given in vivo selectively inhibits for 10-40 min a nucleoplasmic type of RNA polymerase in rat liver but the synthesis in vivo of all species of nuclear RNA remains blocked for several hours.--J. F. L.

34770 BROOKS, ROBERT D. Jr. and JAMES A. VICK. (Dep. Pharmacol., Walter Reed Army Inst. Res., Walter Reed Army Med. Cent., Washington, D. C. 20012, USA.) Toxicological studies of bee venom in mice, dogs and monkeys. AM BEE J 112(7): 250-251. 1972.--Venom of Apis mellifera was injected, either i.v. or s.c., into experimental animals. I.V. injections caused a precipitous decrease in blood pressure within 35 sec in both dogs and monkeys. It also decreased heart rate and depressed respiration. Dosages of 5 mg/kg in dogs, or 2.5 mg/kg in monkeys, i.v., caused death from cardiovascular failure. Similar responses were noted after s.c. injections, but median lethal dosages were higher: 200 mg/kg in dogs and 50 mg/kg in monkeys. The former is equivalent to about 2000 bee stings. Smaller dosages were fatal to mice. Other physiological reactions are noted.
--J. D. Hitchcock.

34772. ULANOVA, I. P., A. I. KHALEPO and A. I. EITINGON. (Inst. Ind. Hyg. Occup. Dis., Acad. Med. Sci. USSR, Moscow, USSR.) Issledovanie kumulyativnykh svoistv khimicheskikh soedinenii na porogovom urovne kak osnova prognozirovaniya khronicheskikh intoksikatsii. [Study into cumulative properties of chemical compounds at the threshold level as a basis for prognostication of chronic poisonings.] GIG TR PROF ZABOL 16(3): 36-38. 1972. [Engl. summ.]--Cumulative properties of chemical compounds at the threshold of their acute action were analysed. Cumulation coefficients were deduced from the integral test changes and with reference to the summary-threshold value featuring the functional state of the nervous system. These coefficients proved to be much inferior to coefficients of cumulation determined with reference to the animal lethality figures. The cumulation coefficients at the threshold level supported a well-marked cumulative capacity of benzene, carbon tetrachloride, m-aminobenzotrifluoride and morpholine. This was supported by the data derived from chronic experiments, considering CCl_4 and benzene, also by the available clinical and hygienic observations. The estimated coefficient of correlation between the areas of chronic action and coefficients of cumulation for the substances under study at the threshold level was 0.99. This makes it possible to forecast possible developments of chronic poisoning. The investigation time was cut down to a maximum of 1 mo.--J. P. K.

34773. KOBULIYA, N. S., L. E. GEDYMIN, F. R. [illegible]VAKHOVSKII and O. P. AKHIPOVA. (Cent. Res. Inst. Tuberc., Ministry of Health USSR, Moscow, USSR.) Ischemic proshitaemosti gistogematicheskikh bar'erov pri razlichnykh rezhimakh giperbaricheskoi oksigenatsii v eksperimente. [Permeability of histo-haematic barriers in different regimes of experimental hyperbaric oxygenation.] EKSP KHIR ANESTEZIOL 17(3): 31-35. Illus. 1972. [Engl. summ.]--Experimentally, 70 guinea pigs were subjected to 100% O_2 in therapeutic (1-2.2 up to 3 ata) and toxic (4-5 ata) regimes of hyperbaric oxygenation for 1-4 hr. Histology and radioactive indicators (with streptomycin-S^{35} in 20,000 U/kg and with 14.2 μCi activity in 1 ml) were used to assess various permeability levels in the histo-hematic barriers of the lungs, liver, kidneys, spleen, myocardium and brain. Toxic regimes were accompanied by a universal increase of vascular walls permeability, conditioned by structural lesions of the histo-hematic barriers. With therapeutic regimes, vascular permeability rose only in the spleen, liver and kidneys, i.e., in the organs with an increasing functional activity under hyperbaric oxygenation, and was not accompanied by histostructural changes of the main elements of the histo-hematic barrier.
--J. L. S.

34774. CONDER, D. W., P. C. OLOFFS and Y. S. SZETO. (Pestol. Cent., Dep. Biol. Sci., Simon Fraser Univ., Burnaby 2, B. C., Can.) GLC separation of heptachlor epoxide oxychlordane, α- and γ-chlordane, BULL ENVIRON CONTAM TOXICOL 7(1): 33-35. 1972.--GLC [gas liquid chromatography] columns were used to identify and quantitate organochloride pesticide residues. Such as 3% OV 1, 3% SE 30 plus 6% OV 1, or 3% OV 1 plus 6% OV 210. They did not satisfactorily separate the compounds of α-chlordane, γ-chlordane oxychlordane and heptachlorepoxide. Gas chromatograph Micro Tek MT 220 with Ni-63 electron capture detector method was employed in this experiment.
--J. P. K.

