

'Safe' mix of gas still at issue

THE DEBATE over what constitutes a breathable level of vinyl chloride is not a new one in the American scientific community.

In the 1930s some researchers found it to be a safe anesthetic. But over the next 20 years scientists found the gas severely affects the heart and rejected its medical use.

By 1949 Russian scientists reported that 15 of 48 vinyl chloride workers were found to have suffered liver damage.

But the debate on the danger that industrial workers were facing in the United States took on no real heat until 1961 when Dr. T. R. Torkelson and other Dow Chemical scientists reported that their research showed liver changes in animals exposed to vinyl chloride concentrations as low as 100 parts per million parts air.

They recommended a working exposure level of 50 parts per million for humans. Dow spokesmen say they began instituting that standard immediately and claim that all their vinyl chloride work-

ers, with the exception of laboratory workers, last year worked in levels of the gas below 10 ppm. Laboratory employees worked in average concentrations of up to 30 ppm, company spokesmen say.

But Torkelson's peers in the scientific community found his 1961 research report suspect and commissioned research of their own.

That study done at Yale University, and published in 1963, rejected the findings of the Dow researchers. The Yale study concluded that, on the basis of their work, the Dow scientists were being unduly cautious. They found that rats exposed to 500 parts per million suffered no significant damage and recommended such exposure level as safe for humans.

The Dow conclusions were based on animal research which lasted six months. The Yale conclusions were based on studies which lasted shorter periods of time. They exposed rats to various concentrations of vinyl chloride for periods ranging from 18 days to three months.

The American Conference of Governmental Industrial Hygienists looked at

both the Dow and Yale studies and basically accepted the findings of the latter.

They recommended that the maximum concentration for human exposure to vinyl chloride be 500 ppm.

More than a decade later, Italian studies showed Torkelson and his associates to be much closer to the truth than the Yale scientists. Those Italian studies showed cancerous tumors in rats exposed to vinyl chloride at levels as low as 250 ppm. Later studies, announced in April of this year, showed liver cancer in mice who were exposed to levels down to 50 ppm.

In January of this year the B. F. Goodrich plant on Bells Lane announced that three of its employees had died of angiosarcoma of the liver, a rare cancer. Since then it has been discovered that 26 workers at plants around the world have died because of their exposure to vinyl chloride.

The Dow experience

But Torkelson is not critical of his scientific peers because they didn't accept his recommendations in 1961.

"Dow has generally taken a fairly conservative position on matters of health. Quite frankly at 100 (ppm vinyl chloride) we saw only a very minor change in the liver," he said.

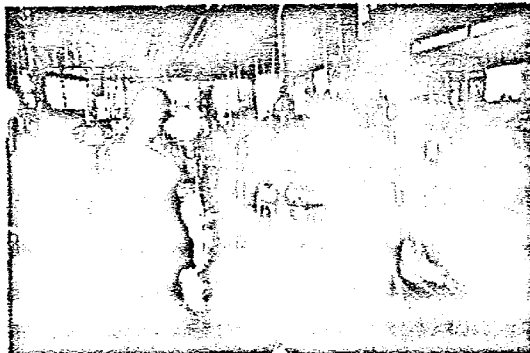
"We might have been justified in interpreting (the research data) differently, but we chose to interpret it the most conservative way we could."

"The other companies certainly had more than one choice ahead of them because there definitely was conflicting animal data and there was the body of human experience that this work had been going on for years with no noticeable change in people."

So far no Dow workers who've died of angiosarcoma have been found.

Whether or not it's because the company went to an exposure rate of 50 ppm in the early '80s when all the other U.S. companies found a 500-ppm limit acceptable or because Dow is a small operator is not known.

Most authorities, familiar with the situation, reckon that it is because the Dow operation is so small that not many employees are exposed to vinyl chloride.



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Vinyl chloride a suspected factor in other diseases

By DAN KAUFMAN, Courier-Journal Staff Writer

A GROWING number of American scientists believe vinyl chloride may cause other diseases besides the ones they've already uncovered.

Some scientists think they'll eventually prove lung, heart and blood-vessel diseases are also caused by exposure to the poisonous gas.

Vinyl chloride is a flammable gaseous compound made by either joining hydrogen chloride with acetylene or by breaking down with heat ethylene dichloride, a petroleum derivative. It was first produced in the 1830s and has been in wide industrial use since the 1940s. Originally it was thought to have no ill effect on humans in concentrations that did not produce narcosis.

The National Institute for Occupational Safety and Health in Washington, D.C., and Mt. Sinai Medical School in New York City are both in the middle of mortality studies which should show if vinyl

The Russian researchers, A. N. Vasin and E. I. Plokhova, concluded that the "considerable changes in the cardiac activity" of the rats, meant that safe exposure levels for humans are below 12 parts per million.

American workers can now legally work in levels of vinyl chloride up to 50 parts per million parts per air. But the U.S. Department of Labor is considering adopting a standard that would permit no detectable amounts of gas in the workplace.

Unions are supporting the proposed standard but many manufacturers are pushing for a higher limit of somewhere between 1 and 50 ppm on the grounds that the no detectable limit would put them out of business. The firms say there must be a detectable level of vinyl chloride at which workers are in no danger.

