HARMFUL AND POTENTIALLY HARMFUL CONSTITUENTS IN TOBACCOS AND MAINSTREAM SMOKE FROM CIGARILLOS AND FILTERED CIGARS

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Sources of data

- HPHC data were obtained from Global Laboratory Services, Wilson, NC 27893-9536 USA.
- Routine analytical chemistry data were also obtained from Global Laboratory Services.

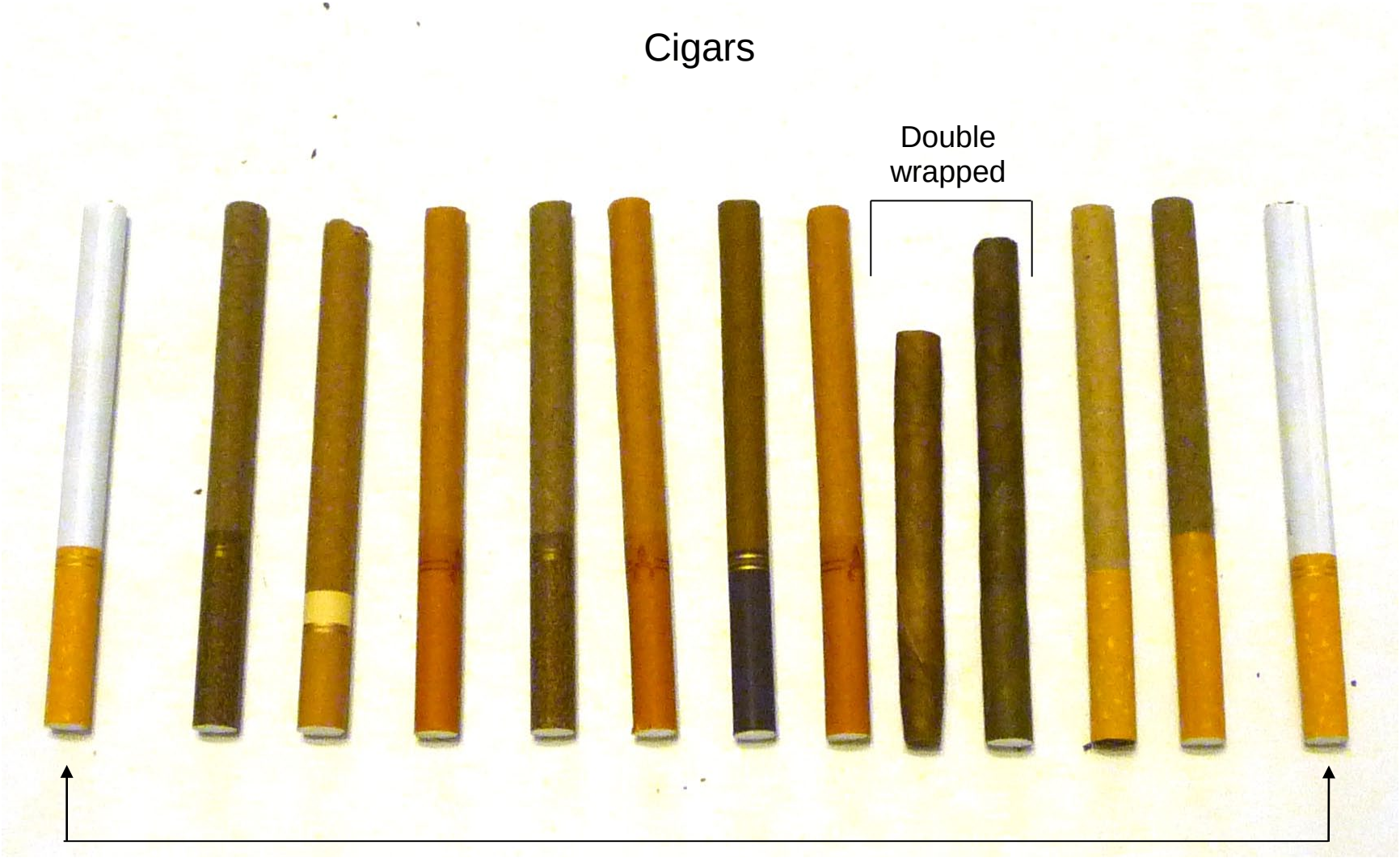
Current situation

- If and when FDA Deeming Regulations become effective, cigarillos and filtered cigars will likely be included
  - Likely that same rules and grandfather date will apply as for cigarettes
  - Unlike cigarettes, there is little public information on the chemical, physical, and toxicological properties of these products and mainstream smoke (MSS)
- Our objective is to educate regulators
  - Prior reports on blend/wrapper/physicals
  - This one is on HPHC in tobacco and MSS

Some pictures follow

- To ensure everyone is familiar with filtered cigars, cigarillos, and the tobacco blends used to fabricate them, the next two slides will show:
  1. Finished filtered cigars and cigarillos and 100-mm cigarettes for comparison
  2. Blends taken from filtered cigars, cigarillos and cigarettes

Filtered cigars and cigarillos



Blends from several products

Experimental

- Samples – Retail pick-up, Atlanta, GA, area, early 2015
  - Four brand-styles (10 packs of 20 each)
    - "A" Traditional European cigarillo, nonfilter, had both reconstituted binder and wrapper
    - "B", "C", & "D" 100-mm domestic filtered cigars
    - No brand-style had a characterizing flavor
    - Domestic products single-wrapped with paper-type reconstituted wrapper
