

Little Cigars vs 3R4F Cigarette: Physical Properties and HPHC Yields

Supporting Information

Tables

Table SI1
The Physical and Chemical Properties Measured for the 3R4F Reference Cigarette
(Average ± Standard Error) Compared to Previously Published Results

		Current Study (N = 4)	Previous Studies ¹⁻⁴
<i>Physical Properties</i>			
Tobacco Mass (mg)		753 ± 10	760-775
Consumed Tobacco (mg)	ISO	579 ± 5	620 ^a
	CIR	568 ± 9	NA ^b
TPM (mg)	ISO	7.3 ± 0.3	9.5 ± 0.4
	CIR	31.9 ± 1.3	44.1 ± 1.4
Puff Number (N)	ISO	7.0 ± 0.0	7.9 -10
	CIR	9.0 ± 0.0	10.4 -10.7
Circumference (mm)		24.5 ± 0.1	24.5
Length (mm)		83.9 ± 0.2	84.0
Filter Length (mm)		26.7 ± 0.0	NA
<i>Semivolatile HPHCs per mass of TPM¹</i>			
NNN (ng/mg)	ISO	14.3 ± 1.1	11.4 ± 1.3
	CIR	9.2 ± 0.5	7.1 ± 1.1
NNK (ng/mg)	ISO	11.9 ± 1.0	10.4 ± 1.2
	CIR	8.7 ± 0.5	7.0 ± 1.1
BaP (ng/mg)	ISO	0.8 ± 0.1	0.6 ± 1.4
	CIR	0.4 ± 0.02	0.3 ± 1.4
Nicotine (µg/mg)	ISO	80.7 ± 5.1	76.8 ± 1.8
	CIR	55.9 ± 2.9	44.7 ± 1.9

Note.

a = At puff number: 8 puff; b = NA: Data not available

Supplemental References

1. Eldridge A, Betson TR, Gama MV, McAdam K. Variation in tobacco and mainstream smoke toxicant yields from selected commercial cigarette products. *Regul Toxicol Pharmacol.* 2015;71:409–427.
2. Roemer E, Schramke H, Weiler H, Wittke S. Mainstream smoke chemistry and in vitro and in vivo toxicity of the reference cigarettes 3R4F and 2R4F. *Beiträge zur Tabakforschung International (Contributions to Tobacco Research).* 2012;25(1):316–335.
3. Marcilla A, Beltran MI, Gómez-Siurana A, et al. Comparison between the mainstream smoke of eleven RYO tobacco brands and the reference tobacco 3R4F. *Toxicol Rep.* 2014;1:122–136.
4. Kentucky Tobacco Research and Development Center. 3R4F Preliminary Analysis. Available at: <https://ctrp.uky.edu/resources/pdf/webdocs/3R4F%20Preliminary%20Analysis.pdf>. Accessed June 25, 2017.

Table SI2
Chemical Constituent Yields Normalized to Nicotine Yield (Average ± Standard Error) in the Mainstream Smoke of the Little Cigars and the Reference Cigarette (3R4F) Using ISO and CIR Smoking Regimens

	NNN	NNK	Menthol	BaP	NNN	NNK	Menthol	BaP
	ng/μg N ^a	ng/μg N	μg/μg N	ng/μg N	ng/μg N	ng/μg N	μg/μg N	ng/μg N
	ISO				CIR			
Cheyenne Full Flavor	0.305 ± 0.012	0.319 ± 0.018	ND ^b	0.022 ± 0.001	0.327 ± 0.022	0.329 ± 0.031	0.008 ± 0.000	0.023 ± 0.002
Cheyenne Menthol	0.282 ± 0.017	0.215 ± 0.013	0.797 ± 0.053	0.016 ± 0.001	0.282 ± 0.010	0.218 ± 0.015	0.772 ± 0.051	0.013 ± 0.001
Swisher Sweets Original	1.004 ± 0.053	0.610 ± 0.031	ND ^b	0.011 ± 0.001	1.017 ± 0.065	0.651 ± 0.043	0.010 ± 0.001	0.011 ± 0.001
Swisher Sweets Sweet Cherry	0.469 ± 0.024	0.360 ± 0.025	ND ^b	0.015 ± 0.001	0.471 ± 0.014	0.398 ± 0.015	ND ^b	0.013 ± 0.001
3R4F	0.178 ± 0.014	0.148 ± 0.013	ND ^b	0.010 ± 0.001	0.164 ± 0.007	0.155 ± 0.008	ND ^b	0.007 ± 0.000

