

- VINYL CHLORIDE DATA BASE INDEX -

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VINYL CHLORIDE, POLYVINYL CHLORIDE / CANCER-RELATED

- 1 AU - FORBES A ; PORTMANN B ; JOHNSON P ; WILLIAMS R
AD - Liver Unit, King's College Hosp., Denmark Hill, London SE5 9RS.
TI - Hepatic sarcomas in adults: A review of 25 cases.
SI - BIOSIS/87/31128
SO - GUT; 28 (6). 1987. 668-674.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. Twenty five patients with an apparently primary sarcoma of the liver are reviewed. Presenting complaints were non-specific, but hepatomegaly and abnormal liver function tests were usual. Use of the contraceptive pill (four of 11 women) was identified as a possible risk factor; one patient had previously been exposed to vinyl chloride monomer. Detailed investigation showed that the primary tumor was extrahepatic in nine of the 25 patients. Distinguishing features of the 15 patients with confirmed primary hepatic sarcoma included a lower incidence of multiple hepatic lesions and a shorter time from first symptoms to diagnosis, but the most valuable discriminator was histology. Angiosarcomas and undifferentiated tumors were all of hepatic origin, epithelioid haemangioendotheliomas (EHA) occurred as primary and secondary lesions and all other differentiated tumors arose outside the liver. The retroperitoneum was the most common site of an occult primary tumor and its careful examination therefore crucial; computed tomography scanning was found least fallible in this respect in the present series. Where resection (or transplantation), the best treatment, was not possible, results of therapy were disappointing, prognosis being considerably worse for patients with primary hepatic tumors. Patients with EHA had a better overall prognosis regardless of primary site.
- 2 AU - BELLI S ; BERTAZZI PA ; COMBA P ; FOA V ; MALTONI C ; MASINA A
AU - PIRASTU R ; REGGIANI A ; VIGOTTI MA
AD - Ist. Superior di Sanita, Univ. Rome, Rome.
TI - A cohort study on vinyl chloride manufacturers in Italy: Study design and preliminary results.
SI - BIOSIS/87/29246
SO - CANCER LETT; 35 (3). 1987. 253-262.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. A cohort mortality study of 5000 vinyl chloride manufacturers is ongoing in 9 Italian plants. They represent the entire workforce of those ever employed in the production of the monomer and its polymerization. The objectives of the study are to investigate the mortality of the exposed population and to clear up the carcinogenic spectrum of vinyl chloride. This article gives the results for 3 out of 9 plants, Rosignano, Ferrara and Ravenna, which represent about 25% of the total cohort. The expected deaths have been calculated using the mortality rates of the Italian population. For the deceased persons information from the death certificates were used in the analysis of mortality; additional clinical and pathological data were collected (best pathological evidence, b.p.e.). In Ferrara a statistically significant excess for all malignant tumors and

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lung cancer was detected. In Rosignano and Ravenna the number of observed deaths were small and therefore no comments can be made on cancer mortality. The cohort study is ongoing in the 6 remaining cohorts and the future analysis will consider duration and level of exposure and latency.

- 3 AU - MICHOT F ; BRUGGESSER D ; FEHR H ; YURTSEVER H ; ANABITARTE M
AD - Regionalspital, CH-4335 Laufenburg.
TI - Microangiopathic hemolysis, erythrophagocytosis and disseminated intravascular coagulation in hemangiosarcoma of spleen and liver due to vinyl chloride exposure.
SI - BIOSIS/87/28091
SO - SCHWEIZ MED WOCHENSCHR; 117 (26). 1987. 990-995.
LA - GER
AB - BIOSIS COPYRIGHT: BIOL ABS. A case of angiosarcoma of the liver and the spleen following vinyl chloride exposure is described. The main symptoms in clinical diagnosis were microangiopathic hemolysis, disseminated intravascular coagulation, hepatosplenomegaly and exposure to vinyl chloride thirty years ago. It is the first case in which liver and spleen are involved in angiosarcoma due to vinyl chloride exposure. The tumor cells showed angioformative and solid histiocytoid growth with erythrophagocytosis.
- 4 AU - Støretvedt S ; Daas H ; Andersen AA ; Langard S
AD - Health Dep./Res. Cent., Norsk Hvdro A/S, Oslo
TI - Incidence of cancer among vinyl chloride and polyvinyl chloride workers: further evidence for an association with malignant melanoma
SI - CA/107/064050B
SO - Br. J. Ind. Med.; VOL 44, ISS 4, 1987,278-80
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Vinyl chloride occupational exposure hazard Cancer vinyl chloride occupational exposure PVC occupational exposure malignant melanoma;Hygiene In vinyl chloride and PVC manuf., malignant melanoma in man in relation to Industrial;Intestine From occupational exposure to vinyl chloride and PVC, of man Colon, carcinoma;Lung From occupational exposure to vinyl chloride and PVC, of man Carcinoma;Melanoma From occupational exposure to vinyl chloride and PVC, of man;Skin From occupational exposure to vinyl chloride and PVC, of man Melanoma
- 5 AU - PURCHASE I FH ; STAFFORD J ; PADDLE GM
TI - VINYL CHLORIDE AN ASSESSMENT OF THE RISK OF OCCUPATIONAL EXPOSURE
SI - BIOSIS/87/20473
SO - FOOD CHEM TOXICOL; 25 (2). 1987. 187-202.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. RRM REVIEW HUMAN WOPKERS ANIMAL DIZZINESS MUTAGEN CARCINOGEN LIVER ANGIOSARCOMA OCCUPATIONAL TOXICOLOGY AIR POLLUTION HAZARDOUS MATERIALS HAZARDOUS OCCUPATION CHEMICAL INDUSTRY

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- 6 AU - BURCH JD ; CRAIB K JP ; CHOI B CK ; MILLER AB ; RISCH HA ; HOWE GR
AD - National Cancer Inst. of Canada Epidemiology Unit, Fac. Med.,
McMurrich Building, Univ. Toronto, 12 Queen's Park Crescent West,
Toronto, ON, M5S 1A8, Canada.
TI - An exploratory case-control study of brain tumors in adults.
SI - BIOSIS/87/19179
SO - JNCI (J NATL CANCER INST); 78 (4). 1987. 601-610.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. An exploratory study of brain
tumors in adults was carried out using 215 cases diagnosed in
Southern Ontario between 1979 and 1982, with an individually
matched, hospital control series. Significantly elevated risks
were observed for reported use of spring water, drinking of wine,
and consumption of pickled fish, together with a significant
protective effect for the regular consumption of any of several
types of fruit. While these factors are consistent with a role
for N-nitroso compounds in the etiology of these tumors, for
several other factors related to this hypothesis, no association
was observed. Occupation in the rubber industry was associated
with a significant relative risk of 9.0, though no other
occupational associations were seen. Two previously unreported
associations were with smoking nonfilter cigarettes with a
significant trend and with the use of hair dyes or sprays. The
data do not support an association between physical head trauma
requiring medical attention and risk of brain tumors and
indicate that exposure to ionizing radiation and vinyl chloride
monomer does not contribute any appreciable fraction of
attributable risk in the population studied. The findings warrant
further detailed investigation in future epidemiologic studies.
- 7 AU - Belli S ; Comba P ; Reggiani A ; Pirastu R ; Bertazzi PA ; Foa V
AU - Maltoni C ; Masina A ; Vigotti MA
AD - Ist. Sup. Sanita, Confinati, Romi
TI - Mortality study of PVC manufacturers in Italy: design of the
study and first results
SI - CA/106/055132G
SO - Acqua Aria; ISS 9, 1986, 983-8
LA - ITA
AB - CBAC COPYRIGHT: CHEM ABS Polyvinyl chloride manuf mortality
Italy; Hygiene In polyvinyl chloride manuf., cancer mortality in
relation to, in Italy Industrial; Lung Mortality from, poly(vinyl
chloride) manufg. worker occupational exposure in relation to, in
Italy; Neoplasms Mortality from, in poly(vinyl chloride) workers,
in Italy

