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Cancer Causes: A Look at the Facts

This speech exemplifies the type of messages companies must address when speaking out on issues affecting industry's public image. (See also, Speakers Program, p. 5,6.)

Below are portions of a talk given by Dr. Harry Demopoulos, associate professor of pathology, New York University Medical Center.

Dr. Demopoulos says it was particularly appropriate to give a talk concerning myths about cancer to a group meeting in New Jersey. "Many problems that have beset industry with respect to regulations are founded in some of the misconceived problems that have been painted in N.J.," he says.

When I came to New Jersey in 1976, on a leave of absence, the Federal government had just released the National Cancer Institute (N.C.I.) mortality study by county that was conducted by looking at death certificates from 1950 to 1969; several N.C.I. epidemiologists, as well as members of the New Jersey Department of Environmental Protection, and Department of Health, concluded that after adding up the age-corrected, race-and sex-corrected death data, that New Jersey led all the other states in cancer deaths for white males, expressed per 100,000. Now, that was indeed, a true statement. That was not a lie. The cancer rates in New Jersey were 205 white male cancer deaths per 100,000 versus the U.S. national average of 174 per 100,000. That created a big hullabaloo. It gave this state the label of "Cancer Alley." Some of the people who were in the New Jersey Department of Environmental Protection at that time have subsequently moved to Washington and have continued to amplify this attitude.

I must admit when I came to New Jersey, I shared the view that most New York City dwellers have, that New Jersey is a terrible place, it's horribly polluted. As a matter of fact, on February 16th of this year the New York Times published a map which was sort of the ultimate view that New York City dwellers have. It showed lung cancer rates in various parts of New York City, Staten Island, on the west side of Manhattan, and parts of Brooklyn. The New York City Department of Health blamed polluted air wafting over the river into the city as the cause of these high cancer rates. The report ignored the fact, easily seen on the map, that there vast "skip" areas, and other cancer "hot spots" that were not in the path of such air flows. The New York City Department of Health report ignored rudimentary epidemiologic methods such as correcting all the data for sex and race. Further, no attempt was made to study cigarette consumption patterns.

Science vs. Politics

Ignored in all of these pronouncements and maps at the federal, state and city levels was the old scientific dictum of *controls*. This is what differentiates science from politics. When you look back at the cancer rates that were published

and resulted in New Jersey being labeled "Cancer Alley," nobody mentioned the fact that Rhode Island was number two, with 203 cancer deaths per 100,000. No one mentioned that other heavily industrialized states did *not* have high cancer rates.

When industry was being blamed in New Jersey, nobody looked at the cancer rates in Pennsylvania and Ohio which are remarkably similar to New Jersey, in terms of the proportion of workers who work in "dangerous" occupations and the number of people who live in communities that are in proximity to major industrial plants that can be viewed by some as polluting. Pennsylvania, Ohio and New Jersey have several things in common. About 40 percent of the workforce is engaged in what you would call heavy, "dirty" industry. Forty percent of the population in those states lives in proximity to so-called "dirty" plants. When you look at the cancer rates, however, Pennsylvania and Ohio have cancer rates that are like the U.S. national average. Yet, only New Jersey had higher cancer rates.

The answer as to what is different about New Jersey is found very simply in the U.S. census. New Jersey has the most urbanized population; 90 percent of the population is urbanized and it also has the most dense urbanization. Only 70 percent of Ohio and Pennsylvania are urbanized. That 20 percent difference explains the difference in the cancer rates among the three states. Before it became politically popular to blame industry, the National Cancer Institute epidemiologists showed unequivocally that urban crowding was a predominant factor in cancer causation. It is clearly a *surrogate* for something else. New Jersey has a rather small land mass and over 80 percent of the people are crowded into a rather small area in the northeast part of the state. It is, therefore, like a large city and if you compare it to similar demographic areas, with equivalent land and population density, and look at it in a controlled way, it is shocking to see that many other cities and counties and regions that do *not* have any industry have higher cancer rates than New Jersey. For example, San Francisco; Washington, D.C.; Nassau County, which is an eastern suburb of New York City; Westchester County; these demographic areas have rates that are equal to or greater than New Jersey's, and those areas are devoid of heavy, polluting industry.

Third National Cancer Survey

If you look at other questions beyond urbanization and ask what are the surrogate factors, the ecologists would say, well, it's urban air pollution, and it's still ultimately being derived from industry. Well, we tested that hypothesis. The hypothesis was that pollutants in the air and in the water are responsible for increasing the cancer rates by at least 25 to 30 percent. In order to test that hypothesis, we simply looked at the National Cancer Institute's own Third National Cancer Survey which surveyed 20 million people in this country, back in 1969, '70, and '71.

