



Cahners Publishing Company, Inc.
221 Columbus Ave., Boston, Mass 02116 (617) 536-7780/TWX 710-310-0632

E. Carter
→ *R.B. Downey*
Thanks
Carter

plastics world

Editorial Newsletter August, 1974

The old adage "success breeds success" applied to editors reads "Tell me I've done something right and I'll bury you in deathless prose". We have had so many excellent comments relative to this newsletter that I'm on the verge of giving up the magazine and going into newsletters. But, seriously, Joel Frados is in no danger, because when an avocation becomes a vocation it also becomes drudgery and I enjoy writing too much to commit to more than one newsletter a month.

Lu Berringer

The new fire

Any newsletter in plastics that failed to mention the VCM problem would hardly be worth its salt (or postage).

This week (July 5) saw the OSHA hearing on permissible levels of VCM (vinyl chloride monomer — a gas) enter its second week. It seems trite to say that plastics have never faced a more formidable challenge, but this is a statement of the true fact.

The OSHA question originally was, what is the level of concentration of VCM that can be tolerated by humans without ill effect? Specifically, a rare liver cancer had been diagnosed in workers exposed to high concentrations of the monomer. The question has since been expanded to include people who work with PVC (polyvinyl chloride) from which residual VCM may be liberated in processing finished products. This has now been even

further expanded to include a person who lived downwind of a plant that produced PVC from VCM. And finally extrapolated by some well meaning but technically incapable newswriters to include people who had consumed great volumes of liquor from PVC containers. (I had a great uncle who departed this life as a result of cirrosis of the liver, but thankfully in 1962 from liquor consumed from glass bottles — so they can't count him).

Needless to say, any problem which involves death becomes immediately charged with emotionalism — and so it is here. No single life is worth a million dollars and the obvious answer seems to be to stop the production of VCM and its products (including PVC). Under the circumstances this seems a reasonable edict. However, and its a big however, what has really been proved, isn't that the purpose of the OSHA hearings?

As a statement of pure fact the Manufacturing Chemists Association (MCA) issued a paper entitled "Vinyl Chloride Chronology", which neither side stepped the fact nor painted it pink. The report stated that in 1961 Dow experiments with rats indicated that long term exposure at 100 ppm (parts per million) level of VCM produced "slight" liver injuries, so they recommended 50 ppm level be manufactured in manufacturing facilities. However, in 1962 as a result of research at Yale, the American Conference of Governmental Industrial Hygienists (ACGIH) recommended 500 ppm as a safe limit and this was duly adopted as the "official" permissible limit.

Subsequent experimentation here and in Europe indicated that concentrations of 250 ppm yielded liver cancer in test rats. The problem was not suppression of this data, but rather lack of communication to the chemical processing community. Unfortunately, this shortcoming limited further research which, if it has been done, would have replaced the current hysteria with well planned intelligent action rather than the unprovable claims and counter claims now prevailing. In April OSHA decreed a 50 ppm emergency limit, the current flap is over their push for a "no detectable level" limit (a tough limit to maintain; in fact, a tough limit to measure effectively).

Sure, people are dead, but the deaths have been few and the cause a rare disease. The "cause" of the illness is not based on scientific probability but rather on "apparent cause" — a weak reason to wreck an industry. To suppose that a hundred years from now, medicos will have arrived at the conclusion that death is caused by life and practically everything we are and do from the moment of our birth.

It is unfortunate that the immediate rebuttal of the SPI has been based on economics rather than an attempt to argue for reason on the basis of meager evidence. VCM may kill and if it does workers most assuredly should be safeguarded. But PVC does not kill and the onus must not spread to PVC any more than the toxicity of sodium and chlorine are extrapolated to common table salt.

I've been told that sex is one of the killers in heart disease, but I don't

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Prognostications on plastics

by Jerry Neth, research editor

It is said that as the Auto Industry goes, so does the nation's economy. Considering that auto sales have been the most obvious victim of the energy crisis, the country's present economic lethargy is not hard to understand.

Like this year's Detroit output, the 1974 business year suffers by comparison to last. The country is producing sort of a "Compact" economy, if you will. And it's a stripped down version at that.

Nonetheless, it appears that the worst is over, and while the auto industry's recovery will not be dynamic, it will be steady.

Certainly that is good news to the plastics processor who supplies the world's largest industry. It is welcome news, moreover, to anyone concerned with the nation's overall economy.