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- 8 AU - THOMAS TL ; FONTHAM E TH ; NORMAN SA ; STEMHAGEN A ; HOOVER RN
AD - Occupational Studies Section, Environ. Epidemiol. Branch, NCI,
Landow Build., Room 4C16, Bethesda, Md. 20892, USA.
TI - Occupational risk factors for brain tumors: A case-referent
death-certificate analysis.
SI - BIOSIS/86/32223
SO - SCAND J WORK ENVIRON HEALTH; 12 (2). 1986. 121-127.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. Numerous studies have suggested
that employment in the oil refining and chemical manufacturing
industries may be associated with excess brain tumor risk. A
case-reference study was undertaken to evaluate brain tumor risk
by occupation and industry (in the USA) in three geographic areas
(northern New Jersey, Philadelphia, and the Gulf Coast of
Louisiana) with a heavy concentration of these industries. Seven
hundred and eighteen white men dying from brain tumor at age 30
years or older were ascertained from death certificates for
1978-1981. The referents were men who died of other causes,
excluding epilepsy and stroke. Usual occupation and industry were
obtained from the death certificates, and the maximum likelihood
estimates of the relative risk were calculated for specific
industries and occupations. Small nonsignificant excess risks of
brain tumors were seen among persons whose usual employment was
in the petroleum refining, electrical equipment manufacturing,
health services, and educational services industries. Compared
with other white-collar professionals, health diagnosticians,
teachers, and artists/designers had a significantly elevated
brain tumor risk. Among blue-collar workers, the only group with
a significantly elevated brain tumor risk was precision metal
workers, who are exposed to metal dusts and fumes and substances
used as coolants, lubricants, and degreasers.
- 9 AU - SWEENEY MH ; BEAUMONT JJ ; WAXWEILER RJ ; HALPERIN WE
AD - NIOSH, 4676 Columbia Parkw., Robert A. Taft Lab., Cincinnati,
Ohio 45226, USA.
TI - An investigation of mortality from cancer and other causes of
death among workers employed at an East Texas (USA) chemical
plant.
SI - BIOSIS/86/23149
SO - ARCH ENVIRON HEALTH; 41 (1). 1986. 23-28.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. The cause-specific mortality of
2,510 males employed at an east Texas chemical plant was examined
in a historical prospective study to evaluate a suspected
increase in deaths from multiple myeloma and brain cancer.
Potential exposures from chemicals, either used in manufacturing
processes or produced during the study period 1952-1977, included
the fuel additive tetraethyl lead, ethylene dibromide and
dichloride, inorganic lead, and vinyl chloride monomer. Overall
mortality for all workers (156 observed vs. 211.14 expected) and
for workers first employed between 1952 and 1959 (131 observed
vs. 167.33 expected) when tetraethyl lead was the single major

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product was lower than expected when compared to the (USA) general population. There were no significant increases in mortality from malignancies or other causes of death. The deficits may be due to the small number of total deaths, and the lower power for detecting excess risk of mortality from multiple myeloma ($z1$ -beta = 27, alpha = .05), brain cancer ($z1$ -beta = 31, alpha = .05), or other rare causes of death; lack of complete workplace exposure data for production workers; and the absence of historical measurements on the extent of environmental exposure to tetraethyl lead and other chemicals.

- 10 AU - ADKINS B JR ; VAN STEE EW ; SIMMONS JE ; EUSTIS SL
AD - Northrop Serv. Inc., P.O. Box 12313, Research Triangle Park, N.C. 27709, USA.
TI - Oncogenic response of strain A/J mice to inhaled chemicals.
SI - BIOSIS/86/20908
SO - J TOXICOL ENVIRON HEALTH; 17 (2-3). 1986. 311-322.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. Strain A/J mice were exposed by inhalation for 6 h/d, 5 d/wk, for 6 mo to carbon disulfide, 1,2-dibromoethane, ethylene oxide, naphthalene, nitrogen dioxide, or vinyl chloride. Significant increases in pulmonary adenoma formation were observed following exposure to 300 ppm carbon disulfide; 20 and 50 ppm 1,2-dibromoethane; 70 and 200 ppm ethylene oxide; 10 ppm nitrogen dioxide; and 50, 200, and 500 ppm vinyl chloride compared to control animals. Repeated studies with 1,2-dibromoethane, ethylene oxide, and vinyl chloride gave similarly significant results. Exposure of mice to 30 ppm naphthalene did not elicit a significant adenoma response. Histopathological examination of lungs from animals in these studies revealed multiple alveolar adenomas. Results from earlier studies with these chemicals, using strain A mice and Swiss mice, and bioassay information with rats and mice were compared with these data. These results provide further information for the validation of this in vivo model as a tool for predicting oncogenic potential following chemical exposure.
- 11 AU - Adkins BJ ; Van Stee EW ; Simmons JE ; Eustis SL
AD - Northrop Serv., Inc., Research Triangle Park
TI - Oncogenic response of strain A/J mice to inhaled chemicals
SI - CA/104/1635158
SO - J. Toxicol. Environ. Health; VOL 17, ISS 2-3, 1986, 311-22
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Strain A/J mice were exposed by inhalation for 6 h/day, 5 day/wk, for 6 mo to CS2 [75-15-0], 1,2-dibromoethane [106-93-4], ethylene oxide [75-21-8], naphthalene [91-20-3], NO2, or vinyl chloride [75-01-4]. Significant increases in pulmonary adenoma formation were obsd. following exposure to 300 ppm CS2; 20 and 50 ppm 1,2-dibromoethane; 70 and 200 ppm ethylene oxide; 10 ppm NO2; and 50, 200, and 500 ppm vinyl chloride compared to control animals. Exposure of mice to 30 ppm naphthalene did not elicit adenoma. Histopathol. examn. of lungs from animals in these studies
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revealed multiple alveolar adenomas. These results provide further information for the validation of this in vivo model as a tool for predicting oncogenic potential following chem. exposure.

- 12 AU - Geryk E ; Zudova Z
 AD - Ustav Dalsi Vzdel. Stred. Zdrav. Pracov.
 TI - Health hazard in occupational exposure to vinyl chloride
 SI - CA/104/192169X
 SO - Prac. Lek.; VOL 38, ISS 1, 1986,1-8
 LA - CZE
 AB - CBAC COPYRIGHT: CHEM ABS Vinyl chloride exposure cancer death Mental illness vinyl chloride exposure Gastrointestinal tumor vinyl chloride exposure Respiratory disease vinyl chloride exposure Abortion spontaneous vinyl chloride exposure Suicide worker vinyl chloride exposure Health hazard vinyl chloride exposure;Abortion From vinyl chloride occupational exposure, in plastics manufg. workers Spontaneous;Carcinogens Vinyl chloride, in occupational exposure in plastics manufg.;Death Premature, from vinyl chloride occupational exposure, in plastics manufg. workers;Digestive tract From vinyl chloride occupational exposure, in plastics manufg. Neoplasms;Health hazard From vinyl chloride exposure, in plastics manufg. workers Occupational;Hygiene In plastics industry, vinyl chloride exposure in Industrial;Lung From vinyl chloride occupational exposure, in plastics manufg.;Mutagens Vinyl chloride, in occupational exposure in plastics manufg.
- 13 AU - Thomas TL ; Waxweiler RJ
 AD - Occup. Stud. Sect., Natl. Cancer Inst., Bethesda
 TI - Brain tumors and occupational risk factors. A review
 SI - CA/104/173420F
 SO - Scand. J. Work, Environ. Health; VOL 12, ISS 1, 1986,1-15
 LA - ENG
 AB - CBAC COPYRIGHT: CHEM ABS Review brain tumor occupational exposure Occupational risk brain tumor review;Aromatic hydrocarbons Occupational exposure to, brain tumors incidence in relation to Polycyclic;Brain Epidemiol. of, occupational risk factors in relation to;Lubricating oils Occupational exposure to, brain tumors incidence in relation to;Neoplasms Of brain, occupational exposure to chems. in relation to;Phenols Occupational exposure to, brain tumors incidence in relation to;Solvents Org., occupational exposure to, brain tumor incidence in relation to
- 14 AU - Forman D ; Bennett B ; Stafford J ; Doll R
 AD - Epidemiol. Clin. Trials Unit, Radcliffe Infirm., Oxford
 TI - Exposure to vinyl chloride and angiosarcoma of the liver: a report of the register cases
 SI - CA/104/154988F
 SO - Br. J. Ind. Med.; VOL 42, ISS 11, 1985,750-3
 LA - ENG
 AB - CBAC COPYRIGHT: CHEM ABS Occupational exposure vinyl chloride cancer Angiosarcoma liver vinyl chloride exposure;Air pollution