34775. WALTSCHEWA, W. (Forschungsinst. Arbeitsschutz, Bereich., Blvd. Petko Napetov 34, Sofia, Bulg.), M. SLATEWA and I. MICHAILOW. Hodenveranderungen bei weissen Ratten durch chronische Verabreichung von Nickelsulfat. [Testicular changes due to long-term administration of nickel sulfate in rats.] EXP PATHOL (JENA) 6(3/4): 116-120. Illus. 1972. [Engl. summ.]--Following long-term [illegible]-sulfate intoxication in rats, severe lesions in the germ cells [illegible]ularly in spermatogenesis could be demonstrated. Very few changes [illegible] observed in the livers and kidneys. Nickel sulfate had a selective [illegible]cytotoxious effect on testicular parenchyma.--A. B. M.

34776. BASALAEV, A. V., A. N. VAZIN and A. G. KOCHETKOV. (G. M. Kirov Gork. Med. Inst., Gorki, USSR.) K patogenezu immunnoi, vospalyatelnykh pri dlitel'nom vozdeistvii vinilkhlorida. [Pathogenesis of changes developing due to long-term exposure to the [illegible]inyl-chloride.] GIG TR PROF ZABOL 16(2): 24-27. Illus. 1972. [Engl. summ.]--Rabbits and rats which inhaled vinylchloride fumes in a maximal permissible concentration (0.03-0.04 mg/l), underwent a 6-mo long all-round examination by physiological, biochemical, histomorphological and roentgenodensitometric methods. Changes in the bioelectric activity of the hypothalamus, hyperadrenalinemia and functional troubles of the cardiovascular system were disclosed. Development of resorptive manifestations in the bone tissue was brought out anorphologically and osteoporosis--roentgenologically. An inference is drawn as to a key importance of hypothalamic dysfunction in the pathogenesis of the disease, this dysfunction giving rise to neurohumoral and neurovascular troubles leading to the development of dystrophic processes in the bone tissue.--P. L. W.

34777. BAZIN, SUZANNE and ALBERT DELAUNAY. (CNRS, Inst. Pasteur, Serv. Pathol. Exp., 92-Garches, Fr.) Action exercee par des substances lathyrogenes sur le collagene de granulomes. [Action exerted by lathyrogenic substances on the collagen of granulomas.] C R HEBD SEANCES ACAD SCI SER D SCI NAT (PARIS) 274(4): 623-626. 1972.--Polyvinyl sponges were implanted s.c. in Wistar rats. Ten days later, penicillamine was given orally in a dose of 20 mg/100 g of weight. In another group, β-mercaptoethylamine was given in a dose of 0.5 mg/100 g, i.p. Granulomatous tissue surrounding the sponges and normal skin were extracted to give neutral and acid soluble collagen, collagen labile at 60° and insoluble collagen. Both drugs gave comparable results. They did not modify the total collagen of normal skin, but decreased the collagen of granulomatous tissue slightly. Neutral soluble collagen was increased and insoluble collagen decreased in both types of tissue. The labile collagen increased in the granuloma and diminished in the skin. The acid soluble collagen increased 200% in the granuloma and 30% in the skin. Intermolecular bonds in collagen which are sensitive to lathyrogens are comparable in granuloma and in normal skin.--M. D. S.

34778. KUDZINA, G. D. and D. I. GOLOVAN'. (A. N. Marzeeva Kiev Res. Inst. Gen. Public Hyg., Kiev, USSR.) Sravnitel'naya otsenka gerbitsidov gruppy khlorbenzoinoi kisloty sanitarno-toksikologicheskim metodom i metodom kul'tur kletok. [Comparative sanitary-toxicological and cell-culture evaluation of the chlorbenzoic acid herbicide group.] VRACH DELO 1: 135-138. Illus. 1972. [Engl. summ.]--Data of chronic sanitary-toxicological experiment on rabbits and a study of the effect of chlorbenzoic herbicide group indicate that the results by these 2 methods concerning the toxicity of the herbicides coincided. The use of cell-culture method for rapid hygienic evaluation of the toxicity of some herbicides is promising and further investigations of this method are justified.--P. L. W.

