

MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

TO : Chief, ETB
Through: Director, DBBS
Chief, BSB *[Signature]*

DATE: September 6, 1978

FROM : Research Veterinary Medical Officer

Hart-0063

SUBJECT: Pathology Report on Monkeys Exposed to PVC

Ten male *Cynomolgus* monkeys were exposed to PVC at 10 mg/m³ by inhalation for 6 hours/day, 5 days/week for almost 22 months. Control male monkeys (10) were maintained in an open animal room in their individual cages. The monkeys were killed within 48 hours after the final exposure. At the time of autopsy, tissues from the lungs (all lobes with trachea), thyroid, heart, tracheobronchial lymph nodes (TBLN), mesenteric lymph nodes (MLN), liver, spleen, kidney, urinary bladder, prostate, testis, stomach (pylorus), duodenum, pancreas, adrenals, and skin from the abdomen were saved for histopathology.

1.1 Control Monkeys

Path. Access. #77-2975, 77-2979, 77-2981, 77-2983 to 77-2986, 77-2991, 77-2993 and 77-2994.

Gross and histopathology: See the pathology report on monkeys exposed to Silica-F.

1.2 Monkeys Exposed to PVC

Path. Access. #77-2974, 77-2976, 77-2980, 77-2982, 77-2988, 77-2989, 77-2995, 77-2996, 77-2997 and 77-2999.

Gross Pathology: Adhesions between the lobes of the lung and the thoracic wall were seen in 77-2980, 77-2995 and 77-2997.

Multiple black areas were seen in the lungs of 77-2976, 77-2980, 77-2982, 77-2988, 77-2989, 77-2996, 77-2997 and 77-2999. Enlarged and black MLNs were seen in 77-2974 and 77-2976.

Histopathology:

Lung: Macrophages with anisotropic particles as in the controls were similarly present in all these monkeys. Admixed with these macrophages were other macrophages with spherical material (PVC) of varying size in the cytoplasm. About 15% of the total macrophage aggregates (macules) in 77-2997, 77-2988 and 77-2980 contained black to brown anisotropic particles of the same degree of deposition as in the controls. In the rest of the PVC exposed monkeys 20 to 22% of

the macules had these black to brown particles. A total of 110 macrophage aggregates were seen at 25X magnification in most of the lungs. The diameter of many of these aggregates varied from 100 to 200 μ while the largest, present in the alveolar region, measured 475 μ . The macrophage aggregates were present in the alveolar walls, alveoli, partially obstructing the alveolar lumens. They were also present around tertiary bronchioles and in some alveolar ducts without causing observable obstruction. A few places showed submucosal accumulations with no polypoidal projections. With phase contrast illumination these macrophage accumulations appear as blue aggregates. This tinctorial character is distinct from the macrophage aggregates seen in amorphous silica (F, G and P) exposed monkeys.

Focal hyperplasia of type II cells was present in 77-2989. Smooth muscle hyperplasia was seen around blood vessels and alveolar walls in 77-2996. Acute bronchopneumonia was seen in 77-2988. Plant material was present in a bronchus in 77-2999. Multiple giant cells away from the plant material were seen in the 77-2999. Non-inflammatory arteriopathy as in the controls was present in all these monkeys.

TBLN: As in the controls the medulla contained macrophages with anisotropic particles. In addition, other macrophages with cytoplasmic material (PVC - blue in color - see lung) were present. Together, these macrophages replaced most of the medulla of the TBLNs in all monkeys.

Liver: Diffuse fatty infiltration of the hepatocytes was present in 77-2982 and 77-2996.

Kidney: Multifocal calcification of cortical tubules was seen in 77-2995.

MLN: See the controls.

The other tissues examined were unremarkable.

Comment: A slightly higher number of macrophage aggregates containing black and brown birefringent particles were seen in PVC exposed than in the control monkeys. The pattern of distribution of the macrophage accumulations in the PVC exposed and the amorphous silica (F, G and P) exposed monkey lungs and the TBLNs was similar. The macules were smaller in size in PVC exposed than those seen in the amorphous silica (F, G and P) exposed monkeys. The monkey lung reaction suggests that it may be a

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non-specific one, inasmuch as these materials (PVC and amorphous silicas-F, G and P) show diverse chemical composition. The second paragraph under "Comment" in the pathology report on monkeys exposed to amorphous silica-F also applies here. The influence of the brown and black particles on the biologic effects of PVC are hard to define but should be carefully considered. The only contribution of the inhaled PVC dust deposition and retention to pulmonary tissue morphology was numerous aggregations of PVC-containing macrophages.

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