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By vinyl chloride, occupational exposure to, liver angiosarcoma from, prediction of; Liver From occupational exposure to vinyl chloride monomer, prediction of Angiosarcoma; Sarcoma Of liver, from vinyl chloride occupational exposure, prediction of Angio-

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- 15 AU - Moss AR
AD - Univ. California, San Francisco
TI - Occupational exposure and brain tumors
SI - CA/104/135110X
SO - J. Toxicol. Environ. Health; VOL 16, ISS 5, 1985, 703-11
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Brain tumor vinyl chloride review
Cancer brain petrochem exposure review; Brain Occupational exposure to petrochems. and vinyl chloride in relation to; Health hazard From occupational exposure to petrochem. and vinyl chloride; Petrochemicals Occupational exposure to, brain tumors in
- 16 AU - REDEL C
TI - THE EFFECT OF DISEASE OCCURRENCE OF VOLUNTARY PARTICIPATION IN MEDICAL SURVEILLANCE OF CHEMICALLY EXPOSED WORKERS
SI - BIOSIS/85/13122
SO - 42ND ANNUAL NATIONAL MEETING OF THE AMERICAN FEDERATION FOR CLINICAL RESEARCH, WASHINGTON, D.C., USA, MAY 3-6, 1985. CLIN RES; 33 (2 PART 1). 1985. 264A.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT HUMAN ACRYLONITRILE VINYL CHLORIDE CARCINOGEN HEPATIC ANGIOSARCOMA
- 17 AU - DIETZ A ; LANGBEIN G ; PERMANETTER W
AD - Innere Abt. Kreiskrankenhauses, D-8263 Burghausen, Bundesrepublik Deutschland.
TI - Vinylchloride-induced hepato-cellular carcinoma.
SI - BIOSIS/85/03255
SO - KLIN WOCHENSCHR; 63 (7). 1985. 325-331.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. Hepatocellular carcinomas (3) were observed in workers of the same industrial plant within 7 yr after long-term exposure to vinylchloride. The characteristics of a chemical carcinogenesis leading to 2 different malignant tumors, hemangiosarcoma and hepatocellular carcinoma, are discussed. This carcinogenic sequence was predicted by animal studies. It was not known why the transformation of hepatocytes into carcinoma is far rarer than of sinusoidal cells into sarcoma. The hepatocellular carcinoma predominantly developed in association with cirrhosis, vinyl chloride was able to cause cancer directly without other known co-carcinogenic agents. This hepatic carcinogenicity was dose-dependent. After the introduction of industrial prevention measures, a new initiation of the tumor is improbable. Because of its long latency period, estimated between 5 and 20 yr, clinical manifestations are still possible. An early diagnosis by sonography and computer tomography, possibly combined with puncture in exposed persons or those formerly at high risk is conceivable, while laboratory

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data, even tumor markers are unreliable. Its fulminant course does not differ from that of other hepatocellular carcinomas and has until now hindered successful treatment.

- 18 AU - SALMON AG
TI - VINYL CHLORIDE THE EVIDENCE FOR HUMAN CARCINOGENICITY IN DIFFERENT TARGET ORGANS
SI - BIOSIS/85/01783
SO - BR J IND MED; 42 (2). 1985. 73-74.
LA - ENG
AB - BIOSIS COPYRIGHT: BIOL ABS. RRM WORKER ANGIOSARCOMA LIVER CANCER
- 19 AU - HALAMA J ; BECKER-STONE S ; HALAMA JM
AD - Radioonkologische Klinik, Stadtkrankenhaus Offenbach a.M., Starkenburgring 66, D-6050 Offenbach a.M.
TI - Angiosarcoma of the liver and other occupational diseases in vinyl chloride workers.
SI - HEEP/85/08105
SO - RADIOLOGE; 25 (1). 1985. 22-29.
LA - GER
AB - HEEP COPYRIGHT: BIOL ABS. Occupational diseases resulting from exposure to vinyl chloride (VC) include angiosarcoma of the liver and other neoplasms. Among workers exposed to VC, capillary abnormalities were found in extremities along with scleroderma and Raynaud syndrome, acro-osteolysis, neurological and psychiatric diseases and chromosome abnormalities, as well as abnormal liver metabolism and hematological findings.
- 20 AU - MALTONI C ; ET AL
TI - ARCHIVES OF RESEARCH ON INDUSTRIAL CARCINOGENESIS VOL. 2. EXPERIMENTAL RESEARCH ON VINYL CHLORIDE CARCINOGENESIS
SI - HEEP/85/07800
SO - MALTONI, C. ET AL. (ED.). ARCHIVES OF RESEARCH ON INDUSTRIAL CARCINOGENESIS, VOL. 2. EXPERIMENTAL RESEARCH ON VINYL CHLORIDE CARCINOGENESIS. V+533P. PRINCETON SCIENTIFIC PUBLISHERS, INC.: PRINCETON, N.J., USA. ILLUS. ISBN 0-911131-36-1.; 0 (0). 1984. V+533P.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. RRM BOOK HUMAN WORKER ANIMAL LIVER CANCER PULMONARY ADENOMA LEUKEMIA BRAIN TUMOR EMBRYOTOXICITY MUTAGEN
- 21 AU - NICHOLSON WJ ; HENNEBERGER PK ; SEIDMAN H
TI - OCCUPATIONAL HAZARDS IN THE VINYL CHLORIDE POLY VINYL CHLORIDE INDUSTRY
SI - HEEP/85/01097
SO - JARVISALO, J., P. PFAFFLI AND H. VAINIO (ED.). PROGRESS IN CLINICAL AND BIOLOGICAL RESEARCH, VOL. 141. INDUSTRIAL HAZARDS OF PLASTICS AND SYNTHETIC ELASTOMERS; SYMPOSIUM ON OCCUPATIONAL HAZARDS RELATED TO PLASTICS AND SYNTHETIC ELASTOMERS, ESPOO, FINLAND, NOV. 22-27, 1982. XIV+441P. ALAN R. LISS, INC.: NEW YORK, N.Y., USA. ILLUS. ISBN 0-8451-0141-2.; 0 (0). 1984. P155-176.