Current Indexes

According to the latest SPI figures, the index for production gained in April, but sales of resin for reinforced dropped significantly when compared to April, 1973.

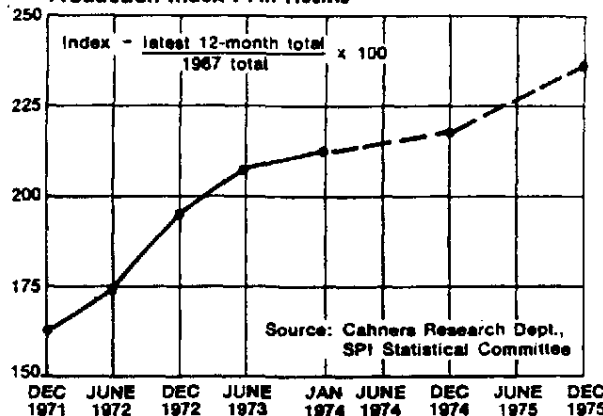
Production

Total plastics production gained 4.0%, April, 1974 compared to April, 1973. This gain comes on the heels of a smallish, 2.3% increase in March. The index is exactly in line with PW's projection to an index of 217 (1967 = 100) by years end. This yearly increase of 3% will be followed by a further 8% increase in 1975, PW believes.

Reinforced

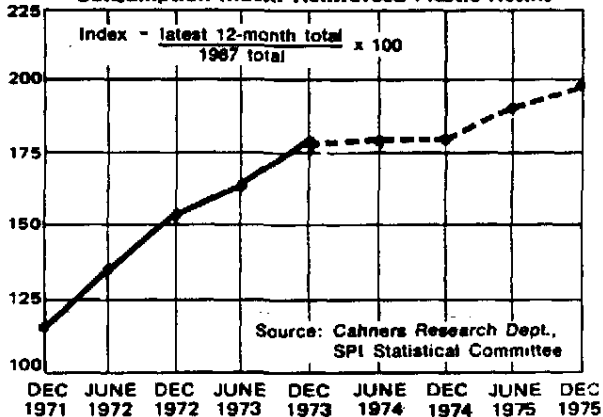
The index of sales for reinforced plastics registered a 12% drop in April and March compared to the same months of a year earlier. However, PW predicts this index will recover and show a 2% gain by year end 1974. This would be a 2%, which we believe will be followed by a 10% gain — index 198 in 1975.

Production Index : All Resins



Month	Index	Lb. Millions
April, 1974	214.7	2,131
April, 1973	202.5	2,050

Consumption Index: Reinforced-Plastic Resins



Month	Index	Lb. Millions
April, 1974	171.6	100
April, 1973	163.1	111
March, 1974	173.6	95
March, 1973	159.9	109

ed, and further delay or lower diagnostic value, if the bleeding could be carried out, particularly admission, particularly

within 48 hours and the features which vorakova et al.¹⁰ found who had endoscopy only 18% of those reported that 79% of bleeding had evidence recently, whilst such ulcers found after 48 hours or 3 days or which shows none of not necessarily imply bleeding.

in that of Cotton in 20% of cases, for this. In a few to pass the endoscope. encountered this in whom it may be while retaining

excess blood pre- the value of gastric endoscopy whilst the advantage of this lesions closely ulcers. Gastric our series in which lesions (16%) was ul. (8.6%). How- should be able to lesions and true age ensures good time required for age does not then endoscope.

failure to find any of these are usually failure is inversely of the endoscopist.

a careful emergency if by an experi- results as endoscopy ers, our series and shown that approx- 50% of gastric meal examination. acute mucosal

lesions. Finally, radiology indicates only a possible and not the actual source of bleeding, and where two lesions are seen endoscopy has the unique value of actually demonstrating the true site of bleeding. Thus radiology should be carried out only when endoscopy has proved negative.

Endoscopy in Relation to Management

The value of early endoscopy in management is that it tells the clinician the site of bleeding and the nature of the underlying lesion. Since acute mucosal lesions often heal rapidly and may be difficult to deal with surgically, while chronic peptic ulcers tend to rebleed and to be amenable to surgery, endoscopic information could allow early decisions on management. However, whether or not this will reduce mortality remains to be evaluated. Other possible benefits from early endoscopy, such as reduction in blood-transfusion and reduced hospital stay, must also be evaluated.