Note.
a = N: Nicotine; b = ND: Not detected

Table SI3
Thickness Measurements of the Paper Wrapper of the 3R4F Reference Cigarette and the Selected Little Cigars in Centimeters (cm)

Product	Thickness in cm			
	Maximum Thickness	Minimum Thickness	The Thickness of the Folded Paper	Average ± Std. Error (N = 3)
3R4F	0.0097	0.0097	-	0.0097 ± 0.000
Cheyenne Full Flavor	0.0127	0.0114	0.0224	0.0155 ± 0.004
Cheyenne Menthol	0.0157	0.0127	0.0224	0.0169 ± 0.003
Swisher Sweet Original	0.0132	0.0102	0.0163	0.0132 ± 0.002
Swisher Sweet Cherry	0.0102	0.0102	0.0150	0.0118 ± 0.002

Figures

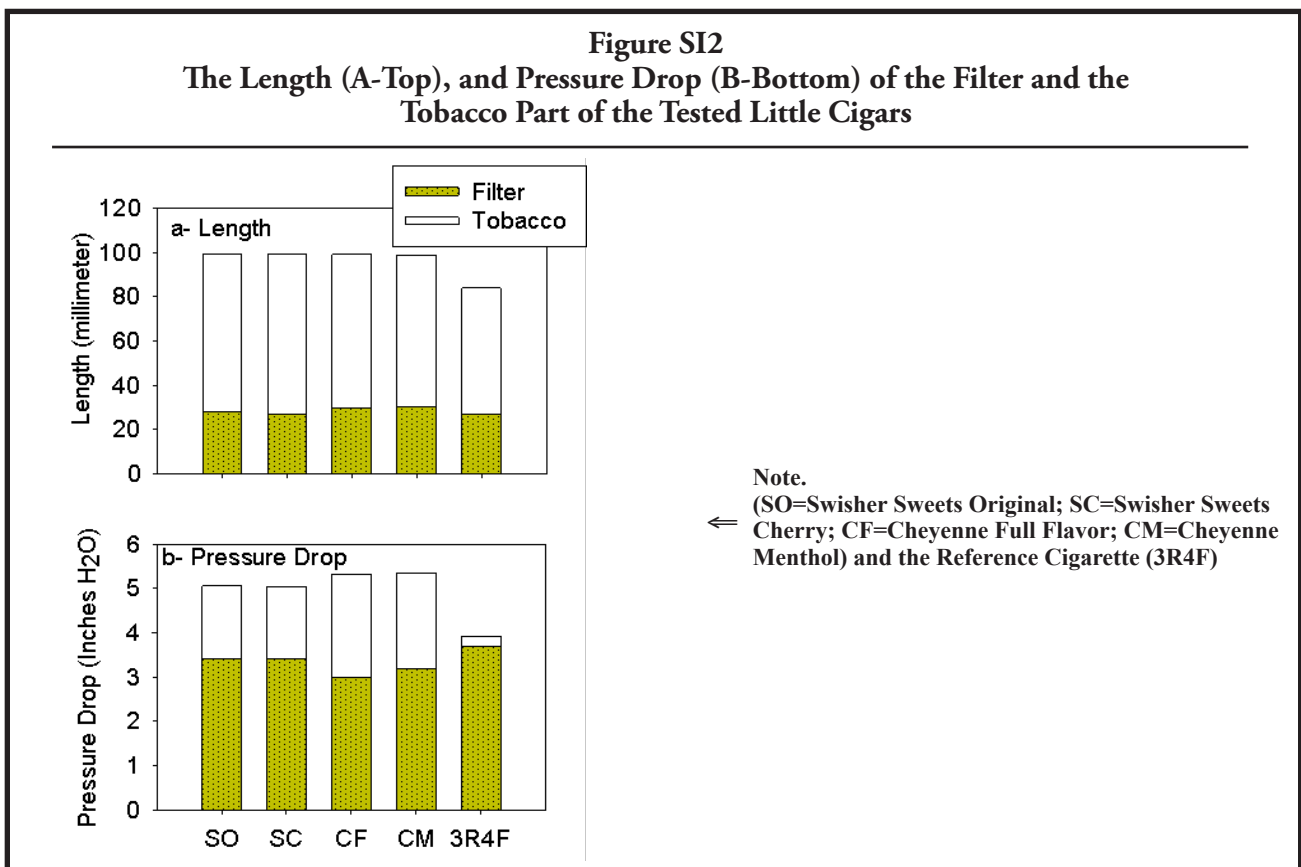
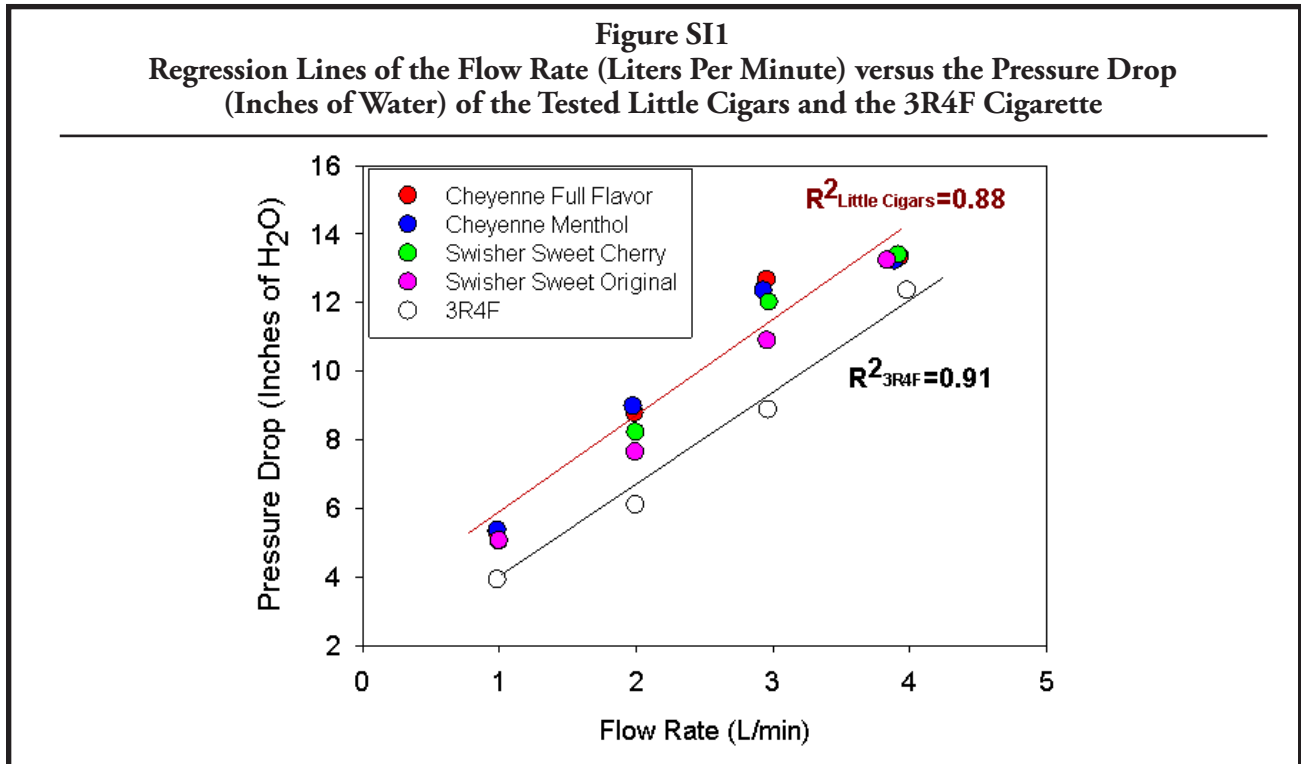
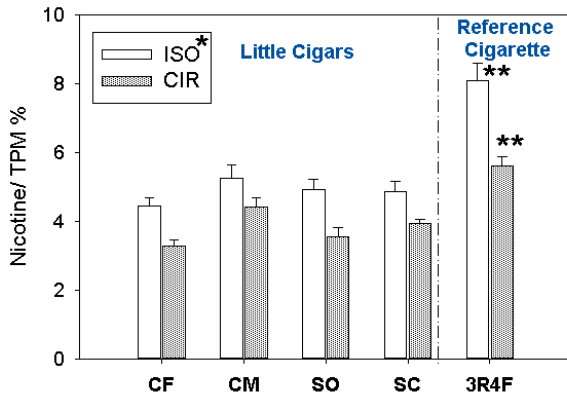