  - 9 packs each sent to GLS for analytical work and standard GLS methods were used

Physical measurements

Sample	Length Mean (mm)	Length Std. Dev.	Diameter Mean (mm)	Diameter Std. Dev.	Apparent Density Mean (g/mL)	Apparent Density Std. Dev.	Open Pressure Drop (mm).	Open Pressure Std. Dev.
A	74.5	0.26	8.30	0.12	0.20	0.01	137	38.6
B	98.7	0.33	7.90	0.03	0.22	0.00	133	6.70
C	99.0	0.30	7.88	0.03	0.30	0.01	214	14.4
D	98.0	0.65	7.94	0.08	0.29	0.01	194	14.2

Tobacco filler chemistry (%-DWB)

Sample	Total Alka-loids	Total Alka-loids Std. Dev.	Chloride	Chloride Std. Dev.	Nitrate	Nitrate Std. Dev.	Nitrite	Nitrite Std. Dev.
A	1.24	0.06	1.56	0.02	1.66	0.03	0.003	0.00
B	1.51	0.01	0.919	0.03	1.01	0.05	0.004	0.00
C	1.25	0.03	1.81	0.02	1.71	0.02	0.003	0.00
D	1.27	0.03	2.04	0.04	1.97	0.04	0.003	0.00

Total sugars and reducing sugars both below limit of quantitation

Tobacco wrapper chemistry (%-DWB)

Sample	Total Alka-loids	Total Alka-loids Std. Dev.	Chloride	Chloride Std. Dev.	Nitrate	Nitrate Std. Dev.	Nitrite	Nitrite Std. Dev.
A	0.67	0.02	1.57	0.02	1.99	0.05	0.003	0.00
B	0.34	0.02	1.05	0.00	1.23	0.01	0.016	0.00
C	0.21	0.02	1.53	0.03	2.09	0.03	0.004	0.00
D	0.48	0.04	1.54	0.08	2.67	0.19	0.003	0.00

Total sugars and reducing sugars both below limit of quantitation

Tobacco HPHC (µg/g)

Sample	Ammonia Mean	Ammonia Std. Dev.	Arsenic Mean	Arsenic Std. Dev.	Cadmium Mean	Cadmium Std. Dev.	Nicotine Mean	Nicotine Std. Dev.	NNK Mean	NNK Std, Dev	NNN Mean	NNN Std. Dev
A	5530	120	0.228	0.01	1.20	0.03	9950	90	0.761	0.00	3.71	0.08
B	2640	70.0	0.146	0.02	1.18	0.02	12000	100	0.987	0.08	4.08	0.06
C	2110	36.1	0.157	0.01	0.84	0.01	9750	240	0.700	0.01	2.76	0.04
D	2213	41.6	0.204	0.01	0.87	0.02	9860	120	1.07	0.06	3.36	0.05