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- LA - ENG
 AB - HEEP COPYRIGHT: BIOL ABS. RRM HUMAN WORKER LUNG CANCER LIVER
 CANCER HEPATO TOXICITY DUST
- 22 AU - PASTORINO U ; BERRINO F ; GERVASIO A ; PERSENTI V ; RIBOLI E
 AU - CROSIGNANI P
 AD - Epidemiology Service Natl. Cancer Inst., Venezian 1, 20133 Milan,
 Italy.
 TI - Proportion of lung cancers due to occupational exposure.
 SI - HEEP/84/09324
 SO - INT J CANCER; 33 (2). 1984. 231-238.
 LA - ENG
 AB - HEEP COPYRIGHT: BIOL ABS. The proportions of male lung cancers
 due to occupational exposure and, respectively, to cigarette
 smoking in a highly industrialized area of northern Italy were
 estimated in a population-based case-control study in 1976-1979.
 Two hundred and four out of the 211 lung cancer cases and 351
 controls sampled from the source population were questioned about
 their occupational and smoking histories. On the basis of the
 occupational history each subject was classified as probably
 exposed (+), possibly exposed (?), or unexposed (-) to 1 of the
 chemicals known to be carcinogenic for the human lung, i.e.,
 asbestos, polycyclic aromatic hydrocarbons, As, Ni and chromium
 compounds, BCME (bis-chloromethylether), CMME
 (chloromethylmethylether) and vinyl chloride. Upon stratification
 by cigarette smoking, contrasting the occupationally exposed
 subjects, whether certainly or uncertainly defined, with the
 unexposed ones, the RR (risk ratio) for lung cancer was 2.1 and
 the occupational etiologic fraction was 0.33 (95% confidence
 interval 0.19-0.47). The tobacco etiologic fraction was 0.81,
 while the 2 exposures together accounted for 89% of the total
 burden of incident cases. If 33% of all male lung cancers were of
 occupational etiology, then this alone would represent 5% of all
 cancer deaths.
- 23 AU - Helldas SS ; Langaard SL ; Andersen A
 AD - Res. Cent., Norsk Hydro A S, Porsgrunn
 TI - Incidence of cancer among vinyl chloride and poly(vinyl chloride)
 workers
 SI - CA/100/197092U
 SO - Br. J. Ind. Med.; VOL 41, ISS 1, 1984,25-30
 LA - ENG
 AB - CBAC COPYRIGHT: CHEM ABS Vinyl chloride manuf occupational
 hazard Polyvinyl chloride manuf occupational hazard Cancer
 occupational exposure vinyl chloride Lung cancer exposure vinyl
 chloride Liver angiosarcoma exposure vinyl chloride Skin
 melanoma exposure vinyl chloride;Liver In vinyl chloride and
 polyvinyl chloride manufg. workers Angiosarcoma;Lung In vinyl
 chloride and polyvinyl chloride manufg. workers;Melanoma Of skin,
 in vinyl chloride and polyvinyl chloride manufg. workers;Neoplasm
 In vinyl chloride and polyvinyl chloride manufg. workers;Skin In
 vinyl chloride and polyvinyl chloride manufg. workers Melanoma

- 24 AU - FEDOTOVA IV
TI - THE INCIDENCE OF MALIGNANT NEOPLASMS AMONG WORKERS ENGAGED IN THE
MANUFACTURE OF VINYL CHLORIDE AND POLY VINYL CHLORIDE
SI - HEEP/84/07644
SO - GIG TR PROF ZABOL; 0 (4). 1983. 30-32.
LA - RUS
AB - HEEP COPYRIGHT: BIOL ABS. RRM HUMAN LUNG CANCER LIVER CANCER
LYMPHATIC NEOPLASM LEUKEMIA DUST
- 25 AU - Cotti G ; Valgimigli L ; Mandrioli A ; Maltoni C
AD - Inst. Oncol., Bologna
TI - Suitable models for long-term bioassays of therapeutic and toxic
effects of antitumor drugs: brain tumors of neuronal cells and
primitive bipotential precursors produced in Sprague-Dawley rats
by vinyl chloride
SI - CA/100/167590N
SO - Dev. Oncol.; VOL 15, ISS Control Tumour Growth Its Biol. Bases,
1983,376-8
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Exposure of rats to vinyl chloride
[75-01-4] (2,500 ppm, in utero and after birth to 1 yr of age)
resulted in the appearance of brain tumors characteristic of
human medulloblastoma, medulloblastoma, and neuroblastoma.
This animal model should be useful for the study of antitumor
agents against brain tumors of neuronal cells and their primitive
precursors.
- 26 AU - Maltoni C ; Cotti G ; Valgimigli L ; Mandrioli A
AD - Inst. Oncol., Bologna
TI - Suitable models for long-term bioassays of the therapeutic and
toxic effects of antitumor drugs: liver angiosarcomas produced
in Sprague-Dawley rats by vinyl chloride
SI - CA/100/167589U
SO - Dev. Oncol.; VOL 15, ISS Control Tumour Growth Its Biol. Bases,
1983,339-41
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Rats exposed to vinyl chloride
[75-01-4] (in air at 2500 ppm, 4-7 h daily, 5 days/wk) from day
12 of embryonic life for 57 wk had a 63.1% incidence of liver
angiosarcoma with a latency period of 49.9 wk, and a 41.4%
incidence of lung metastasis. The exptl. tumors were similar to
those of humans with respect to gross pathol., histopathol., and
metastatic behavior. This model of liver angiosarcoma should
prove useful in assessing drug treatments for this tumor type.

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- 27 AU - Cotti G ; Valgimigli L ; Mandrioli A ; Maltoni C
AD - Inst. Oncol., Bologna
TI - Suitable models for long-term bioassays of therapeutic and toxic effects of antitumour drugs: brain tumors of neuronal cells and primitive bipotential precursors produced in Sprague-Dawley rats by vinyl chloride
SI - CA/100/116212H
SO - Fortschr. Onkol.; VOL 10, ISS Control Tumour Growth Its Biol. Bases, 1983,376-8
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Rats were exposed to 2500 ppm vinyl chloride (75-01-4) from the 12th day of embryonal development (pregnant breeders were exposed 4 h/day until delivery) for 50 wk; brain tumors developed in .apprx.47% of males and .apprx.49% of females. The medullopitheliomas and -blastomas which developed manifested symptoms prior to the death of the animals characteristic of human brain tumor victims and thus may well serve as model systems for antitumor drug testing.
- 28 AU - Maltoni C ; Cotti G ; Valgimigli L ; Mandrioli A
AD - Inst. Oncol., Bologna
TI - Suitable models for long-term bioassays on the therapeutic and toxic effects of antitumour drugs: liver angiosarcomas produced in Sprague-Dawley rats by vinyl chloride
SI - CA/100/116211G
SO - Fortschr. Onkol.; VOL 10, ISS Control Tumour Growth Its Biol. Bases, 1983,339-41
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Rats exposed to 2500 ppm vinyl chloride (75-01-4) from the 12th day of embryonal life (dams exposed) to 1 yr of age developed liver angiosarcomas, including .apprx.57% in males and .apprx.69% in females. Comparison of the rat angiosarcomas with those in humans showed marked similarities, esp. in pathol., histol., and spread; thus, they may well serve for antitumor drug bioassaying.
- 29 AU - EVANS D MD ; WILLIAMS WJ ; KUNG I TM
AD - Histology Dep., Llandough Hosp., Penarth, Glamorgan CF6 1XX, Wales, UK.
TI - Angiosarcoma and hepatocellular carcinoma in vinyl chloride workers.
SI - HEEP/84/02358
SO - HISTOPATHOLOGY (OXF); 7 (3). 1983. 377-388.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. Observations of livers from 5 vinyl chloride workers revealed angioformative and hepatocellular growth disturbance in varying proportions. Angiosarcoma could be seen in 4 cases, liver cell hyperplasia in all, hyperplastic nodules in 3 cases and hepatocellular carcinoma in 2 cases. The transition between hyperplastic nodule and hepatocellular carcinoma was demonstrated in 1 case. The relationship between these changes and vinyl chloride exposure was discussed and

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evidence that they are causally related was presented.

