

Constituent comparison in smokeless tobacco products used in Europe.

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Introduction

There is currently much debate regarding the potential use of smokeless tobacco (ST) products as part of a public health strategy for reducing the health impact of smoking. Globally there are many different forms of ST products in use today, and some forms of ST are clearly associated with increases in risks of diseases such as oral cancer. Due to differences in tobacco types used, added ingredients, manufacture process and storage methods, the chemical profiles of ST products may vary widely.

In Sweden the smoking incidence in males is low (<14%) which may be associated with the widespread use of snus. Swedish snus is manufactured to an industry product standard (Gothiatek®) that limits the levels of certain toxic constituents e.g. tobacco specific nitrosamines (TSNAs) which are classified as known or probable carcinogens. The health risks associated with snus have been estimated to be at least 90% lower than those of smoking^{1,2}. Each of these factors may contribute to Sweden having the lowest male incidence of smoking related disease, including oral cancer, in the developed world.

Snus is banned in the EU apart from Sweden. However, permitted ST products may contain higher levels of toxic constituents and therefore may pose an increased risk to health relative to snus. Supporters of the use of ST for tobacco harm reduction purposes recommend that a regulatory framework for such products should be implemented. This would include limits on certain toxic constituents as used by the industry in Sweden.

Study Aim

The objective of this study was to measure the constituent levels of a range of ST products currently permitted by EU legislation and available across Europe, and to compare these with limits proposed by the European Smokeless Tobacco Council (ESTOC) for potential incorporation into future EU ST regulation³ (based upon Gothiatek® limits, derived from food legislation) and also with levels found in Swedish snus.

Methods

A selection of 30 smokeless tobacco products, from the many available, were sourced from within the EU (Nasal snuff – Germany & UK, Asian Based Products – France, UK, Chewing Tobacco Bits – Denmark, Snus – Sweden). The products ranged from nasal snuff, chewing tobacco, chewing bits, tobacco toothpaste and snus. The products were analysed at Group Research & Development, Southampton for:

- Moisture: Water Content by Volatile Loss by Oven at 110°C for 3 Hours
- pH by pH electrode meter
- Nicotine (total alkaloids) by Continuous Flow Analysis, method LOQ 0.4%
- Nitrite by flow injection analysis, method LOQ 1.0ppm
- Benzo(a)pyrene (B(a)P) by High-Performance Liquid Chromatography, method LOQ 0.25ppb
- N-Nitrosodimethylamine (NDMA) by Liquid Chromatography tandem Mass Spectrometry, method LOQ 0.45ppb
- Tobacco specific nitrosamines (TSNAs) measured as N'-Nitrosoanabasine (NAB), N'-N nitrosoanatabine (NAT), 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) and N'-Nitrosonornicotine (NNN) and totalled, by Liquid Chromatography tandem Mass Spectrometry, method LOQ in ppm NAB 0.003, NAT 0.027, NNK 0.009, NNN 0.025
- Metals; arsenic, cadmium, chromium, lead and nickel by Inductively coupled plasma mass spectrometry, LOQ in ppm 0.02, 0.02, 0.04, 0.02, 0.08 respectively.

The results were compared to the ESTOC Standards³, reported average results for Swedish Matches snus from 2006 and Lucky Strike Brown averages for 2006. All results have been reported on a dry weight basis (DWB)

ESTOC Proposed Standard³ for Smokeless Tobacco Product constituents³

STP Constituent	Limit (dry weight basis)
TSNA (tobacco-specific nitrosamines)	10 mg/kg
NDMA (nitrosodimethylamine)	10 microg/kg
B(a)P (benzo(a)pyrene)	20 microg/kg
Lead	2 mg/kg
Cadmium	2 mg/kg
Arsenic	To be reported only
Chromium	"
Nickel	"
Nitrates	"

*The ESTOC standard also proposes guidelines for ingredients and ingredients reporting, including banning of products containing proven hazardous ingredients such as areca nut.

Results

• 22 out of 26 of the ST products contain toxic constituents at levels above those found in Swedish snus products

• 5 out of 26 (~20%) of the ST products contain toxic constituents at levels above those proposed by the European Smokeless Tobacco Council (ESTOC) for potential incorporation into future EU ST regulation.

Discussion

Swedish snus is the ST product that has amongst the lowest level of toxic constituents of those tested and has been cited by many studies to be associated with the low incidence of smoking and tobacco related disease rates in Sweden. As a result snus is considered by some to be a product that may reduce the health impact of smoking. However, it is the only product tested that is not freely available to non-Swedish smokers within the EU. Gutkha and Gutkha Tulsī also have low levels of the constituents tested, but like many of the Asian based products these contain potentially harmful ingredients such as areca nut and slaked lime which are associated with high rates of oral disease⁴.

This study demonstrates that the majority of products examined, that are legally permitted for sale within the EU, contain higher levels of toxic constituents than those typically found in Swedish snus, the product that is currently banned within the EU except Sweden. In addition, ~20% of the measured products also contain levels of constituents above those proposed by ESTOC.