MSS – ISO TNCO (mg/cig)

Sample	Puff Ctn. Mean	Puff Ctn. Std. Dev.	TPM Mean	TPM Std. Dev.	Tar Mean	Tar Std. Dev.	Nic Mean	Nic Std. Dev.	CO Mean	CO Std. Dev.
A	9.07	0.24	42.9	3.46	36.4	2.57	1.22	0.04	42.5	3.19
B	9.58	0.33	23.4	1.55	22.1	1.48	0.878	0.04	31.6	1.42
C	12.7	0.95	19.8	2.15	18.4	1.96	0.612	0.06	36.4	0.73
D	10.7	0.51	21.5	0.67	19.8	0.56	0.621	0.01	40.9	0.90
3R4F	9.11	0.46	10.2	0.28	8.47	0.20	0.93	0.02	10.9	1.92

MSS – Carbonyls (µg/cig)

Sample	Acetal-dehyde Mean	Acetal-dehyde Std. Dev	Acrolein Mean	Acrolein Std. Dev.	Formal-dehyde Mean	Formal-dehyde Std. Dev.	Croton-aldehyde	Croton-aldehyde Std. Dev
A	1149	197	33.8	5.87	8.97	1.10	30.1	5.37
B	1107	235	53.5	11.3	11.3	2.01	26.1	6.20
C	1350	157	65.4	7.05	11.4	2.07	30.8	3.27
D	1200	118	58.8	7.20	12.8	2.92	25.8	3.38
3R4F	550	79.2	39.0	5.55	16.1	2.09	13.3	1.97

MSS – Volatile organics (µg/cig)

Sample	Acrylo-nitrile Mean	Acrylo-nitrile Std. Dev.	1,3-bu-tadiene Mean	1,3-bu-tadiene Std. Dev.	Ben-zene Mean	Ben-zene Std. Dev.	Isoprene mean	Isoprene Std. Dev.	Toluene Mean	Toluene Std. Dev.
A	43.1	4.10	133	13.0	129	9.17	797	104	239	16.7
B	24.1	1.06	94.7	4.69	91.8	2.74	622	38.2	153	6.51
C	27.1	2.64	101	7.61	140	13.6	530	52,4	209	21.9
D	27.5	0.21	110	7.21	139	0.58	537	37.0	208	1.15
3R4F	8.32	1.47	56.5	2.54	40.8	5.74	391	17.9	67.5	10.1

MSS – Other HPHC (ng/cig) – 1

Sample	4-NH_2-biphenyl Mean	4-NH_2-biphenyl Std. Dev.	1-NH_2-naphthalene Mean	1-NH_2-naphthalene Std. Dev.	2-NH_2-naphthalene Mean	2-NH_2-naphthalene Std. Dev.	B[a]P Mean	B[a]P Std. Dev.	NNK Mean	NNK Std. Dev.	NNN Mean	NNN Std. Dev.
A	11.4	0.21	103	5.84	44.5	4.71	23.8	3.33	329	5.20	553	3.06
B	2.96	0.13	66.6	2.84	34.5	1.97	22.1	0.60	366	18.8	375	4.51
C	3.32	0.15	59.4	4.58	36.5	1.50	25.1	1.93	333	16.7	348	11.2
D	3.23	0.26	36.7	3.40	22.8	2.15	25.3	0.95	349	7.51	409	9.24
3R4F	1.8	1.0	15.3	0.66	7.9	1.33	7.73	0.32	88.3	3.8	98.9	1.36

Concluding remarks

- Results were about as expected
  - Cigar wrapper is not cigarette paper
    - Lower porosity hence higher MSS CO
    - Less uniform so more variability in results
  - Low alkaloid, low sugar blends with higher ammonia than most cigarette tobaccos
  - Results to date do not explain lighter tobacco color in Brands C and D
- HPHC smoke data were congruent with previously reported results of *in vitro* toxicological assays on MSS from similar products.