

RECORD TYPE : P  
SUB TYPE : S  
SECURITY CODE :  
FUNDING BODY :  
ORGANIZATION : IITL CANADA  
GROUP NUMBER : 444  
LOCAL PROJECT NUMBER(S) : T-7708;04  
PROJECT TITLE : Biological Effects of Tobacco Smoke and Tobacco Extracts in Short Term Tests  
PERSON RESPONSIBLE : BILIMORIA, M.H.  
EFFORT : 0.95 \* 1987  
PROJECT DESCRIPTION : Bacterial tests will be employed to study the mutagenicity of smoke condensates from IITL and opposition brands, as well as new market entries, to ensure that IITL products rank favourably in a comparative study. By determining the mutagenicity of smoke condensates and fractions from different cigarettes smoked under different conditions, the aim is to identify those parameters which affect mutagenicity. The effect of additives on condensate mutagenicity will also be studied as will smokeless tobacco products.

SCOPE : GROUP  
DEPTH : APPLIED/DEVELOPMENT  
FUNCTION : PUBLIC AFFAIRS  
OBJECTIVE : REGULATORY  
CLUSTER : BIOLOGY

DATE REVIEW WRITTEN : December 1987  
REVIEW TITLE : Biological Effects of Tobacco Smoke and Tobacco Extracts in Short-Term Tests.  
REVIEW TEXT : 1. Mutagenicity of Commercial Cigarettes :

130

JUNE 87 - JAN 88

LENGTH.

Due to potential government ranking of the mutagenic activities of commercial cigarettes, we are testing current market brands and new market entries as well as most experimental cigarettes. It is important to continue periodic testing of major opposition brands so that any change in biological activity is detected at the earliest possible moment. Recently, such a change in mutagenicity was recorded for Mark Ten, K, F. Two years ago this brand showed low mutagenicity and was placed among the lowest activity Canadian brands. When this brand was re-tested in July 87, it showed a marked increase in mutagenic activity. This was confirmed by re-examining the cigarettes purchased in September 1985 which were still preserved in the laboratory.

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A visual examination of the tobacco showed that the old blend was slightly darker with either more upstalk or trashy tobacco. Also, the old blend showed the presence of PCL which was absent from the more recent versions.

A ranking of all commercial cigarettes tested at IRL, Montreal, showed that the 100 mm brands tested, both Canadian flue-cured and U.S. blended, were the highest in mutagenicity in their respective groups. Consequently, we decided to examine other 100 mm. brands made from flue-cured tobacco to determine if they too showed high mutagenicity. In one experiment we tested three 100 mm. brands and found that all three were significantly higher than the Player's Check control ( $p < 0.05$ ) and high enough to be placed with the higher activity commercial flue-cured brands. In fact, one of them, viz., Viscount, EM, was found to be significantly higher than the other two 100 mm. brands (Benson & Hedges and Matinee Sp. F.). By testing Benson & Hedges Light and the same brand cut to 84 mm., it was shown that the length of the cigarette per se was not responsible for the high mutagenicity, which may be the result of other parameters such as tobacco recipe and filter ventilation.

2. Effect of Antioxidants and Other Chemicals on the Mutagenicity of CSC.

Work is continuing on the screening of chemicals for their synergistic or antagonistic effects with cigarette smoke, as such interactions between toxic agents are realistic in terms of human exposure. In recent studies designed to reduce toxicity by omitting the pre-incubation step, CdCl appears to increase the mutagenicity of CSC with strain TA98. Other studies have shown that CdCl is mutagenic with strain TA1535 and its repair-proficient parent strain TA1975. Consequently, we shall study the mutagenicity of this compound in the presence of CSC using other Ames strains including TA100.

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Among other recently studied chemicals, uric acid, believed to be an important antioxidant in humans, has not shown any effect on the mutagenicity of CSC, while catechin and L-cysteine appear to reduce it. However, these results need to be repeated. We will continue to screen chemicals, particularly phenolic antioxidants, for their antimutagenic effects. Numerous studies have shown these chemicals to possess antitumorigenic activity. Such studies have the potential for reducing the biological activity of tobacco smoke.

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