB	9:38	9:15	0.06	No	
	9:41		0.06	Yes	Belched 3x between
TW	14:24	11:30	0.08	No	
	14:26		0.08	Yes	Belched 1x between
GH	14:12	11:30	0.08	No	
	14:15	11:30	0.08	Yes	Belched 3x between

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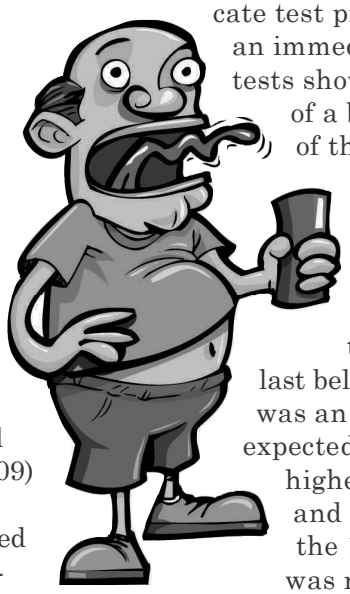
Belching

The shortest time frame between the end of drinking and a belch was approximately 23-25 minutes. Even at this point, the belches had no effect. One subject (SM), who was 36 minutes past the end of drinking, had her after-belch test (10:09) raised by 0.01 g/210 L. This is within the allowed variability of the duplicate test protocol, however, and an immediate subsequent set of tests showed no elevating effect of a belch. The second test of the second set (10:15) was approximately eight minutes past the first belches given by this subject, and less than two minutes after the last belch. If mouth alcohol was an issue, one would have expected the 10:15 test to be higher than the 10:13 test, and possibly higher than the 10:09 test. Clearly, it was not.



Conclusions

Although the subject group was small, the results are clear. The presence of smokeless tobacco in the mouth did not add alcohol to a breath test result, either directly or by trapping alcohol in the oral cavity. Vigorous belching even as short as 25 minutes after drinking did not elevate the test result, most likely because the subjects' stomachs were empty of alcohol at this point. Any belch which occurred after the alcohol was absorbed did not elevate the breath test result.

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