COATED MICA FLAKE PIGMENT

The Pathogenic Action Resulting from
A Single Inhalation Exposure

Male CRCD Rats

MR-582 - H-2979 - P-125

Necropsy findings in this study were summarized in report No. 121. The present study is of further interest in relation to mica flake pigment No. H-2978 (see reports Nos. 112 & 124). The latter is a pigment which contains in addition to the main ingredients muscovite mica (64.8%) and titanium dioxide (33.2%) a small quantity of antimony trioxide (2%). The formulation of pigment No. 2979 differs from the foregoing in having chromic sesquioxide (1.3%) substituted for the Sb_2O_3, the ratios of mica (67.2%) and TiO_2 (31.5) remaining about the same.

Histopathologic changes are summarized in Tables 1 & 2. Comparison of these reactions with those recorded for pigment No. 2978 indicates that, although there is persistent residual reaction of the lung tissue for both, the emphasis of change differs for the two substances and the pigment with the antimony component is slightly more injurious than is the present pigment containing the Cr_2O_3. Thus the pulmonary edema, emphysema and petechiation and tracheobronchitis are less pronounced in the group of rats exposed to the chromium charged mica. In the latter, however, there are additional interstitial infiltrations of alveolar septa, subpleural granulomatosis and intra-alveolar lipophage clusters which were not features of the lung tissue in the group of rats exposed to the antimony coated mica. The pneumonitis which is common to both groups is slightly more pronounced in the group exposed to the chromium variety of mica.

Since Cr_2O_3 is even more insoluble than Sb_2O_3, the occurrence of tissue reactions in extra thoracic organs is astonishing. The different patterns of reaction may reflect the separate affinities of chromium and antimony for

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individual cytological systems. Thus, there is involvement of the cerebral cortical neurones in this group of rats which was not noted in the animals exposed to the antimony coated mica. Again, whereas the latter affected the liver, the chromium avoided this organ. Instead the pancreas, thymus, adrenals and spleen were involved. The deposition of mica in the subcapsular zone of the spleen is an interesting observation for this indicates that phagocytosed particles may enter the circulation since there is no other route by which they could reach the spleen. Mica particles were not noticed in any other organs, suggesting that the spleen selectively retains the mica.

The reactions in the pancreas were limited to the acini; in the case of the adrenal only the cortex showed a change. Again, in the case of the thymus, the medullary centers were sought out for injury. This variegated response reflects the sites of biological action of chromium.

Comment

In view of the foregoing findings, exposure of human beings to significant aerosol concentrations of coated mica flake pigment with a chromium component would be contraindicated, unless prolonged inhalation experiments prove these tissue responses to be functionally inconsequential, reversible and non-progressive.

G. W. H. Schepers, M.D.
Pathologist

GWHS:mfs
11-22-61

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TABLE 1

COATED MICA FLAKE PIGMENT

Histopathologic Changes in CRCD Rats Following
A Single Four-Hour Inhalation Exposure

MR-582 - H-2979 - P-125

Respiratory System

Rat No.	Phagocytosis of Mica	Phagocytosis of Hemosiderin	Interstitial Cellular Infiltration	Lipophage Clusters	Edema	Petechiae	Hyperemia	Emphysema	Perivascular Infiltration	Subpleural Granulomatosis	Lymphoid Hyperplasia	Bronchitis	Tracheitis	Mediastinitis
48020	+	+++	++	+++	+	-	+	+	+++	+	++	+	+	-
48021	-	+++	+	-	+	-	+	-	+	-	+	+	-	-
48022	-	++	+	-	+	-	+	-	-	+	-	-	-	+
48024	+	++	+++	+++	-	+	+	+	+++	++	-	-	-	-

\+ = Slight reaction
++ = Moderate reaction
+++ = Marked reaction

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G. W. H. Schepers, M.D.
Pathologist

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TABLE 2

COATED MICA FLAKE PIGMENT

Histopathologic Changes in CRCD Rats Following
A Single Four-Hour Inhalation Exposure

MR-582 - H-2979 - P-125

Rat No.	BRAIN: Neuroglia Vacuolation	BRAIN: Neurones	BRAIN: Hyperemia	HEART: Right Ventricle Hypertrophy	LIVER: Focal Granulomata	LIVER: Centrilobular Vacuolation	PANCREAS: Acini: Hypotrophy	PANCREAS: Decreased Zymogen	DUODENUM: Duodenitis	KIDNEY: Focal Interstitial Nephritis	ADRENAL: Cortex: Hyperemia	ADRENAL: Fasciculata: Fatty Degeneration	THYMUS
48020	+	+	+	0	-	+	+	++	+	-	+	++	
48021	+	++	+	+	+	-	+	+	++	++	+	++	
48022	++	+	+	+	-	-	-	+	0	-	+	++	
48024	+	+	-	+	-	-	-	-	++	-	+	+	

0 = No tissue
\+ = Slight reaction
++ = Moderate reaction
+++ = Marked reaction
NAD*= No Abnormality Detected: STOMACH, BONE MARROW, THYROID, PITUITARY & TESTES

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G. W. H. Schep
Pathologist

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