34779. COOPER, PHILIP and STEPHEN H. TOLINS. (Dep. Surg., Bronx Veterans Admin. Hosp., Bronx, N. Y. 10463, USA.) Relationship between smoking history and complications immediately following surgery for duodenal ulcer. MT SINAI J MED 39(3): 247-252. 1972.--No evidence is given of an association between smoking and complications, nor between smoking and operative mortality, nor between smoking and days to discharge. The most obvious trend is probably predictable, namely, patients over 50 have more complications and a higher mortality rate than those under 50. In spite of the relatively large number of patients included in this report the smoking habits, the age distribution, and disease rate in the population studied are quite likely to differ from the general population. Some inconsistencies were found between smoking histories taken on the same patient at different times. This may have resulted from the quality and accuracy of the information given to the examiner by the patient. Few, if any, generalities should be drawn from this research. Results apply only to immediate postoperative findings and do not apply to long-range effects of smoking upon the patient after surgery for duodenal ulcer disease.--E. M. D.

34780. LISTEA, F. M. and L. A. MOTROVA. (Fac. Postgrad. Med., Riga Med. Inst., Riga, USSR.) O klinicheskikh osobennostyakh alkogol'nykh polinevritov. [Clinical traits of alcoholic polyneuritis.] ZH NEVROPATOL PSIKHIATR IM S S KORSAKOVA 72(5): 647-651. 1972. [Engl. summ.]--The traits of alcoholic polyneuritis in 27 patients were studied. Four main clinical variants of the disease were distinguished. The most characteristic and frequent form of alcoholic polyneuritis was the syndrome of sluggish paralysis in the parts of the lower extremities. A more common and mixed form of polyneuritis, sensorial and ataxic forms, were rarely observed.--J. P. K.

34781. STEGER, ROBERT E. (Coop. Ext. Serv., N. M. State Univ., Las Cruces, N. M., USA.) Native plants poisonous to humans. J RANGE MANAGE 25(1): 71-72. 1972.--A summary is given of the toxic principles, the plants, toxic parts, symptoms and some general comments for several commonly toxic plants in the U.S.A.--D. T. S.

34782. PARIS, RENE-RAYMOND and ANNE-MARIE TESSIER. (Fac. Pharm., Lab. Matiere Med., 4-ave. Observatoire, 75-Paris 6, Fr.) Presence de substances du groupe des Cucurbitacines chez diverses Euphorbiacees toxiques africaines, notamment chez Maprounea membranacea Pax et K. Hoffm. [Presence of substances of the group of cucurbitacines in various African toxic Euphorbiaceae especially in Ma-

Meat-Wrapper's Asthma

A New Syndrome?

William N. Sokol, MD; Yossef Aelony, MD; Gildon N. Beall, MD

Three patients employed as meat wrappers developed respiratory symptoms when exposed to the fumes of a polyvinyl chloride film cut with a hot wire. The patients were middle-aged women who smoked cigarettes and demonstrated reversible airway obstruction on pulmonary function testing. The cause of their symptoms is not known, but some ingredient of the polyvinyl chloride film is suspected.

We have recently treated three patients who are employed as meat wrappers and who had severe respiratory problems. In all three, the onset of respiratory difficulty followed exposure to fumes produced by cutting with a hot wire a plastic film made of the common polymer, polyvinyl chloride. We are reporting these cases because we suspect the phenomenon is not uncommon, yet it has not been reported previously in the medical literature.

Report of Cases

CASE 1.—A 40-year-old woman who had worked as a supermarket meat wrapper for ten years without respiratory difficulty was first seen in 1972. Following the introduction of a new plastic film to wrap the meat, she began to experience dyspnea, coughing, and wheezing after four to five hours of work. She attributed this reaction to the fumes produced when the plastic film was cut with a hot wire. Her symptoms were most severe on Mondays when the breathlessness often prevented her from completing the day's work. As the week progressed, her symptoms still occurred after four to five hours of wrapping, but each day they seemed to decrease in intensity. She had smoked a pack of cigarettes each day for 15 years but stopped when her symptoms began. There was no personal or family history of eczema, hay fever, or asthma. The patient was first examined when a severe episode of wheezing forced her to leave work. At that time, results of physical examination were normal, except for a few end-expiratory wheezes and moderate expiratory delay.

Complete blood cell count, erythrocyte sedimentation rate, routine blood chemical assays, urinalysis, VDRL test for syphilis, and chest x-ray film were within normal limits. Skin tests for common allergens were all negative. Tests of pulmonary function showed a mild obstructive defect with a decreased vital capacity and increased residual lung volume responsive to bronchodilator therapy.