Figure SI3
Percentage of Nicotine per Mass of Total Particulate Matter (TPM) in the Selected Little Cigars

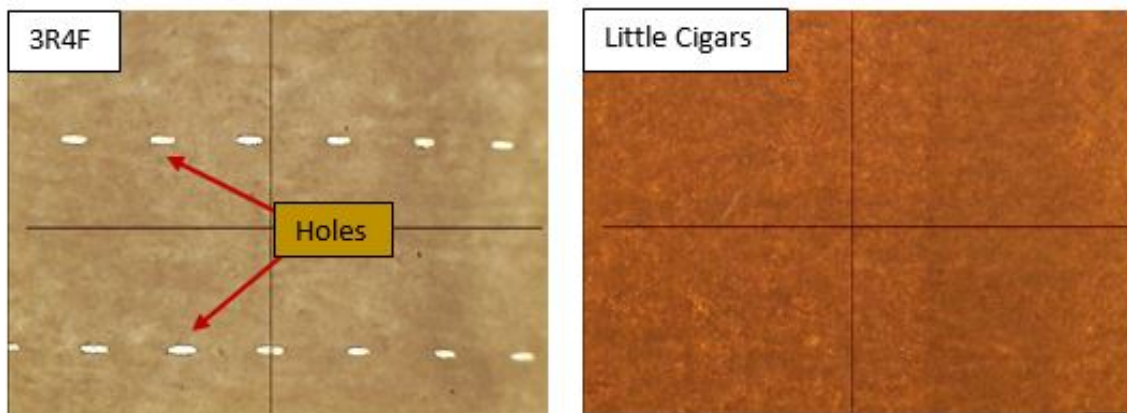


Note.
 (CF = Cheyenne Full Flavor; CM = Cheyenne Menthol; SO = Swisher Sweets Original; SC = Swisher Sweets Cherry) and reference cigarette (3R4F) based on CIR and ISO smoking machine regimens; [*] Significant difference was found between ISO and CIR across all products ($p < .05$); [**] Significant difference was found between the 3R4F and the little cigars when using CIR ($p < .01$) and ISO ($p < .001$) smoking regimens.

Figure SI4
A Snapshot of the Tobacco Texture for the 3R4F Reference Cigarette and the Selected Little Cigars

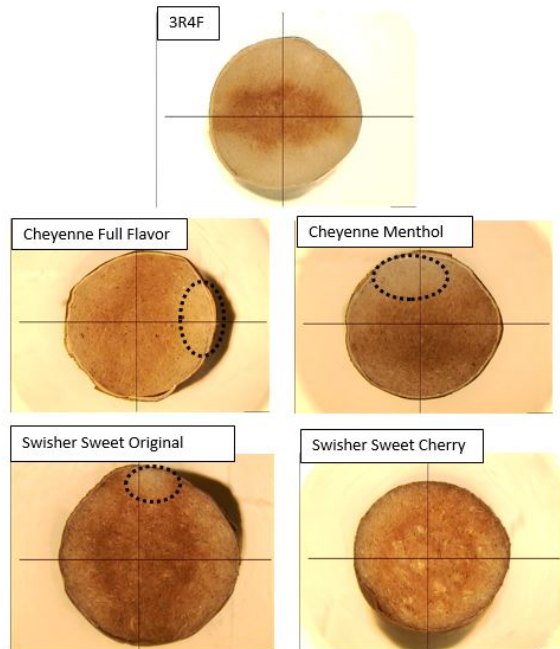


Figure SI5
A Snapshot of the Upper Side of the 3R4F Reference Cigarette and Little Cigars Filter Paper



