Differences in detailed chemistries among cigars and cigarettes and their potential relevance to the toxicological properties of mainstream cigar smoke

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Abstract

Several experts on smoking-related diseases have noted the rapid increase in the sales of certain types of cigars at the same time cigarette sales have been declining. Unlike cigarette tobaccos and cigarette smoke, whose chemical and toxicological properties have been well characterized, relatively little is known about cigars, particularly the newer types of machine-made cigars. Such contemporary products often have flavored tobacco fillers, and use reconstituted tobacco wrappers and binders as opposed to leaf tobacco used on premium cigars. Thus, detailed analyses of the fillers, binders, and wrappers would likely provide more information on product chemistries than would analyses on mainstream cigar smoke. We used two GC-MS scan techniques [Direct Silylation scan (in situ extraction and silylation with DMF/BSTFA) and Hexafluoroisopropanol scan (in situ extraction with HFP)] to characterize several brand-styles of contemporary cigars. The results from the two scans provided very good discrimination of tobacco fillers, binders, and wrappers.

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Introduction

Cigars are believed to represent one of the oldest ways humans have used tobacco products. The production of cigars in the US increased until cigarettes became popular. As cigarette usage increased cigar use decreased. In the latter third of the twentieth century, sales of cigars and cigar-like products in the USA, particularly those of known as little cigars and cigarillos, began to increase (National Cancer Institute, 1998). The little cigars and cigarillos are machine made as opposed to being hand-rolled as is the case with luxury, large cigars (Wehlburg, 1999). Part of the increase in the sales of cigars and cigarillos in USA has been the result of changes in taxation and prohibitions on certain characterizing flavors in cigarettes (Steinberg and Delnevo, 2010). Even before the September 2009 ban on certain characterizing flavors in cigarettes, there had been an increase in the sales of flavored cigar products (UMDNJ-School of Public Health, 2006). Moreover, there has been debate about what products should be properly called cigars. Some of the increase in cigar sales have been from products that differ from cigarettes only in being wrapped in reconstituted tobacco paper instead of being wrapped in cigarette paper.

Experimental

The objective of this work was to show that two experimental GC-MS scan techniques we have used for characterizing other tobacco products could be used to distinguish among different types of cigar products, and could also distinguish the tobaccos used in such products from those used in cigarettes and cigar products that are very similar to cigarettes. Examples of products are shown in Figures 1 (UMDNJ-School of Public Health, 2006) and 2 below.

Fig. 1

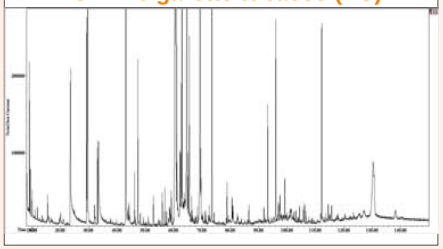
Fig. 2 Samples used in this work

We used the same experimental procedures we reported at several previous meetings such as Poster TOXI 51 at the 238th ACS national meeting (Washington, DC 2009).

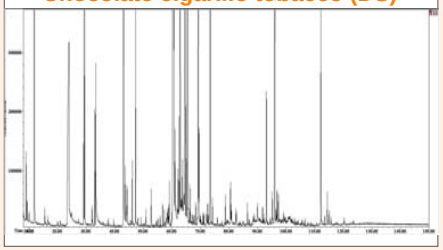
Results and discussion

Our results are shown in the TIC (total ion chromatogram) plots to the right of this panel. The four TIC plots in the left column are for direct silylation (DS) GC-MS scans of tobaccos from the KY3R4F reference cigarette (typical of contemporary US cigarettes), a chocolate-flavored cigarillo, cigarillo made from pipe tobacco, and a cigarillo made from cigar tobacco. These scans, which profile sugars, organic acids, and chlorogenic acids in the tobaccos show that there is little difference between the tobacco used in US-blend cigarettes and the chocolate-flavored cigarillo. The two TIC plots in the right column are from a solvent extraction (HFP or methanol) of the tobaccos and show peaks in the chocolate flavored tobacco not present in cigar tobacco.

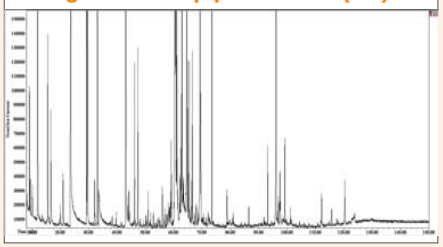
KY3R4F cigarette tobacco (DS)



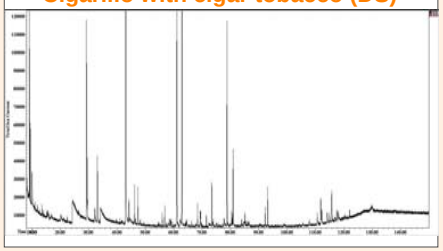
Chocolate cigarillo tobacco (DS)



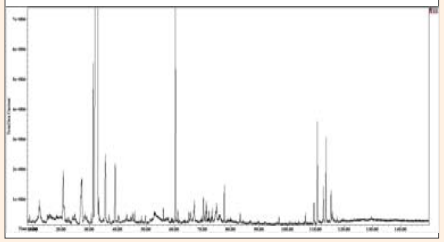
Cigarillo with pipe tobacco (DS)



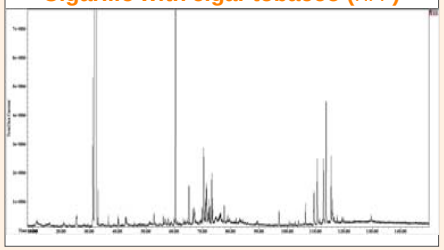
Cigarillo with cigar tobacco (DS)



Chocolate cigarillo tobacco (HFP)



Cigarillo with cigar tobacco (HFP)



Conclusions

The use of data from both the DS Scan and the HFP scan allows differentiation of true cigar products from cigar products that are simply cigarette tobacco in wrapped in a reconstituted tobacco sheet instead of cigarette paper. The use of these two techniques can distinguish between cigars made with pipe tobacco filler and those made with cigarette tobacco fillers.

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