- 30 AU - DREW RT ; BOORMAN GA ; HASEMAN JK ; MCCONNELL EE ; BUSEY WM
 AU - MOORE JA
 AD - Med. Dep., Brookhaven National Lab., Upton, N.Y. 11973.
 TI - The effect of age and exposure duration on cancer induction by a known carcinogen in rats, mice and hamsters.
 SI - HEEP/84/00473
 SO - TOXICOL APPL PHARMACOL; 68 (1). 1983. 120-130.
 LA - ENG
 AB - HEEP COPYRIGHT: BIOL ABS. Female Golden Syrian hamsters, F-344 rats, Swiss CD-1 mice and B6C3F1 hybrid mice were exposed 6 h/day, 5 days/wk to carcinogenic levels of vinyl chloride (VC) for 6, 12, 18 or 24 mo. (rats and hamsters only). Other groups of rodents were held for 6 or 12 mo. and then exposed for 6 or 12 mo. At the end of the study the incidence of VC-induced neoplasms was compared in each of the groups to assess the effects of duration of exposure and age at the start of exposure on carcinogenicity of VC. In rats, with early initial exposure, hemangiosarcomas, hepatocellular carcinomas and mammary gland carcinomas occurred with increasing incidence with longer exposure duration. Rats held for 6 mo. before exposure developed VC-related neoplasms, while rats held 12 mo. before the start of exposure failed to show a significantly increased incidence of these neoplasms. In hamsters, hemangiosarcomas, mammary gland carcinomas, gastric adenocarcinomas and skin carcinomas resulted from VC exposure. The highest incidence of malignant neoplasms occurred in hamsters exposed for the first 12 mo. whereas exposure begun after 12 mo. of age did not cause neoplasms. In both strains of mice, VC exposure during the first 6 mo. of the experiment induced a high incidence of hemangiosarcomas and mammary gland carcinomas. Swiss mice also developed lung carcinomas after only 6 mo. of exposure. In all three rodent species an initial 12 month exposure to VC was adequate to detect its carcinogenic potential, but the shortened survival of VC exposed mice and hamsters precluded a meaningful comparison with longer periods of exposure. Exposures were most effective when started early in life.
- 31 AU - AUSTIN SG ; SCHNATTER AR
 AD - Dep. Epidemiol., Union Carbide Corp., Old Ridgebury Road, Danbury, Conn. 06817.
 TI - A case-control study of chemical exposures and brain tumors in petrochemical workers.
 SI - HEEP/84/00104
 SO - J OCCUP MED; 25 (4). 1983. 313-320.
 LA - ENG
 AB - HEEP COPYRIGHT: BIOL ABS. The relationship between chemical exposures and deaths attributable to primary brain tumors among employees of a Texas, (USA) petrochemical plant was investigated. Cases consisted of 21 deaths in which the underlying cause was confirmed as a primary brain tumor. Two control groups of 80 employees each were randomly selected from 450 decedents known to

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the company in June, 1979. Potential exposures while employed were compared between cases and controls for 5 known or suspect carcinogens (benzene, ethylene dichloride, ethylene oxide, diethyl sulfate, vinyl chloride). Exposure potentials were also compared for an additional 37 chemicals to which at least 4 cases were potentially exposed. Overall and 15 yr latency analyses were performed. The proportion of cases exposed to the 5 potentially carcinogenic chemicals (including vinyl chloride) were lower than or consistent with the proportion of exposed controls. No statistically significant differences between the proportions of cases and controls exposed to the 37 other chemicals were found.

- 32 AU - Fedotova IV
 AD - Inst. Gig. Tr. Profzabol., Gorkiy
 TI - Incidence of malignant tumors among workers engaged in the manufacture of vinyl chloride and poly(vinyl chloride)
 SI - CA/098/221148E
 SO - Gig. Tr. Prof. Zabol.; ISS 4, 1983,30-2
 LA - RUS
 AB - CBAC COPYRIGHT: CHEM ABS Tumor vinyl chloride manufg worker Malignant tumor polyvinyl chloride manuf Hazard tumor vinyl chloride exposure;Air pollution By vinyl chloride, occupational exposure to, in vinyl chloride and poly(vinyl chloride) manuf., malignant tumors from;Carcinoma Of lung and stomach, from vinyl chloride, after occupational exposure;Health hazard Of malignant tumors, from vinyl chloride exposure in poly(vinyl chloride) manuf. Occupational;Neoplasm Of lymphatic and hemopoietic tissue, from vinyl chloride, after occupational exposure
- 33 AU - FILATOVA VS ; ANTONYUZHENKO VA ; SMULEVICH VB ; FEDOTOVA IV
 AU - KRYZHANOVSKAYA NA ; BOCHKAREVA TV ; GORYACHEVA LA ; BUL'BULYAN MA
 AD - Gorki Res. Inst. Ind. Hyg. Occup. Dis., Gorki, USSR.
 TI - Blastomogenic hazard of vinyl chloride (clinico-hygienic and epidemiologic study).
 SI - HEEP/83/03770
 SO - GIG TR PROF ZABOL; 0 (1). 1982. 28-31.
 AB - HEEP COPYRIGHT: BIOL ABS. Study of incidence of malignant tumors in workers engaged in the manufacture of vinyl chloride (VC) and polyvinyl chloride (PVC) exposed to various concentrations of VC showed that mortality due to oncologic diseases was higher in the group of workers exposed to VC in high concentrations (300 mg/m³ and more). Death rate among the women of the examined groups due to malignant tumors of the lymphatic and hemopoietic tissues was 12-fold higher than among the population of the city. Hemangiosarcomas and other liver tumors were not detected. There is pathogenetic relationship between tumor and non-tumor manifestations of VC pathology. A complex of health measures aimed at the maximal reduction of VC effect on the workers is proposed.

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- 34 AU - BERGMAN K
AD - Toxicol. Lab., National Food Administration, Box 622, S-751 26 Uppsala, Sweden.
TI - Reactions of vinyl chloride with RNA and DNA of various mouse tissues in vivo.
SI - HEEP/82/12835
SO - ARCH TOXICOL; 49 (2). 1982. 117-130.
AB - HEEP COPYRIGHT: BIOL ABS. The irreversible binding of ¹⁴C-vinyl chloride metabolites to RNA and DNA of mouse brain, lung, liver, kidney, spleen, pancreas and testes after a single i.p. injection was studied. Hydrolysates of nucleic acids from selected organs were separated on Aminex A6 for quantitation of alkylation products. Radioactivity in nucleic acids was registered in all organs with the exception of brain. RNA from spleen, pancreas and liver and DNA from spleen and liver contained the highest amounts of radioactivity. In nucleic acids from spleen and pancreas, organs of high metabolic activity, the entire radioactivity was metabolically incorporated as C1-fragments. In RNA of kidney and liver a large part of the radioactivity was present as incorporated C1-fragments but 3,N4-ethenocytidine (in kidney), and 1,N6-ethenoadenosine and 1,N6-ethenoadenine (in kidney and liver) were identified as alkylation products. In liver DNA incorporation of C1-fragments was insignificant, indicating different interactions of vinyl chloride metabolites (C1-fragments and alkylating products) with RNA and DNA. The elution profiles of radioactivity in hydrolysates of liver DNA were dominated by an alkylation product of unknown structure (probably a derivative of deoxyguanosine). Possibly 1,N6-ethenodeoxyadenosine and 1,N6-ethenoadenine were also present in liver DNA. Results were consistent with the ability of vinyl chloride to act as a multipotent carcinogen by alkylation of DNA in several tissues.
- 35 AU - Greiser E ; Reiml W ; Weber H
AD - Duesseldorf
TI - Vinyl chloride exposure and mortality of German chemical industry workers compared to the mortality of unexposed chemical industry workers and PVC workers
SI - CA/098/131571H
SO - Zentralbl. Arbeitsmed., Arbeitsschutz, Prophyl. Ergon.; VOL 32, ISS 2, 1982,44-62
LA - GER
AB - CBAC COPYRIGHT: CHEM ABS Malignancy occupational exposure vinyl chloride Liver carcinoma occupational exposure PVC Lymphoma occupational exposure vinyl chloride Leukemia occupational vinyl chloride exposure Brain carcinoma occupational exposure PVC Ischemic heart disease exposure PVC Statistical analysis mortality rate worker Cardiac infarction exposure PVC;Brain From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to;Carcinoma From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany,

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mortality in relation to;Death Statistical anal. of, from occupational exposure to PVC and vinyl chloride in Federal Republic of Germany;Health hazard from exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to Occupational;Heart From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to Ischemia;Heart From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to Infarction;Leukemia From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to;Liver From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to;Lymphoma From occupational exposure to PVC and vinyl chloride, statistical anal. of, in Federal Republic of Germany, mortality in relation to;Statistics and Statistical analysis Of mortality from occupational exposure to PVC and vinyl chloride in Federal Republic of Germany

