CHEMICAL CARCINOGENS AND RESPIRATORY EPITHELIUM

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1. Introduction

In an earlier communication [1], carcinogenic hydrocarbons benzo(a)pyrene (BaP), 7,12-dimethylbenz(a)anthracene (DMBA) and 3-methylcholanthrene (MC) were shown to produce metaplasia and increased proliferation of the epithelium of suckling rat tracheas maintained in organ culture. Tissues exposed for several days by including hydrocarbon in the medium, and tissues so treated and then withdrawn to hydrocarbonfree media were examined at intervals by histologic and autoradiographic methods; the latter were applied to tissues fed tritiated thymidine to detect cells synthesizing DNA. All hydrocarbons caused extensive death of connective tissue elements (fibrocytes, cartilage) and led to thymidine incorporation in only a small proportion of surviving connective tissue cells.

Distinctive epithelial alterations were produced by each hydrocarbon, but the general effect of all three agents was reduction in numbers of differentiated cells, marked increase in proportions of basal cells incorporating tritiated thymidine and slightly increased proportions of cells in mitosis (table I). Cells

TABLE I

COMPARISON OF RATES OF MITOSIS AND OF ^{3}H-THYMIDINE INCORPORATION IN RAT TRACHEAL EPITHELIUM EXPOSED TO DIMETHYLBENZANTHRACENE IN ORGAN CULTURE
(Modified from table 3 in [1].)

Expt. No.	DMBA Days Exposed and Dose	Total Cells per Circumference: Controls Labeled %	Controls Mitotic %	Treated Labeled %	Treated Mitotic %	Description of Epithelial Height
34	6 d, 2.0μg/ml	5.0	0.4	23.4	1.6	Very high
9	7 d, 1.4μg/ml	5.6	0.9	4.7	1.3	Medium high
8	9 d, 0.8μg/ml	2.9	0.5	23.6	0.4	Low
8, 13	9 d, 1.4μg/ml	7.5	—	15.4	0.9	Low
13	11 d, 1.4μg/ml	7.1	0.7	38.7	1.5	Low
	Means	5.5	0.6	21.1	1.1	
	Ratio L/M	10/1		20/1		

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