Emergency Endoscopy Services

For the best possible results endoscopy should be carried out within 24 hours of the patient's admission, although there is still a good diagnostic yield up to 48 hours after admission. Early endoscopy involves the endoscopist in much time and effort, and, if adequate facilities with properly trained paramedical

staff are not easily available, it is prohibitively time consuming.

It is inconceivable that a district general hospital with one gastrointestinal consultant trained in endoscopy could provide an adequate service for acutely bleeding patients. Such hospitals planning to develop an endoscopy service should bear the manpower aspects carefully in mind when doing so. Ideally two consultants with the help of middle-grade medical staff trained in endoscopy should be employed in each hospital.

Requests for reprints should be addressed to J. A. H. F.

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Public Health

PROPORTIONAL MORTALITY AMONG VINYL-CHLORIDE WORKERS

RICHARD R. MONSON JOHN M. PETERS

Departments of Epidemiology and Physiology, Harvard School of Public Health, Boston, Massachusetts 02115, U.S.A.

MAURICE N. JOHNSON

B. F. Goodrich Company, Akron, Ohio

Summary In a proportional-mortality analysis of one hundred and sixty-one deceased workers in two plants using vinyl chloride, a 50% excess of deaths due to all cancer was seen. Specific sites of cancer with the greatest excess included liver and biliary tract, lung, and brain. The excess in fatal cancer was seen mainly in men who died before age 60. Also, there was a trend in time in the ratio of observed to expected deaths: since 1970 over twice as many cancer deaths as expected have occurred.

INTRODUCTION

ON Feb. 15, 1974, four fatal cases of angiosarcoma of the liver among men who worked in a polyvinyl-chloride polymerisation plant were reported.¹ We present here a proportional-mortality analysis of all deaths known among workers in that plant. Also included are deaths in men who worked in a plant in which vinyl chloride is produced.

METHODS

Vinyl-chloride monomer is produced at a plant in Calvert City, Kentucky, and is polymerised into polyvinyl chloride at a plant in Louisville. These plants have been in operation since the late 1930s.

Whenever an active or pensioned employee at these plants dies, a copy of the death certificate is obtained. An abstract of the certificate is made and the certificate is sent to the insurance company. Using these sources, one hundred and sixty-one deceased White males who were employed at one of the two plants were identified. No information was available on workers who left employment before retirement. For all but nineteen a copy of the death certificate was obtained. For the remainder the cause of death as recorded in the company abstract was used. Deaths from 1947 through 1973 were ascertained. Of these deaths, one hundred and thirty-five occurred among Louisville workers and twenty-six were among Calvert City workers.

The distribution of causes-of-death was tabulated using the code on the death certificate. The expected distribution was calculated on the basis of proportional-mortality ratios for United States White males. The observed deaths from all causes were stratified into 5-year age/time-specific groups, and age/time/cause-specific proportional-mortality ratios were multiplied by these numbers to obtain the stratum-specific expected numbers.²

RESULTS

The patterns of mortality among workers in the two plants were similar, so all men were grouped together. As seen in table 1, a 50% excess of deaths due to cancer was observed ($\chi^2=5.7$, $P<0.02$). In addition to the four deaths previously reported,¹ a fifth man who died of angiosarcoma of the liver was identified. Also, there was one cancer of each of the following sites: gallbladder, common bile duct, and

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TABLE 1—OBSERVED AND EXPECTED DEATHS IN VINYL-CHLORIDE WORKERS*

I.C.D. no.†	Cause of death	Observed	Expected	Obs./exp.
..	All	161	161.0	1.0
140-205	All cancer	41	27.9	1.5
150-159	Digestive	13	8.3	1.6
153	Liver and biliary tract	8	0.7	11.0
162, 163	Lung	13	7.9	1.6
193	Brain	5	1.2	4.2
200-205	Lymphatic and hematopoietic ..	5	3.4	1.5
	Other cancer‡ ..	5	7.1	0.7
330-334	C.N.S. vascular ..	8	9.5	0.8
400-468	Circulatory	66	68.6	1.0
800-998	External	22	24.5	0.9
960-969	Suicide	10	5.3	1.9
..	All other causes§	24	30.5	0.8

* Expected numbers based on age/time/cause-specific proportional-mortality ratios for U.S. White males.