- 36 AU - Maltoni C ; Ciliberti A ; Carretti D
AD - Inst. Oncol., Bologna
TI - Experimental contributions in identifying brain potential carcinogens in the petrochemical industry
SI - CA/097/157751W
SO - Ann. N. Y. Acad. Sci.; VOL 381, ISS Brain Tumors Chem. Ind., 1982,216-49
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Vinyl chloride [75-01-4] And acrylonitrile [107-13-1] caused brain tumors, neuroblastomas, and gliomas (oligodendrogliomas), resp., in rats when given by inhalation. Such an effect was not seen with vinyl chloride at .ltoreq.500 ppm and acrylonitrile at .ltoreq.10 ppm. When the level of dose and the type of tumor were not considered, following exposure, resp., by inhalation and ingestion to different industrial compds., the incidence of brain tumors were lowered to borderline levels. Thus, in epidemiol. investigations in humans, ref. must always be made to defined types of tumors and to groups of individuals with the same level of exposure (homogeneous groups).
- 37 AU - Maltoni C ; Lefemine G ; Ciliberti A ; Cotti G ; Carretti D
AD - Tumour Cent., Inst. Oncol., Bologna
TI - Vinyl chloride: a model carcinogen for risk assessment
SI - CA/097/034544Y
SO - Environ. Sci. Res.; VOL 25, ISS Genotoxic Eff. Airborne Agents, 1982,329-44
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS The exposure of golden hamsters, mice, and rats to vinyl chloride [75-01-4] produced tumors (e.g. Zymbal gland carcinoma, liver angiosarcoma, nephroblastoma, and neuroblastoma) in a dose-dependent manner. The neoplastic response to vinyl chloride was modulated by species and age, with

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newborn animals being more responsive to the carcinogenic ability of vinyl chloride than adults.

- 38 AU - SELIKOFF IJ
TI - THE IRON GRIP OF LATENCY CAN IT BE LOOSENED?
SI - HEEP/83/08811
SO - 182ND ACS (AMERICAN CHEMICAL SOCIETY) NATIONAL MEETING, NEW YORK, N.Y., USA, AUG. 23-28, 1981. ABSTR PAP AM CHEM SOC; 182 (0). 1981. CHAS 48.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN BLADDER CANCER ANGIO SARCOMA LUNG CANCER MESOTHELIOMA BETA NAPHTHYLAMINE VINYL CHLORIDE ASBESTOS CARCINOGEN OCCUPATIONAL HEALTH INITIATION PROMOTION SMOKING
- 39 AU - WAXWEILER RJ ; SMITH AH ; FALK H ; TYROLER HA
TI - EXCESS LUNG CANCER RISK IN A SYNTHETIC CHEMICALS PLANT
SI - HEEP/82/13795
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 159-166.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN POLY VINYL CHLORIDE CARCINOGEN UNDIFFERENTIATED LUNG CANCER ADENO CARCINOMA
- 40 AU - COOPER WC
TI - EPIDEMIOLOGIC STUDY OF VINYL CHLORIDE WORKERS MORTALITY THROUGH DEC. 31 1972
SI - HEEP/82/13792
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 101-106.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN RESPIRATORY TRACT MALIGNANCY DIGESTIVE TRACT MALIGNANCY BRAIN NEOPLASM USA
- 41 AU - GROTH DH ; COATE WB ; ULLAND BM ; HORNUNG RW
TI - EFFECTS OF AGING ON THE INDUCTION OF ANGIO SARCOMA
SI - HEEP/82/13639
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 53-58.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. RAT VINYL CHLORIDE CARCINOGEN LIVER LUNG METASTASES SEX

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- 42 AU - INFANTE PF
TI - OBSERVATIONS OF THE SITE SPECIFIC CARCINOGENICITY OF VINYL CHLORIDE TO HUMANS
SI - HEEP/82/13636
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 89-94.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. LIVER CANCER LUNG CANCER CENTRAL NERVOUS SYSTEM CANCER LYMPHATIC CANCER LEUKEMIA OCCUPATIONAL HAZARD
- 43 AU - CHU KC ; MILMAN HA
TI - REVIEW OF EXPERIMENTAL CARCINOGENESIS BY COMPOUNDS RELATED TO VINYL CHLORIDE
SI - HEEP/82/13628
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 211-220.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. MOUSE RAT VINYLIDENE CHLORIDE TRI CHLORO ETHYLENE PER CHLORO ETHYLENE DI CHLORO ETHANE DI BROMO ETHANE EPI CHLOROHYDRIN CARCINOGEN FORE STOMACH TUMOR LIVER HEM ANGIO SARCOMA HEPATO CELLULAR CARCINOMA KIDNEY TUMOR UTERINE TUMOR MAMMARY GLAND TUMOR FIBROMA LUNG TUMOR
- 44 AU - LILIS R
TI - REVIEW OF PULMONARY EFFECTS OF POLY VINYL CHLORIDE AND VINYL CHLORIDE EXPOSURE
SI - HEEP/82/13485
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 167-170.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN LUNG CANCER IMMUNO TOXICITY DYSPNEA FIBROSIS INHALATION
- 45 AU - MALTONI C ; LODI P
TI - RESULTS OF SPUTUM CYTOLOGY AMONG WORKERS EXPOSED TO VINYL CHLORIDE MONOMER AND TO POLY VINYL CHLORIDE
SI - HEEP/82/13474
SO - CONFERENCE TO REEVALUATE THE TOXICITY OF VINYL CHLORIDE MONOMER, POLY(VINYL CHLORIDE) AND STRUCTURAL ANALOGS, BETHESDA, MD., USA, MAR. 20-21, 1980. ENVIRON HEALTH PERSPECT; 41 (0). 1981 (RECD. 1982). 85-88.
LA - ENG
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN MOUSE LUNG CANCER CYTO TOXICITY PULMONARY TOXICITY

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CANCER MORTALITY

- 50 AU - EMMERICH KH ; NORPOTH K
 AD - Inst. Pathol., Univ. Muenster, Domagkstr. 17, D-4400 Muenster, W. Ger.
 TI - Malignant tumors after chronic exposure to vinyl chloride.
 SI - HEEP/82/08236
 SO - J CANCER RES CLIN ONCOL; 102 (1). 1981 (RECD. 1982). 1-12.
 AB - HEEP COPYRIGHT: BIOL ABS. Correlations between exposure to vinyl chloride and the development of malignant tumors in the liver have been known since 1974 and have been confirmed by many experimental investigations. Based on the evaluation of (human) mortality statistics from 9 different countries an increased incidence of malignant tumors of the lung, the gastrointestinal tract and the central nervous system (CNS) and of malignant lymphomas is documented in connection with exposure to vinyl chloride. Statistically significant increases were only found in the incidence of malignant liver tumors. Metabolism and toxicology of vinyl chloride are discussed in detail.
- 51 AU - GUENGERICH FP ; GEIGER LE ; HOGY LL ; WRIGHT PL
 AD - Dep. Biochem., Vanderbilt Univ. Sch. Med., Nashville, Tenn. 37232.
 TI - In vitro metabolism of acrylonitrile to 2-cyanoethylene oxide, reaction with glutathione and irreversible binding to proteins and nucleic acids.
 SI - HEEP/82/07346
 SO - CANCER RES; 41 (12 PART 1). 1981. 4925-4933.
 AB - HEEP COPYRIGHT: BIOL ABS. The metabolism of the suspected carcinogen acrylonitrile was studied using subcellular fractions isolated from rats and humans. Irreversible binding of radioactive label from (1-14C)- or (2,3-14C)acrylonitrile to protein and DNA was enhanced by reduced NADP in the presence of rat liver microsomes or a reconstituted cytochrome P-450 system. During the reduced NADP-dependent reaction, HCN was produced and the heme of cytochrome P-450 was destroyed. Rat brain microsomes did not produce detectable levels of metabolites. Conclusive evidence of metabolically mediated binding of acrylonitrile to protein and DNA in human systems was not found. Metabolism was induced in rats by pretreatment of animals with either phenobarbital or 5,6-benzoflavone. Labeled 2-cyanoethylene oxide was found to bind irreversibly to calf thymus DNA and microsomal protein. The extent of binding was greater in the case of 2,3-14C-labeled than 1-14C-labeled material. The relative 1st-order rate of acrylonitrile binding to calf thymus DNA in rat liver microsomal systems was 1-2 orders of magnitude less than that for 1,1,2-trichloroethylene and 3 orders of magnitude less than that for vinyl chloride or vinyl bromide. Rat liver microsomes or a reconstituted cytochrome P-450 system catalyzed the mixed-function oxidation of acrylonitrile to 2-cyanoethylene oxide. 2-Cyanoethylene oxide has a half-life of about 2 h in neutral buffer at 37°. This epoxide was found to serve as a substrate for microsomal epoxide hydrolase. HCN was released during hydrolysis of 2-cyanoethylene oxide or reaction of the