With the exception of the Russian study, evidently no research exists on the heart's reaction to low levels of vinyl chloride.

Some workers at the Goodrich plant on Bell Lane, however, are convinced that something is affecting their hearts.

One of the employees, who has heart disease, said, "We knew there was an abnormal amount of people having heart trouble and artery disease, but we never knew what we could do about it. We'd bring it up in safety meetings, and they didn't want to talk about it. Those so-called safety meetings were mostly about how to put a rupture disc back in or about not losing any production."

However, workers now agree almost unanimously that the safety-first slogan has had meaning since plant manager Phil Lawrence took over operations more than a year and one-half ago.

But if the workers are convinced their heart problems are related to their work their physicians are not.

Physicians with whom this reporter talked said they felt that the workers' heart problems were "garden variety" of common disease.

Worker suspicion rife

Nationally heart disease is the most common cause of death. Somewhere between 50 and 55 per cent of all deaths are caused by it, according to Dr. Nancy Flowers, a UL heart expert. And physicians, including those who've performed open-heart surgery on Goodrich employees, say that if many workers there have heart disease so do a lot of other Americans.

Indeed, a study of deaths at the Louisville and Celvett City Goodrich plants by the Harvard School of Public Health found deaths related to heart problems "essentially the same but maybe slightly lower than national figures."

But Dr. Richard Monson, the main author of the study, says that it really shows nothing about the incidence of heart disease.

Given that cancer is increased it means that other causes must be decreased, he said, because your totals must still add up to 100 per cent.

"There is not really any information (on heart disease) there one way or the other. All you can really say is that if there was an increase in heart disease it was less than the increase in cancer," he said.

Dr. J. William Lloyd, director of the office of occupational health surveillance and biometrics for the National Institute of Occupational Safety and Health, buttressed Morasca's point.

"Both (heart disease and cancer) might be up on a rate basis, but on a proportional basis (like the Harvard study) no (additional) heart disease would show," he said.

Lloyd said his agency is engaged in a mortality study of workers here which may show whether or not there has been a higher than normal incidence of heart disease.

The Russian heart research appeared in abstract form in a toxicology section of Chemical Abstracts in 1969.

The overall editor of that section was

T. R. Torkelson, a Dow Chemical scientist, who is now the head of the Manufacturing Chemists Association's vinyl chloride task force. The task force is supported by U.S. manufacturers and users of vinyl chloride.

Torkelson says he remembers the abstract but at the time "did not think it was worth pursuing."

"I just didn't think it was of enough significance. I don't mean to be flip, but when a pretty girl walks by your desk your heart rate changes."

Further study seen merited

Torkelson added that Russian research "can range from tremendous to pathetic. The man who can produce results is a hero so sometimes much of it is politically motivated and not scientifically accurate. We had no way to evaluate that research."

But others contest Torkelson's evaluation of Russian research.

UL's Dr. John Brown, a chemistry professor, says that although he knows nothing of the heart research, Russian knowledge of vinyl chloride is generally conceded to be the most advanced in the world.

Dr. Flowers, chief of UL's cardiovascular section, thinks that the Russian work merits further research.

She said, after reading a translation of the article, "They have certainly demonstrated that there are changes (in rats' hearts) and that there is a cumulative effect. How that would relate to the human I don't know."

News analysis

chloride workers are experiencing a higher incidence of such diseases. Vinyl chloride is the basic building block of a widely used industrial plastic.

Dr. Harry Heumann, a research professor at Mt. Sinai, said, "There is no doubt in my mind that we will eventually discover a whole series of conditions which develop as a result of exposure to vinyl chloride."

"You already know about the bone, skin and liver changes and the cancer. Now there is the suggestion of heart trouble, changes in the lungs and it looks like the blood vessels will be affected."

Indeed, Russian studies done as long ago as 1969 indicate that extremely low levels of vinyl chloride change a rat's heart functions.

Those studies showed exposure levels as low as approximately 12 to 16 parts per million parts per air (ppm) caused irregular rhythm, slowing and other changes in the hearts of 10 white rats when they breathed such levels for five months.

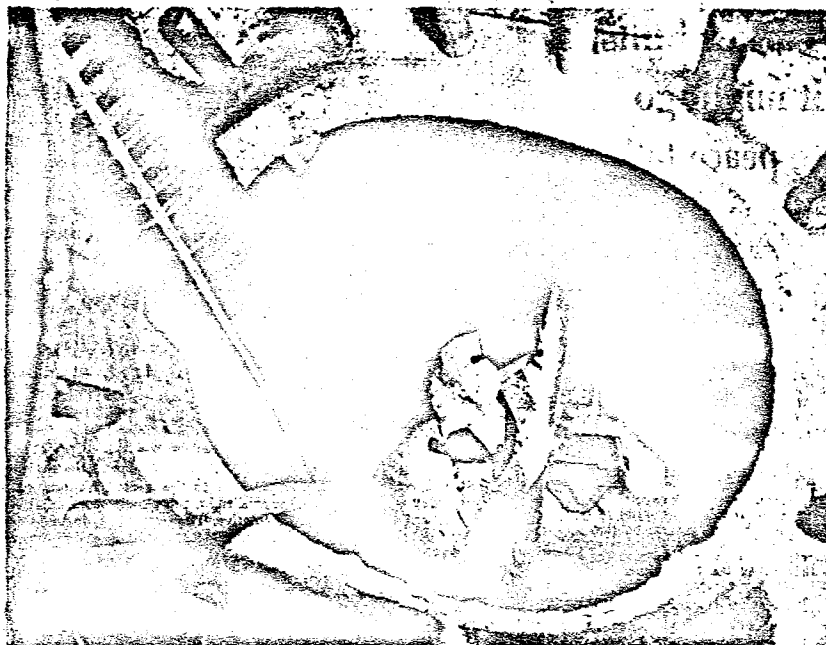
But apparently no American researchers are attempting to find out if such low levels might pose danger for larger animals.