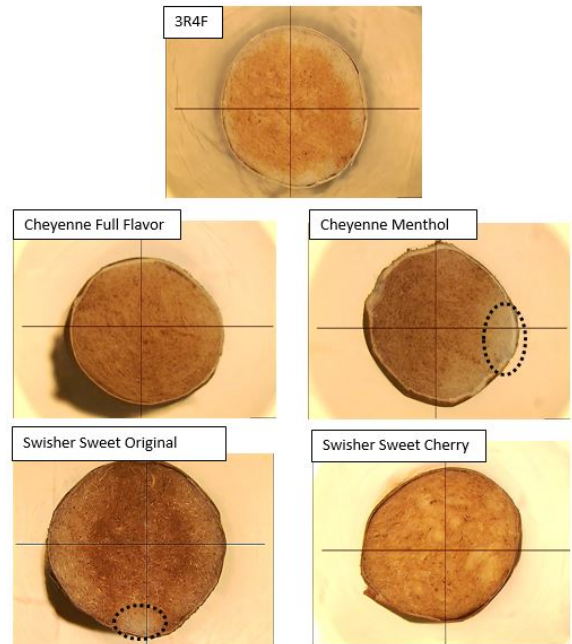
Note.
 Ventilation holes measure (average \pm standard error) 0.016 ± 0.001 cm in length and 0.007 ± 0.0002 cm in width.

Figure SI6
A Snapshot of the 3R4F Reference Cigarette and Selected Little Cigars Filters after Machine Smoking (ISO Puffing)



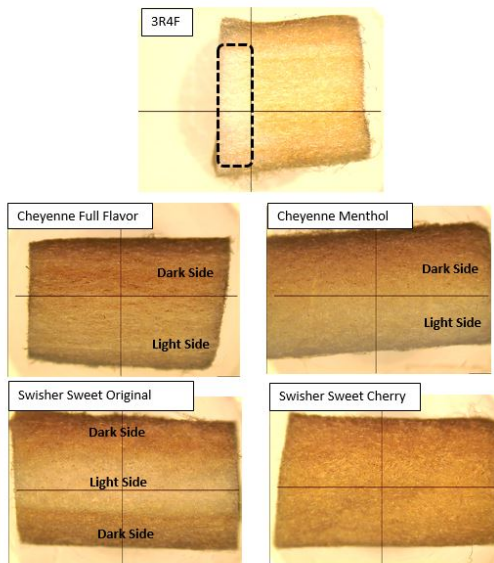
Note.
 The section shows the close-to-mouth filter; the dotted circles show the light parts of the filter in little cigars.

Figure SI7
A Mid-cross Section of the Filter Part of the 3R4F Reference Cigarette and Selected Little Cigars after Machine Smoking (ISO Puffing)



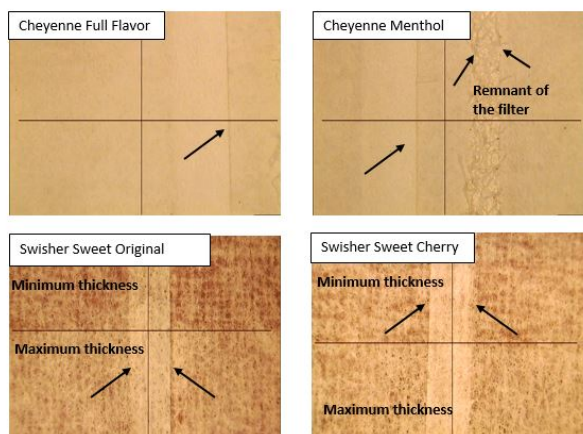
Note.
 The dotted circles show the light parts of the filter in little cigars

Figure SI8
Longitudinal Section of the 3R4F Reference Cigarette and Selected Little Cigars Filters after Machine Smoking (ISO Puffing)



Note.
 ← The dotted square shows the light part of the filter in the reference cigarette.

Figure SI9
An Inner View of the Filter Paper of the Selected Little Cigars



Note.
The arrows refer to the over folded paper (the thickest part of the filter); the 3R4F reference cigarette showed uniform paper with 2 lines of holes around the filter (not shown here).

Figure SI10
An Inner Snapshot of the Paper Wrapper of Cheyenne and Swisher Sweet



Note.
The white portion is an additional inner paper that wrapped the little cigar tobacco.