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epoxide with reduced glutathione; HCN release in either case was not stoichiometric with epoxide disappearance. 2-Cyanoethylene oxide reacted less rapidly with reduced glutathione than did acrylonitrile. Rat liver cytosol preparations contained glutathione S-transferase activity towards acrylonitrile and greater activity with 2-cyanoethylene oxide as a substrate. Cytosol preparations from rat brain and human liver had no detectable glutathione S-transferase activity towards acrylonitrile but did exhibit some activity towards 2-cyanoethylene oxide. These studies establish the basic pathways involved in the metabolism of acrylonitrile and should provide a basis for examination of the relevance of these individual steps and their roles in bioactivation and detoxication under more physiological situations.

- 52 AU - BEAUMONT JJ ; BRESLOW NE
 AD - Industrywide Studies Branch F-8, National Institute for Occupational Safety and Health, 4676 Columbia Parkway, Cincinnati, OH 45226.
 TI - Power considerations in epidemiologic studies of vinyl chloride workers.
 SI - HEEP/82/07175
 SO - AM J EPIDEMIOL; 114 (5). 1981. 725-734.
 AB - HEEP COPYRIGHT: BIOL ABS. Nine retrospective mortality studies of workers exposed to vinyl chloride were reviewed to determine whether differences in their hypothesis testing results might be due to differences in statistical power. Where possible, the power of each study was calculated for cancer of the lung, brain and liver. When power was taken into consideration, the results for liver and brain cancer were consistent with an etiologic role for vinyl chloride. For lung cancer, the data were not consistent with an etiologic role, in that 2 studies with very high power yielded negative results.
- 53 AU - CAULET T ; PAYEN L ; PINTEAUX A ; PLUOT M ; DELATTRE JF
 AU - LEUTENEGGER M
 AD - Service Central Anatomie Cytol. Pathol., CHU Robert Dabre, rue Alexis Carrel, 51100 Reims.
 TI - Angiosarcoma of the liver: A case.
 SI - HEEP/82/05996
 SO - ARCH ANAT CYTOL PATHOL; 29 (4). 1981. 239-245.
 AB - HEEP COPYRIGHT: BIOL ABS. The case of an angiosarcoma of the liver occurring in a 64 yr old diabetic man with fever and a painful abdominal syndrome is presented. Clinical examination and chest X-rays revealed an hepatomegaly and a large opacity of the upper lobe of the right lung. He died 1 mo. later from a massive intra-abdominal hemorrhage. At necropsy the relevant findings were a huge angiosarcoma of the liver with pulmonary and lymph node metastases. The microscopic features were identified by optical and ultrastructural studies. This case is compared to other cases of the literature which occurred in the absence of known exposure to carcinogenic factors such as thorotrast, arsenic and vinyl chloride (75% of the cases) and in conjunction

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with long-term exposure to specific agents. In the present case none of the carcinogenic factors was found in the patient's history.

- 54 AU - SPIT BJ ; FERON VJ ; HENDRIKSEN C FM
AD - Inst. CIVO-Toxicol. Nutr. TNO, P.O. Box 360, 3700 AJ Zeist, Neth.
TI - Ultrastructure of hepatic angiosarcoma in rats induced by vinyl chloride.
SI - HEEP/82/05965
SO - EXP MOL PATHOL; 35 (2). 1981. 277-284.
AB - HEEP COPYRIGHT: BIOL ABS. The hepatic angiosarcoma studied was from a male Wistar rat exposed to vinyl chloride monomer (VCM) by the oral route for 120 wk. Widened sinusoids linked by large electron-lucent, spindle-shaped tumor cells and membrane-bound nuclear-free structures were seen in the transitional zone between the tumor mass and the adjacent liver tissue. In areas consisting solely of tumor tissue the tumor cells had a more angular or irregular shape. The origin of the tumor cells is discussed in light of the characteristic differences between endothelial cells and Kupffer cells described in the literature. Although an endothelial origin of the tumor cells could not be established unequivocally, at present there is little reason to doubt such an origin.
- 55 AU - THUNG SN ; GERBER MA
AD - Dep. Pathol., Mt. Sinai Sch. Med., One Gustave L. Levy Place, New York, N.Y. 10029.
TI - Precursor stage of hepatocellular neoplasia following long exposure to orally administered contraceptives.
SI - HEEP/81/12979
SO - HUM PATHOL; 12 (5). 1981. 472-475.
AB - HEEP COPYRIGHT: BIOL ABS. Hepatic neoplasms and peliosis are known to occur in women taking contraceptives orally. Hyperplasia of hepatocytes combined with hypertrophy of sinusoidal lining cells and sinusoidal dilatation with progression to peliosis was observed in the liver of a patient who had been taking such contraceptives for 10 yr. These changes resembled the precursor stage in the development of hepatic angiosarcoma induced by vinyl chloride, Thorotrast and arsenic. In users of orally administered contraceptives these findings may precede the development of hepatocellular neoplasms.
- 56 AU - FORTWENGLER H P JR ; JONES D ; ESPINOSA E ; TAMBURRO CH
AD - Div. Digestive Dis. Nutrition, Dep. Med., Health Sci. Cancer Cent., Univ. Louisville, Ky. 40292.
TI - Evidence for endothelial cell origin of vinyl chloride-induced hepatic angiosarcoma.
SI - HEEP/81/12766
SO - GASTROENTEROLOGY; 80 (6). 1981. 1415-1419.
AB - HEEP COPYRIGHT: BIOL ABS. Previous reports of (human) hepatic angiosarcoma have not clearly defined the cellular type from which this tumor arises, as evidenced by the terminology of endothelioma, Kupffer cell sarcoma, endothelial cell sarcoma and

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hemangioendothelial sarcoma, etc., which were used interchangeably. There was no consensus on the separate entity of Kupffer and sinusoidal endothelial cells. Evidence for the endothelial cell origin of this tumor is provided by demonstrating factor VIII, a known endothelial cell marker, in the tumor cells. Fluorescence due to the presence of factor VIII appeared intense in the tumor sinusoidal cells of all 4 vinyl chloride-associated angiosarcomas studied, whereas normal liver sinusoidal lining cells showed negligible fluorescence.