Treatment with orally administered bronchodilators relieved her symptoms. She has been able to [illegible] and continue working by taking [illegible]

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dilators orally each workday. Discontinuation of therapy is followed by recurrence of wheezing and dyspnea at work. No medication is required in the evening or on weekends.

CASE 2.—A 45-year-old woman experienced dyspnea while working as a supermarket meat wrapper. She had worked at this market for ten years without respiratory difficulty until soon after a process was introduced to wrap the meat in a plastic film cut with a hot wire. While wrapping, the patient noted the gradual onset of breathlessness and wheezing, and she was forced to leave work. She felt well but did not work for the next six months. On returning to meat wrapping, she developed shortness of breath and wheezing within 20 minutes. The dyspnea became so disturbing that she came to hospital emergency room.

The patient had smoked a pack of cigarettes a day for 26 years. Her family history and personal history were negative for asthma, hay fever, eczema, or atopy. Results of physical examination (five hours after leaving work) were normal.

Complete blood cell count, erythrocyte sedimentation rate, routine blood determination, latex fixation, VDRL test for syphilis, and chest x-ray film were within normal limits or negative. Skin tests with common allergens were negative. Pulmonary function testing showed a decreased maximal expiratory flow rate that improved with bronchodilation. The patient was given bronchodilators orally to take prophylactically. Using this medication, she has been able to wrap meat intermittently without any respiratory symptoms. She is asymptomatic after work and on weekends, requiring no medications at those times.

CASE 3.—A 54-year-old woman had a three-year history of intermittent wheezing and coughing. Her illness began six years after she started working in a supermarket as a meat wrapper. A few weeks before her symptoms commenced, the wrapping material was changed to a plastic film, which she cut with a wire heated to 161 C. Many people working in the area complained of the fumes produced when the film was cut. One of her co-workers was unable to wear his contact lenses near the fumes, and another developed coughing when exposed to the fumes. Thirty minutes after first inhaling these fumes, the patient noted tightness in her chest, followed by wheezing, shortness of breath, and coughing. Her symptoms improved after moving away from the fumes but returned on reexposure. She denied having headache, chills, fever, or sore throat. In the next nine months, she continued to experience difficulty only during working hours. During one severe episode, she was hospitalized for pneumonia and asthma. On returning to work, she developed wheezing and breathlessness, requiring readmission to hospital. Her symptoms eventually developed after working hours and on weekends. Believing that her respiratory problem was related to the plastic fumes, she quit her job. In the ensuing two years, she has developed nonseasonal wheezing, shortness of breath, and coughing, punctuated by upper respiratory infections. She currently develops one-flight dyspnea and produces one quarter of a cup of sputum daily for approximately four months of the year. The patient smoked one pack of cigarettes per day for nine years, but she stopped smoking when her present illness began.

History showed a contact dermatitis but no previous history of hay fever, rhinitis, or asthma. Her family history is negative for atopy or asthma.

The results of physical examination were within normal limits, except for her chest, which showed scattered wheezes on expiration and persistent bibasilar crepitant rales.

Laboratory tests including a complete blood cell count, erythrocyte sedimentation rate, VDRL test for syphilis, and routine blood chemistries were within normal limits. An x-ray film of the chest showed mild overinflation, with apical capping of both upper lobes. Histoplasmin and intermediate strength tuberculin tests were negative. A coccidioidin skin test gave 10 mm of induration at 48 hours. Intradermal tests to common allergens were negative. Pulmonary function studies showed a decreased vital capacity and an increased functional residual capacity. The forced vital capacity responded to bronchodilation. Nitrogen washout was increased to 4.6% retention after seven minutes of oxygen breathing, with a normal of <2%.

Comment

These three case reports strongly suggest that a causal relationship exists between the inhalation of plastic fumes and respiratory symptoms. In each instance, the plastic film was polyvinyl chloride made by the same manufacturer. All patients had worked in similar areas and had no respiratory symptoms wrapping meat with other materials for six to ten years prior to the use of the polyvinyl chloride film. In each patient, symptoms occurred only after exposure to the polyvinyl chloride fumes. The areas where the meat was wrapped were rather crowded, without special ventilation for fume removal, and were chilled to approximately 11 C. The patients had worked in these same areas, however, before the introduction of polyvinyl chloride and had experienced no symptoms.

The time required for development of symptoms was brief (30 minutes) in patients 2 and 3 and was delayed (five hours) in patient 1. In patient 3, symptoms eventually occurred independently of fume exposure, and she now has chronic dyspnea and produces sputum. Patients 1 and 2 have symptoms only on exposure to the plastic fumes. All three patients smoked cigarettes (10 to 26 years) before their illnesses, and all three had reversible airway obstruction on pulmonary function testing. None demonstrated peripheral eosinophilia, reactions to common allergens administered by intracutaneous skin testing, roentgenographic abnormalities, or marked personal or family history of atopy.

