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A COMPARATIVE INHALATION TOXICITY STUDY ON SMOKE
FROM CIGARETTES CONTAINING FLUE-CURED TOBACCO
AND "BATFLAKE" IN VARYING PROPORTIONS
(FIRST REPORT)

(Report No. RD.1231-R)

SUMMARY AND CONCLUSIONS

A comparative inhalation toxicity study has been carried out using cigarettes containing flue-cured tobacco and BATFLAKE Mark II in varying proportions.

A new exposure system was developed for the project and this is described briefly.

The study reported here involved preliminary range finding work to fix exposure conditions, a dosimetry experiment, measurements of respiratory function of animals and an extensive pathological examination, particularly of the respiratory system.

Dosimetry studies showed that in the exposure system used, smoke particulate matter (TPM) penetrated to all parts of the respiratory system. Mass deposition of TPM was greatest in the lungs of animals. There was no marked difference in deposition pattern of smoke from cigarettes containing BATFLAKE Mark II compared with the tobacco control. Of the particulate matter retained in the respiratory system of rats, 85% or more was detected in the lower respiratory system. Nasal filtration of particulates did not occur to a very significant extent.

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Under the exposure conditions used for the study, there was no difference in the respiratory patterns of animals breathing smoke from that cigarette containing the highest level of BATFLAKE, compared with the control tobacco cigarette. There was no evidence that inhalation of smoke from either the control or BATFLAKE-containing cigarettes had any consistent effect on simple "normal" respiratory characteristics of animals.

For comparable groups, the carboxyhaemoglobin levels in animals immediately following an exposure to smoke was reduced as the level of BATFLAKE increased in the test cigarettes.

A reduction in gain in bodyweight was seen for rats exposed to smoke. Sham-smoking also caused a reduction in bodyweight gain.

Smoke exposure caused an increase in the combined lung and trachea weight of animals. The increase in lung and trachea weight was inversely related to the percentage of BATFLAKE in the test cigarettes.

Smoke exposure tended to increase the heart weight of animals. The increase in heart weight was inversely related to the percentage of BATFLAKE in cigarettes.

Most rats survived to termination and the inhaled smoke caused:-

1. Squamous metaplasia in the larynx.
2. Hyperplasia and keratinisation in the larynx.
3. Goblet cell hyperplasia in the bronchi.
4. Goblet cell hyperplasia in the nasal cavity.
5. Increased macrophage activity in the lung.

It was inferred, from quantitative data, that the degree of reaction observed for three of these changes - laryngeal keratinising hyperplasia, bronchial goblet cell hyperplasia and alveolar macrophage activity -

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was related to the cigarette type and the smoke concentration to which animals were exposed. For animals exposed to smoke from cigarettes containing BATFLAKE Mark II, all values of hyperplastic response decreased as the proportion of the substitute increased.

Squamous metaplasia occurred in the larynx of every rat exposed to smoke, including those in the group subjected to smoke from cigarettes containing the lowest proportion (25%) of tobacco. It developed early but was not observed as a response to smoke in any other region of the respiratory tract.

Smoke did not cause hypertrophy of mucus-secreting glands nor did it evoke a suppurative reaction in the respiratory tract. Upper alimentary and cardiovascular tissues were unaffected.

Evidence was obtained to indicate that viral lung damage reduces the survival time of rats exposed to the higher concentrations of smoke.

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