- 57 AU - KOISCHWITZ D ; LELBACH WK ; LACKNER K ; HERMANUTZ D
 AD - Radiol. Klin., Univ. Bonn, Roentgenabt. Med. Klin., 5300
 Bonn-Venusberg, W. Ger.
 TI - Vinyl chloride-induced angiosarcoma and hepatocellular carcinoma of the liver.
 SI - HEEP/81/11698
 SO - FORTSCHR GEB ROENTGENSTR NUKLEARMED; 134 (3). 1981. 283-290.
 AB - HEEP COPYRIGHT: BIOL ABS. Three patients with industrial exposure to PVC (polyvinylchloride) are described, who developed angiosarcomas of the liver; in 1 patient this was combined with a multi-locular primary hepatocellular carcinoma. The epidemiology, clinical features and diagnosis are discussed, with particular reference to angiography, sonography and computerized tomography (CT). The non-invasive methods, such as CT and sonography, are the techniques of choice if an angiosarcoma is suspected after long exposure to PVC.
- 58 AU - Radike MJ ; Stemmer KL ; Bingham E
 AD - Med. Cent., Univ. Cincinnati, Cincinnati
 TI - Effect of ethanol on vinyl chloride carcinogenesis
 SI - CA/096/137685D
 SO - EHP, Environ. Health Perspect.; VOL 41,, 1981,59-62
 LA - ENG
 AB - CBAC COPYRIGHT: CHEM ABS Four treatment groups (80 male rats/group) were used in a 2 times, 2 factorial design: inhalation of 600 ppm vinyl chloride (VC) (75-01-4) 4 h/day, 5 days/wk for 1 yr; VC and ingestion of 5% EtOH (64-17-5) in water (vol./vol.); filtered air and EtOH; filtered air. Ingestion of EtOH was begun 4 wk prior to inhalation of VC and continued for life or termination of the study at 2.5 yr from the 1st VC exposure. In the model system, EtOH potentiated the carcinogenic response to VC in the liver and produced an excess of neoplasms in animals receiving EtOH alone. Inhalation of VC induced angiosarcoma of the liver in 23% of the exposed animals; EtOH in addn. to VC inhalation increased the incidence to 50%. Concomitant administration of VC and EtOH also produced an excess of hepatocellular carcinoma and lymphosarcoma. EtOH with or without VC had a strong tumorigenic effect on the endocrine system. Thus, EtOH is a cocarcinogen in relation to the carcinogen VC.

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- 59 AU - Groth DH ; Coate WB ; Ulland BM ; Hornung RW
 AD - Div. Biomed. Behav. Sci., Natl. Inst. Occup. Saf. Health, Bethesda
 TI - Effects of aging on the induction of angiosarcoma
 SI - CA/096/137684C
 SO - EHP, Environ. Health Perspect.; VOL 41,, 1981,53-7
 LA - ENG
 AB - CBAC COPYRIGHT: CHEM ABS Adult albino rats of 4 different ages (6, 18, 32, and 52 wk) were exposed to 940 ppm vinyl chloride [75-01-4] by inhalation for 24 wk, 5 days/wk, for 7 h/day. In each age group, there were 110-128 males and the same no. of females. The similarly housed control group, which was not exposed to vinyl chloride, consisted of the same no. of males and females in each age group. All animals that died spontaneously, or were sacrificed moribund, or were killed at scheduled times (3, 6, and 9 mo after initial exposure) were autopsied. All organs were examd. grossly, and several tissues from each animal were examd. microscopically. The older the rats were when they were exposed, the greater the incidence of angiosarcomas. The incidences of angiosarcomas in the 4 age groups (from youngest to oldest) in the exposed males in the nonscheduled sacrifice groups were: 0/37 (0%); 0/44 (0%); 3/45 (6.7%); and 13/55 (24%). Similarly, for the females, these incidences were: 2/38 (5.3%); 7/47 (15%); 23/49 (47%); and 11/54 (20%). Most of the angiosarcomas were highly anaplastic, primary tumors in the livers that metastasized to the lungs. Only 1 angiosarcoma was seen in all the control rats; that occurred in s.c. tissue. Thus, older adult animals and females are more susceptible to the angiosarcoma-inducing effects of vinyl chloride than young adult animals and males, resp.
- 60 AU - Suzuki Y
 AD - Mt. Sinai Sch. Med., City Univ. New York, New York
 TI - Neoplastic and nonneoplastic effects of vinyl chloride in mouse lung
 SI - CA/096/137683B
 SO - EHP, Environ. Health Perspect.; VOL 41,, 1981,31-52
 LA - ENG
 AB - CBAC COPYRIGHT: CHEM ABS Neoplastic effects of vinyl chloride (VC) [75-01-4] were studied in lungs of 27 mice exposed at 2500 and 6000 ppm for 5 and 6 mo (large doses and long-term exposure). The neoplastic cells were transformed from type II alveolar epithelium via its hyperplastic form. Nonneoplastic effects of the chem. were also studied in the 27 mice. Major light microscopic alterations obsd. were proliferation and hypertrophy of the terminal bronchiolar cells, consisting of ciliated and Clara cells, hypersecretion of the epithelial mucin in the goblet cells of both the bronchial and the proximal bronchiolar epithelium, hyperplasia of alveolar epithelium, mobilization of alveolar macrophages, and occasional presence of peribronchial or bronchiolar chronic inflammation. Submicroscopic changes of pulmonary alveoli were represented by focal thickening of the basement membrane, multiple foci of hyperplastic type II cell

(the precondition of the alveologenic tumor), active discharge of osmiophilic lamellar bodies from the type II cell and phagocytosis of the bodies by macrophages, appearance of cholesterol crystalloids in the macrophages, degeneration of alveolar septal cells, and occasional appearance of a large nucleus with swelling of the capillary endothelium. The neoplastic effect of vinyl chloride of smaller doses (100, 10, 1 and 0 (control) ppm) and shorter exposure (4 wk) was studied in lungs of 120 mice. A dose-response relation was considered in the incidence of the alveologenic tumor prodn. of VC. Thus, mouse lung is an extremely sensitive indicator of the oncogenicity of VC.

- 61 AU - Suzuki Y
AD - Environ. Sci. Lab., Mt. Sinai Sch. Med., New York
TI - Electron microscopic observations of hepatic and subcutaneous hemangiosarcomas induced in mice exposed to vinyl chloride monomer
SI - CA/096/117288Y
SO - Am. J. Ind. Med.; VOL 2, ISS 2, 1981,103-17
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Both s.c. and hepatic hemangiosarcomas were induced in mice exposed to vinyl chloride [75-01-4] monomer, and for the 1st time, the ultrastructure of hemangiosarcomas related to vinyl chloride exposure were described. The s.c. hemangiosarcoma developed in a mouse's ear 29 wk after exposure to 10 ppm vinyl chloride for 4 wk, and the hepatic hemangiosarcoma was found in a mouse's liver at necropsy 56 wk after exposure to 600 ppm vinyl chloride for 4 wk. Both tumors showed a localized, cystic nodular appearance with a dark red tone. Histol., an angiomatous architecture, the presence of neoplastic mesenchymal cell aggregates, focal necrosis, and hemorrhagic foci were common. Ultrastructurally, 2 neoplastic cell types, a mesenchymal and well-differentiated endothelial cell type, were identified in both tumors. In addn., in the hepatic tumor, a pericyte-like neoplastic cell was also present. The incidence of hemangiosarcoma was much lower than that of lung tumors (alveologenic tumor) in mice exposed to vinyl chloride at the same concns. for the same duration. Thus, there is no basic difference in ultrastructure between the vinyl chloride-induced hemangiosarcomas and hemangiosarcomas not related to this chem. exposure.
- 62 AU - Infante PF
AD - Off. Carcinogen Identif. Classif., Occup. Saf. Health Adm., Washington
TI - Observations of the site-specific carcinogenicity of vinyl chloride to humans
SI - CA/096/128639Q
SO - EHP, Environ. Health Perspect.; VOL 41,, 1981,89-94
LA - ENG
AB - CBAC COPYRIGHT: CHEM ABS Review carcinogenicity vinyl chloride exposure;Carcinogens Vinyl chloride as, in occupational exposure;Health hazard From vinyl chloride exposure, neoplasms in

R&S 102651

diff ref
AD 42

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VINYL CHLORIDE, POLYVINYL CHLORIDE / CANCER-RELATED

relation to Occupational;Neoplasms From vinyl chloride, of brain
and liver and lung, occupational exposure in relation to

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