They point out that man's circulatory system and the rat's is not exactly the same so no direct extrapolation should be made from the rat's heart to man's heart.

'Zero' standard under study

Current American study, including that being done at the University of Louisville, is concentrating on cancer-causing effects of the gas. Six workers at the Louisville Goodrich plant are known to have died of liver cancer which scientists almost certainly have been caused by exposure to vinyl chloride. The worldwide total of such deaths now amounts to

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Workers in close contact with vinyl chloride now wear protective clothing and breathing devices.

Worker cancer incidence is 'high'

A RECENTLY completed Harvard study of deaths at the Calvert City and Louisville Goodrich plants shows that liver cancer is ten times higher than it should be and that cancer in general is about 50 per cent higher than normal.

Company spokesmen, however, point out that the study involved small numbers of deaths, so that in some cases one additional death could change the statistics significantly.

The spokesman does not dispute the accuracy of the statistics since the company supplied the Harvard researchers with the facts they needed.

The study done by Dr. Richard Moman and Dr. John Peters noted that the amount of cancer in the two plants has increased sharply in the last four years. They found the rate to be about 200 per cent higher than expected.

The study covered deaths between 1947 and 1973. Until 1965 employees died of cancer at about a normally expected rate. But after that the rates started to shoot up dramatically.

The recent increase lends credence to those who believe the latency period between the heavy exposure to vinyl chloride and the time cancer appears is 20 years or more.

Dr. Irving J. Selidoff of the Mt. Sinai School of Medicine thinks "uncontrolled exposures in the past are likely to be reflected in the occurrence of tumors in the decades ahead."

Six deaths from cancer

Company spokesmen say that the cancer risk at the two Kentucky plants is unexplained and point to a study done by the Manufacturing Chemists Association that shows that cancer deaths in the entire industry are "comparable to those experienced by other U.S. industrial populations but less than the general public."

Eight employees of the company have been furloughed because of changes in their livers. The changes may have been

caused by vinyl chloride, a gas which is used at the plant.

Six vinyl chloride workers, who were employed at the plant, have died of a rare liver cancer. Two more have the cancer, angiomas of the liver.

One of the men furloughed had been on the job less than three years. He cleaned vats in which vinyl chloride is used.

All of the dead workers were first exposed to the chemical about 20 years ago.

The workers have been furloughed until it can be determined if additional exposure would be harmful. They are receiving their full pay.

The dead workers were all exposed to vinyl chloride when there were relatively few precautions taken to keep it from escaping into the air. Company officials say that they are now maintaining an exposure level of somewhere around 10 parts vinyl chloride per million parts air.

Company officials say there is no evidence that this is harmful to humans.

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However, Dr. Flowers said her guess is that the hazard (to humans) is minimal. But you should not discount what happened in this research.

She was one of several doctors who discovered that people inhaling large amounts of Freon in order to get high were dying of heart attacks rather than suffocation or some other cause as was first thought.

Freon and vinyl chloride are both hydrocarbons.

Once tested for anesthesia

It is now known that concentrated doses of vinyl chloride can cause heart damage but that wasn't always the case.

Because high levels of the gas cause humans to lose consciousness, some medical researchers in the 1930s recommended its use as an anesthetic. Employees at the Goodrich Bellis Lane plant report it was not an uncommon, in the past, for workers to pass out because of exposure to the gas. They say this no longer happens now that levels of the gas are more carefully controlled.

In the 1930s researchers found vinyl chloride to be safest of its family of gases and noted its "general tonic effect (to be) very slight." They felt it was safer than some other anesthetics then in use, such as chloroform. Vinyl chloride's anesthetic use was recommended "for supplementary narcosis with laughing gas and oxygen."

But by the 1940s further research revealed that levels high enough to produce unconsciousness in dogs also produced "very serious" malfunctions of the heart, including racing, independent functioning of the right and left sides and other changes in the heart's electrical signals.

When these effects became known it was, of course, concluded that vinyl chloride's use as an anesthetic was unsafe.

Those dangerous effects, however, were caused at extremely high levels, such as 75,000 to 110,000 parts vinyl chloride per million parts of air.

Like all anesthetics, vinyl chloride at extremely concentrated levels causes death.

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