The diagnoses were far more accurate than the death certificates in the N.C.I.'s mortality study because these were surgical pathology specimens. The slides were all read by Board Certified pathologists. In that Third National Cancer Survey, there was a wealth of information and it was not originally designed to answer this hypothesis, but it came

out that way. There were seven cities in that survey. Four of them were what we would call "clean" cities; San Francisco, Dallas, Minneapolis and Atlanta. They are urban centers without any kind of heavy industry. In that survey also were Detroit, Pittsburgh and Birmingham, the "Pittsburgh of the South." Those seven cities encompassed 16 million people. We did not massage the data; we simply lifted it out of the tables and put the data next to each other and if the hypothesis was correct that industrial air pollution or urban air pollution were a major factor in cancer causation, we would have expected to have seen that four "clean" cities had lower cancer rates than the three "dirty" cities.

We looked at overall cancer rates for white males as well as for black males, age-corrected, and to our surprise, the three "dirty" cities had an overall eight percent *lower* cancer rate than the four "clean" cities. I don't think the eight percent is statistically significant, however, it invalidates the hypothesis. Furthermore, we looked at specific kinds of cancers that Blott, who is an NCI epidemiologist, and others have said are industry-types of cancers, like lung, larynx, nasopharynx, stomach, lymphomas, leukemias, urinary bladder, liver and skin. These are all supposed to be in industry-associated types of cancers. The Third National Cancer Survey gave us site specific cancer diagnosis, i.e., by an atomic site. Those supposed industry-associated cancers were not higher or greater in incidence in the three "dirty" cities compared to the four "clean" cities. In Detroit, Pittsburgh and Birmingham, 45 percent of the occupational workforce is engaged, and has been engaged for several decades, in industry that most people would say is worrisome. Further, these decades of exposure were without controls. And yet, we did not see greater cancer rates in those cities. A 45 percent workforce engaged in "dirty" industry translates into something like about 22 or 23 percent of the general population, which is a large enough percentage of the population to skew the data up higher if, in fact, these workers were being exposed to significant levels of carcinogenic hazards.

Chronic Low-Dose Exposures

This is the NCI's own data. We didn't manipulate it. And, curiously, in the OSHA hearings and in any discussions that I have ever held with people on the Federal level, nobody ever looks at the Third National Cancer Survey. It's almost like their unwanted child because if you examine the data, within it is contained certain answers to questions that bedevil society, government, labor and industry. For example, there are questions raised about chronic low-dose exposures. Let's not worry just about the workers, what about the people in the communities? They are exposed to low-dose emissions. What about the question of synergism, which is almost unanswerable in an experimental sense. The answers, again, to those questions, are found in the Third National Cancer Survey and the comparison of the three "dirty" cities with the four "clean" ones. Detroit, Pittsburgh and Birmingham have virtually every kind of pollutant chemical that you can imagine in the air and in the water. If synergism and chronic low-dose exposures were real hazards, and if, in fact, there were no thresholds, we should have seen higher rates in those three "dirty" cities. They

have been in "business" for several decades, and the chances exist.

Now, there has to be a reason why we didn't see more of any type of cancer and the reason is as follows: There are thresholds. There is a threshold for virtually every substance that is noxious to mankind. There are thresholds for deadly viruses. There are thresholds for bacteria, fungi, anything that is noxious and harmful to humans generally has a threshold, and this includes carcinogens.

Now, clearly the exposures, although seemingly horrendous in the three "dirty" cities, were well below threshold levels because there was no effect. Recall, the Third National Cancer Survey showed eight percent *less* cancer in the "dirty" cities.

Another thing to keep in mind is there is a real biological reason to explain thresholds. It is not a magical thing. We have DNA repair mechanisms that are very efficient. Furthermore most carcinogens and many toxic substances act by what we term free radical chemical mechanisms. There are endogenous anti-oxidants that we have evolved with over the eons that protect us against free radical pathology. These anti oxidants can be overwhelmed with excessive doses of a carcinogen, such as occurs in laboratory animals, but human exposures are not at these doses, and we have not been overwhelmed, not even in Detroit, Pittsburgh, or Birmingham. It should be noted that the Third National Cancer Survey was conducted from 1969-1971. The cancers diagnosed at that time were starting to develop during the 1940's and 1950's. In those years, air/water pollutants were not controlled as they are now. We have therefore gone through "worst-case" conditions in our industrialized-urban centers, and nothing happened. Those who beat the drums of doom, as in recent books written by non-scientists, are clearly leading a march down the wrong path in cancer prevention. Abundant controls exist now, and most of them are needed; some are not, however.

Threshold Studies UCC 100250

Another thing that proves that there are thresholds is the experience with cigarette smoke. Cigarettes of the high-tar variety are perhaps the most carcinogenic substance that mankind deals with in a routine manner on a mass basis. Yet, it has been well proven through smoking dog studies; that thresholds exist; dogs, incidentally, love to smoke. Once they are trained, they jump right into the box and puff like mad. The threshold studies were conducted through smoking dog studies, as well as through careful autopsies on individuals where the smoking history was well recorded, and where the bronchi were serially sectioned and examined. If you smoke 10 to 15 of the 1 mg. tar cigarettes, there are no carcinogenic hazards associated with that. We don't even see the premalignant changes in the epithelium; so that here is the most carcinogenic substance that is massily used and there is, decidedly, a threshold.

