

Evaluation of
Apple Juice Concentrate
For Use as a Cigarette Ingredient

April 2005

INTRODUCTION

Apple juice concentrate (CAS # 85251-63-4) is currently used worldwide at levels below **100 ppm** in selected cigarette brands manufactured and/or distributed by Philip Morris International. This document is a review of current published toxicology information on apple juice concentrate abstracted from online toxicity databases.

TOXICITY DATA ON UN-BURNED MATERIAL

The following information was generated from the MICROMEDEX database tool <http://csi.micromedex.com> on April 29th 2005, unless otherwise indicated.

Overview

Apple juice concentrate has variable composition, notably fruit sugars, malic acid and phenolic compounds such as chlorogenic acid. As the material is a common foodstuff, toxicology has not been evaluated in respect of usage in food.

There are a number of reports of sensitisation reactions to apples, and cross reactivity with pollen from certain trees¹.

TOXICITY DATA ON BURNT MATERIAL

Data on the toxicity of apple juice concentrate as a cigarette ingredient has been evaluated in a series of studies. The results of these studies may be found in the following references:

R.R. Baker et al., 2004, "An overview of the effects of tobacco ingredients on smoke chemistry and toxicity", *Food and chemical toxicology*, 42S:53-83. ****PEER REVIEWED****

E.L. Carmines, 2002, "Evaluation of the Potential Effects of Ingredients Added to Cigarettes. Part I: Cigarette Design, Testing Approach and Review of Results," *Food and Chemical Toxicology*, 40:77-91. ****PEER REVIEWED****

K. Rustemeier et al, 2002, "Evaluation of the Potential Effects of Ingredients Added to Cigarettes Part II. Chemical Smoke Composition," *Food and Chemical Toxicology*, 40:93 - 104. ****PEER REVIEWED****

Roemer et al, 2002, "Evaluation of the Potential Effects of Flavor Ingredients Added to Cigarettes. Part 3. In Vitro Genotoxicity and Cytotoxicity," *Food and Chemical Toxicology*, 40:105-111. ****PEER REVIEWED****

P.M. Vanscheeuwijck et al, 2002, "Toxicological Evaluation of Cigarettes without and with the Addition of Flavor Ingredients to the Tobacco. Part 4. Subchronic Inhalation Toxicity," *Food and Chemical Toxicology*, 40:113-131. ****PEER REVIEWED****

Gaworski et al, 1999, "Toxicological evaluation of flavor ingredients added to cigarette tobacco: skin painting bioassay of cigarette smoke condensate in SENCAR mice," *Toxicology*, 139 1-17. ****PEER REVIEWED****

¹ Herrmann D. Henzgen M. Frank E. Rudeschko O. Jaeger L. Effect of hyposensitisation for tree pollinosis on associated apple allergy. *Journal of Investigational Allergology & Clinical Immunology*. 5(5): 259-267, 1995

These studies indicate that ingredients used in the production of cigarettes do not increase the overall toxicity of cigarette smoke.

CONCLUSION

Cigarette smoking causes lung cancer, heart disease, emphysema and other serious diseases in smokers. Smokers are far more likely to develop diseases, like lung cancer, than non-smokers. There is no 'safe' cigarette. Government health warnings about smoking apply to all cigarettes, regardless of the ingredients added, including those containing only tobacco and paper.

While Philip Morris International has not conducted human studies on the health effects of ingredients used in cigarette manufacture, studies have been conducted using scientifically accepted *in vitro* and *in vivo* toxicity assays with various ingredient mixtures (see Toxicity Data on Burnt Material above). These studies show there is no meaningful difference in the composition or toxicity of smoke when the smoke from cigarettes with added ingredients is compared to the smoke from cigarettes without added ingredients. These findings are supported by similar studies from the published literature. It is our scientific judgement, based on the best available data, that apple juice concentrate used in our cigarettes does not increase the overall toxicity of cigarette smoke.