We do not know the frequency of this syndrome, but we suspect it is not rare. The first patient told us about the second patient. The third patient came independently but has told us about a co-worker (whom we have not seen) who has suffered similar symptoms apparently from exposure to the polyvinyl chloride film. We have learned from local physicians of two other patients with similar histories. Unfortunately, we have not been able to study these patients.

The manufacturer of the polyvinyl chloride film used by these meat wrappers has informed us that because of previous reports from several cities of respiratory problems associated with polyvinyl chloride fumes produced in the meat wrapping process, an investigation of the matter has already been completed. The investigation, in which polyvinyl chloride film was pyrolyzed and the resulting gases identified and quantitated, concluded that these fumes did not present any hazard to meat wrappers.

Other investigators, however, have suggested that polyvinyl chloride does have toxic potentialities. Gross and Haberman[1] implanted polyvinyl chloride slivers into rabbit muscle, which resulted in an unusual number of eosinophils in a foreign-body granuloma with numerous giant cells, while the control plastic (polyethylene) showed only the usual nontoxic, noneosinophilic-containing, foreign-body reaction. In addition, pure poly-

vinyl chloride resin destroyed cells in in vitro cultures. The cell culture inhibition experiments have been independently confirmed.[2] There is some evidence that the eosinophil-rich foreign-body reaction noted by Guess and Haberman may be seen in humans. Szende et al[3] described a 31-year-old factory employee who shoveled polyvinyl chloride dust. His chest roentgenogram showed many minute nodules, along with an interstitial fibrotic pattern. Lung biopsy specimens showed a foreign body surrounded by a granuloma, with striking eosinophilia. The foreign body could be dissolved with a polyvinyl chloride solvent, cyclohexanol.

The problem posed by our patients is whether fumes generated from *heated* polyvinyl chloride are toxic. Cornish and Abar[4] pyrolized polyvinyl chloride polymers in a stream of air by gradually raising the temperature from ambient to 600 C. Exposure to this air stream supplemented with oxygen produced pulmonary edema and interstitial edema in rats. Some animals also showed focal bronchial and intra-alveolar hemorrhage. It is doubtful, however, if this level of exposure was ever experienced by our patients.

Our patients resemble somewhat those individuals, first described by Harris,[5] who experienced respiratory difficulty when exposed to heated Teflon. This syndrome has been called polymer fume fever. The symptoms include attacks of tightness of the chest, difficulty in breathing, sometimes with a dry, irritating cough, and fever beginning several hours after exposure to the heat-degradation products of polytetrafluoroethylene (Teflon). Recovery is rapid and usually complete. The patients who develop this syndrome work in plants where polytetrafluoroethylene is processed, and smoke cigarettes. The plastic adheres to the cigarette and is given off when heated to >300 C as a very fine particulate sublimate. The syndrome is thought to be due to the inhalation of this sublimate.[6,7]

Our patients differed from those with polymer fume fever by not experiencing chills, fever, or sore throat. This example of a polymer-fume-related syndrome, coupled with the evidence that polyvinyl chloride may have some toxic potential strengthen our suspicion that the patients' symptoms are caused by exposure to the polyvinyl chloride fumes.

Cornish and Abar[4] have reported that carbon monoxide and hydrochloric acid are the products of major toxicologic importance from the combustion of vinyl chloride polymer. O'Mara et al,[9] in describing the combustion profile of vinyl chloride monomer, noted phosgene as well as hydrochloric acid and carbon monoxide. Hydrochloric acid and phosgene are both bronchial irritants that could conceivably cause the patients' symptoms.

Conclusion

Although the cause of the syndrome is unclear and we have only described three cases, it seems advisable to call this matter to general attention to gain some idea of its prevalence and to inform physicians and their patients of the potential hazard of fumes from polyvinyl chloride.

References

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3. Szende B, et al: Pneumoconiosis caused by the inhalation of polyvinylchloride dust. *Med Lav* 61:433-436, 1970.
4. Cornish H, Abar E: Toxicity of pyrolysis products of vinyl plastics. *Arch Environ Health* 19:15-21, 1969.
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CORRECTION

Wrong Pollution.—Two errors occurred in the second item on the ANAGRAMS page of the Sept 17 issue (225:1435, 1973).

The title of the booklet on pollution should have been given as "The Physician's Guide to Odor Pollution," not air pollution (paragraph 3) or water pollution (paragraph 5

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