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American Health Foundation

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Gregory N Connolly, DMD. MPH
Director
Massachusetts Tobacco Control Program
Massachusetts Department of Public Health
250 Washington Street, Fourth Floor
Boston MA 02108

Dear Dr. Connolly:

Let me not break with tradition and apologize again for my delayed response to your request for an evaluation of the 1999 MA Benchmark Study. We have summarized our critique as part of the attached report. Whereas the critique as such should be sent to the tobacco scientists who developed the "Benchmark Project," the ideas expressed in the following text are specifically written for your information. I leave it up to you to decide if you would like to forward this information.

First, we would like to comment that the chemists from the four cigarette manufacturers did a tremendous job and perhaps one should acknowledge that. In our critique of the industry report we state that it may be advisable to ask your Department's consultants to prepare a more specific evaluation of certain aspects of the study, each in his/her area of expertise. This more comprehensive critique should be sent to the industry scientists *via* you at least 1-2 weeks before another meeting. Our group could specifically critique the tobacco-specific nitrosamine issue and that of benzo(a)pyrene.

Obviously, the industry scientists and their lawyers are not very eager to analyze the mainstream smoke (MS) and sidestream smoke (SS) of all US commercial cigarettes that constitute in each year of analysis at least 3% of the market. Assuming there are 26 brands plus the Kentucky reference cigarette, and these 27 cigarettes were to be analyzed for 62 constituents in MS and SS with both the FTC and the MADH smoking schedules, one would need to determine 6,696 values. We feel that the following smoking profile compounds do not have to be determined since they do not make a significant contribution to the overall smoke toxicity and/or carcinogenicity of MS or SS. These include:

Volatile Carbonyl Compounds	IARC Carcinogenicity
Croton Aldehyde	3
Propionaldehyde	3
Butyraldehyde	3
Acetone	3
Methyl Ethyl Ketone	3

continued

Volatile Organic Compounds	IARC Carcinogenicity
Styrene***	2B
Acrylonitrile*	2A
Pyridine	3
Quinoline	3
Phenolic Compounds	
Hydroquinone	3
Resorcinol	3
Inorganic Agents	
Selenium	3
Lead	3
Cadmium**	2A
Mercury	3

IARC Classification Code: 1 = *Human Carcinogen*
2A = *Probably carcinogenic to humans*
2B = *Possibly carcinogenic to humans*
3 = *Noncarcinogenic*

* Acrylonitrile is classified as a Class 2A carcinogen, however, its concentrations in smoke are too low to add significantly to the overall carcinogenicity of smoke
** Similarly, cadmium, a class 2A carcinogen, is present in cigarette smoke at concentrations that have little bearing on the carcinogenicity of cigarette smoke.
*** This applies also to styrene, a class 2B carcinogen.

We would have recommended that pH determinations of the smoke be added to the required analyses because it is possible that the pH of the smoke of cigarettes with low nicotine yield (≤ 1.2 mg/cigarette) may produce a smoke pH >6.5 due to additives, while the blended US cigarette with higher nicotine yields produces a smoke pH between 5.5 and 6.0. Above pH 6.5, cigarette smoke contains a greater proportion of unprotonoted (free) nicotine that is rapidly absorbed in the oral cavity and upper respiratory tract. This increases the smoker's dependency on nicotine (suggested method for the determination of pH of each individual puff see *Tobacco Sci* 11,25, 1967 and *Food CosmetToxicol* 12, 115, 1974).

Another group of compounds not assessed thus far is that of the volatile carcinogenic *N*-nitrosamines, especially those in SS. For *N*-nitrosodimethylamine (NDMA), for example, SS emission can be up to 1,100 nanograms (ng)/cigarette and for *N*-nitrosopyrrolidine (NPYR) 400 ng /cigarette. In highly ETS-polluted indoor air one finds up to 240 ng/m^3 of NDMA and up to 100 ng/m^3 of NPYR. Both these volatile *N*-nitrosamines are classified as 2A and 2B carcinogens, respectively, by the IARC.

I hope you find these comments and our evaluation helpful.

Sincerely Yours,

D Hoffmann

Dietrich Hoffmann, Ph.D.
Associate Director

enclosure

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