In conclusion we agree with those members of the public health community who call for regulation of the ST products category to include regulatory standards for maximum levels of toxic constituents^{5,6}.

References

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Results Table

SMOKELESS TOBACCO TYPE	Nitrite ppm (DWB)	B(a)P ppb (DWB)	NDMA ppb (DWB)	TSNAs ppm (DWB)	Arsenic ppm (DWB)	Cadmium ppm (DWB)	Chromium ppm (DWB)	Lead ppm (DWB)	Nickel ppm (DWB)	Oven Moisture (%)	pH	Nicotine % (DWB)
NASAL SNUFF												
MacCraig Royal	6.93	4.1	3.1	3.8	0.28	1.06	1.28	1.18	1.11	15.1	8.6	1.11
Ozora President	6.92	6.5	2.0	3.8	0.27	1.16	1.47	1.03	1.18	17.3	8.4	1.39
Posichli Gletscher Prise extra	<1.02	1.6	8.8	2.5	0.13	0.55	0.53	0.54	0.56	24.1	7.2	0.52
Lowen Prise	6.85	4.9	3.0	3.7	0.19	0.77	0.94	0.66	1.17	20.0	8.0	1.19
Packards Club Snuff	3.99	3.7	<1.5	3.3	0.27	0.95	0.99	0.79	1.11	15.3	8.2	1.18
Savithi Apple	4.16	4.8	<1.4	3.6	0.29	1.31	1.24	0.97	1.15	16.7	8.5	1.34
Radiol Premium	2.90	4.8	<1.3	3.6	0.31	0.88	1.08	0.96	1.22	16.1	7.9	1.16
Alpina Snuff	1.57	2.7	<1.4	2.5	0.19	0.66	1.55	0.86	1.49	17.7	7.2	0.87
Kloster Andechs Special	1.79	2.8	<1.4	2.3	0.12	0.5	1.03	0.54	1.07	21.5	7.4	0.75
Rumey's Export	6.63	3.4	3.3	2.6	0.18	0.88	0.85	1.26	0.93	19.4	9.0	0.83
Singlora Menthol	4.02	3.6	1.9	1.8	0.13	0.58	0.68	0.77	0.83	14.1	8.6	0.6
Edel Prise Extra	5.07	3.9	2.5	2.4	0.18	0.66	0.92	1.26	0.88	13.1	8.4	0.72
Kensington	6.19	3.8	3.5	2.0	0.13	0.56	0.57	0.68	0.77	21.1	10.0	0.7
Torque	1.55	6.1	2.1	3.0	0.18	0.42	0.63	0.9	0.99	20.6	9.7	1.12
ASIAN BASED PRODUCTS												
Makia Inrika	15.2	ND	2.0	1.0	0.59	0.87	2.94	1.34	1.78	51.5	10.9	2.81
Neffa Souffi	<1.02	0.6	2.4	4.0	0.72	1.83	1.82	1.4	1.23	23.3	8	2.79
iPCO Creamy Snuff	3.15	1.5	ND	7.5	0.19	0.14	1.11	0.69	1.2	39.4	9.0	0.79
Gutkha	<1.02	1.2	<0.5	0.5	0.06	0.04	0.40	0.17	0.83	6.9	8.7	<0.4
Khaini	1.72	1.7	<0.9	ND	0.47	0.7	1.02	1.25	1.39	49.7	8.1	3.11
Pan Massala	<1.02	4.4	<0.5	<0.03	0.04	<0.03	0.25	0.17	1.12	7.4	8.6	<0.4
Baba 120	1.01	2.7	1.3	ND	0.18	0.35	1.1	0.72	1.51	16.3	5.6	4.63
Gutkha Tulsī	0.54	1.3	1.2	1.3	0.07	0.1	0.41	0.38	1.09	4.7	8.6	0.74
Makia Bouffier Benthoou	<0.04	ND	5.1	1.1	0.90	0.69	2.87	1.86	1.59	52.4	11.2	2.67
Zen Mizca (zarda)	0.98	0.9	1.3	2.4	0.24	0.47	1.47	2.03	1.86	16	5.6	3.29
Raise (gum)	0.89	0.1	1.4	2.4	0.15	0.27	1.12	0.73	1.53	17.3	5.5	2.05
CHEWING TOBACCO BITS												
Oliver Twist Tropical	<1.02	0.7	<1.4	1.2	0.22	0.5	0.57	0.9	1.19	22.4	5.0	2.07
SWEDISH SNUSS												
Rocker	1.70	1.5	2.8	1.4	0.12	0.45	0.80	0.37	1.46	50.5	8.06	1.83
General	1.45	1.0	1.6	1.3	0.11	0.52	0.60	0.31	1.21	53	8.5	1.95
Lucky Strike Brown Mean 2006	<1.18	1.5	<1.0	<1.95	0.14	0.63	0.73	0.38	1.05	53.2	7.8	1.72
Swedish Match Mean 2006	2.0	1.2	1.0	1.6	0.12	0.4	0.80	0.2	1.2	n/a	n/a	n/a

 results similar to Swedish Snus products
 results above Swedish Snus products
 results above ESTOC proposed standard