† International Classification of Diseases, seventh revision.

‡ Nasopharynx 1, prostate 1, kidney 1, thyroid 1, undetermined 1.

§ Includes 2 cirrhosis (4.4 expected).

liver (type unspecified). There were five brain tumours—three glioblastoma multiforme and two of unspecified type. There was a 60% excess of cancer of the lung, of the following cell types: bronchogenic (one), anaplastic (one), adenocarcinoma (three), unspecified (eight). There were two unusual other types of cancer—thyroid and nasopharynx.

There was an excess of deaths due to suicide: ten observed and about five expected.

The observed and expected numbers of all cancer according to age and year of death are presented in table II. Excess death due to cancer was seen primarily in men who died before age 60. There was a trend in the observed/expected ratio with year at death. Before 1965 no excess of deaths due to cancer was observed. However, since then there has been an increase in the proportion of death due to cancer, so that since Jan. 1, 1970, death from cancer has occurred twice as frequently as would be expected on the basis of U.S. vital statistics data.

TABLE II—OBSERVED AND EXPECTED DEATHS DUE TO ALL CANCER ACCORDING TO AGE AND YEAR OF DEATH

Characteristic	Category	Observed	Expected	Obs./exp.
Age at death (yr.) ..	< 50	11	7.6	1.4
	50-59	17	8.1	2.1
	60+	13	12.2	1.1
Year of death ..	< 1965	12	11.4	1.1
	1965-69	10	7.3	1.4
	1970+	19	9.2	2.1

DISCUSSION

These data include the original four vinyl-chloride workers who were known to have died with angiosarcoma of the liver. Four other workers with fatal cancer of the liver and biliary system have been identified. In addition, there is a suggestion that at least two other types of cancer—lung and brain—appear with excess frequency in vinyl-chloride workers. It also appears that the relative frequency of all cancers is increasing with time. While no projection may be made with certainty, additional excess cancer among vinyl-chloride workers would seem likely.

An analysis using proportional-mortality ratios does not take into account the absolute risk of dying in the population being studied. Thus, it is possible that the mortality-rate in the vinyl-chloride workers is less than that of the United States population. For example, the mortality in White steelworkers was 86% of that expected¹ and in White cotton textile workers 79% of that expected.¹ However, even if each of the observed/expected ratios in table II were multiplied by 0.8 (80%) an excess of cancer, especially of the liver and biliary tract and brain, would prevail. Further, the increase with time in the ratio for all cancers would still be observed, since each of the observed/expected ratios in table II would be multiplied by 0.8.

Another theoretical objection to a proportional-mortality analysis is that a high ratio of observed to expected deaths may be due either to an excess of one cause of death or a deficit of another cause of death. Based on the data in table I, it seems most likely that the high ratio for cancer reflects an excess of cancer, since the ratios for each of the four major categories other than cancer are all in the range of 0.8-1.0.

It will be several years before a final conclusion can be made with respect to the carcinogenic potential of vinyl chloride. Since any harmful effect in an individual may require many years of exposure, we believe that current exposure must be controlled.

Requests for reprints should be addressed to R. R. M.

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Packaging for Safety

HOSPITAL admissions of children with suspected accidental poisoning by medicines are not on the increase, and death of the child is a very unlikely result of such incidents. All the same, the work-load involved, the unpleasant nature of the treatment, and the worry to parents justify a hard look at any proposal to make medicines safer. A working-group of the Medicines Commission has just reported on the packaging aspects of this question.* The working-group opposes the compulsory introduction of reclosable child-proof containers and comes down in favour of a stepwise introduction of non-reclosable containers, where potentially dangerous tablets and capsules are packed in individual units in strip or blister packs. Among the objections to the reclosable containers comes one from the Department's lawyers; under the draft British Standard such containers would need to be tested on children who would have to be taught how to open them to see if they were capable of repeating the operation. If a child so tutored poisoned himself the testers might be held liable. But the D.H.S.S. legal division adds a further objection: "the position in law is that no parent or guardian of a child of tender years is entitled to give consent to any procedure which is not for the benefit of the child." Medical research workers have long feared that this was so, but has the Department, now the commissioner of much clinical research, stated this publicly before

* Medicines Commission. Report on the Presentation of Medicines in Relation to Child Safety. Obtainable from the D.H.S.S., 33/71, Finsbury Square, London EC2A 1PP.

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