Similarly, there are thresholds with alcohol. Alcohol and cigarette smoke are synergistic and together if you smoke the high-tar cigarettes and drink excessive quantities of alcohol, you find that you can account for 35 percent of the cancer deaths. This type of synergism is rare. Most of the

cancers of the mouth, larynx, esophagus and lung are caused by these two factors and they are synergistic. But, again, it has to be with excessive quantities of distilled liquor. It's the alcohol itself, not the congeners or other substances that are found in the drink.

Now, the misconceptions that have been brewing, first in New Jersey, and later in Washington, have aroused not only the ire of you fellows in industry, but the ire of University medical scientists who are in the comprehensive and specialized cancer centers as MIT, Harvard, NYU, Columbia, University of Pennsylvania, McArdle Cancer Center, and others. We are upset at what the Federal government has been doing. Our worry stems from the fact that if society is to listen to the Federal government, it will be led down yet another primrose path, blaming industry, air and water pollution for most of the cancer burden, whereas, in fact, the answers to cancer lie elsewhere and have been very well defined through a great deal of epidemiologic research and extensive laboratory research. Whoever attempts to lead the nation towards less cancer had better be correct, because the selection of the wrong path is the equivalent of leading millions of Americans to certain death.

Answers To Cancer Prevention

The answers to cancer prevention are as follows. And it's easy to keep the scorecard in mind. There are about 1,000 people a day that die of cancer in this country. 350 of them, or 35 percent, are going to die today from having smoked high-tar cigarettes and having consumed excessive quantities of distilled liquor and they will die from cancer of the mouth, larynx, esophagus and lung.

Another 45 percent are attributable to diet, and this figure was courageously stated by Dr. Arthur Upton, the Director of the National Cancer Institute. He has confirmed that university scientists have been saying for the past few years. No other government scientist has had the integrity to state what Dr. Upton stated; he further and strongly recommended major decreases in fat consumption, with increases in fresh fruit and vegetable consumption. Forty-five percent of cancer deaths are related to disordered nutrition. Under the category of disordered nutrition, there are four sub-categories: excess calories; excess fat ingestion; obesity, carrying around an extra 30 or 40 pounds; and nutritional deficiencies such as fiber deficiency and Vitamin A deficiency.

Now, with Vitamin A you have to be careful. There is an optimum dose which happens to be the Recommended Daily Allowance. Too much Vitamin A will also cause cancer in addition to being toxic. Too little Vitamin A will also cause cancer.

There is approximately five percent of cancers that are occupationally induced due to previous exposures 20, 30 and 40 years ago when even the best scientists did not know that many chemicals were capable of causing cancer. Recall that most university scientists and government scientists were engaged in chasing viruses and it's only recently that the blind-alley virus theory was proven invalid.

There is evidence that the five percent of cancer deaths

that are due to occupational exposures may have plateaued and may be on the way down.

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So that I think if controls are kept over the very dangerous chemicals and physical processes that you use in industry, I think we can continue to see what looks like a decline in occupational cancer, which we think is currently around five percent. Sir Richard Doll and others think it's much lower, but I would caution you that you cannot relax. The chemicals that you deal with in ever increasing quantities to meet consumer demands and to try to remain competitive in a ferocious world market are dangerous, and I think there are elements of truth to what the government regulators say; we can see a major explosion in industrially caused cancer if we do not have sensible controls. The question is, how rigid should the controls be? I think that we can be less rigid than what OSHA and EPA have proposed recently since there is clear evidence that there is no need for that kind of rigidity. Occupational carcinogens are under control, and new chemicals are receiving close scrutiny; air and water pollution are blameless in carcinogenesis.

Exposure To Radiation

A few other points that I would like to make in closing are that in addition to determining that cigarettes and alcohol, disordered nutrition, and occupational exposures cause 35 percent of the cancer deaths, there is another three percent that are caused by exposure to radiation which is largely background, not nuclear plants, but background radiation. We have enough radioactive potassium in our bodies, for example, to cause 4,000 radioactive decays per minute. That adds up.

Another two percent of the cancer deaths are caused by preexisting medical disorders, like chronic ulcerative colitis, chronic gastritis and things like that. And about 1 percent are caused by prescription drugs for the treatment of serious medical disorders.

It has also been determined that almost zero percent of cancer deaths, it's something like .00001 percent, are caused by air pollution. Water pollution is in the same category of zero percent. Other studies have shown that nuclear power plant accidents, asbestos in hair dryers, asbestos in school rooms and saccharin/cyclamates can not cause cancer as presently used. And yet, those things that are listed as being zero percent are uppermost in the public's mind. This is due to the propaganda machines. We are treated to outrageous remarks by individuals like Wolfe from Ralph Nader's group that asbestos is the second leading cause of cancer deaths in males in this country. It's an absolutely unfounded statement that, by no stretch of even Sellikoff's imagination, could that be true. And yet, individuals like this are placed politically on the National Cancer Advisory Board and govern, and help to govern the National Cancer Institute's policy. It is terrifying because our nation can be led down the wrong path in prevention.

So you have an uphill fight in terms of public relations but I think that, if controls are kept, truth and reason are on your side and I think that you can win this battle that you are in. Thank you.