



LOUISIANA CHEMICAL ASSOCIATION

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DAN S BORNE
PRESIDENT

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TO: LCA Members

FROM: Dan S. Borne'

We are providing you with the report, "A Review of Cancer Epidemiology in Louisiana," written by Drs. Otto Wong and Donna Foliart of the Health Science Division of ENSR, a leading national environmental services firm. This is a critical review of environmental and occupational epidemiologic studies in Louisiana. A summary of the report is attached to this letter.

The request for this report came from the Scientific Advisory Council of the Louisiana Chemical Association (LCA). The council members are physicians, epidemiologists, toxicologists and industrial hygienists of individual member companies of LCA. In 1988, the council recommended an independent, comprehensive critique of the existing Louisiana cancer epidemiology literature. The review addresses important methodologic issues in cancer epidemiology studies including: study design; type of data analyzed; population study size; length of time period observed; and statistical procedure used. The review synthesizes the literature by type of epidemiologic study design as well as by the location of cancer in the body (cancer site).

The LCA approved the council's recommendation and contracted with Dr. Otto Wong, the principal investigator, a nationally recognized epidemiologist and biostatistician who has published more than 65 scientific articles in peer-reviewed epidemiologic and statistical journals. He is a Fellow in the American College of Epidemiology. We believe that Dr. Wong's report represents a serious scientific effort at synthesizing existing cancer epidemiology literature in Louisiana.

We trust that you will perform your own critical appraisal of this review as well as other epidemiologic studies in this report that you are being made aware of for the first time. It is imperative that we have a thorough and comprehensive understanding of the strengths and weaknesses of the existing cancer literature so that we can appropriately address today's scientific questions about cancer and the environment in Louisiana.

Should you have any questions about this report, please contact Dr. Otto Wong directly at (415) 865-1888, or contact LCA and we will have a member of the Scientific Advisory Council respond to your inquiry.

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BACKGROUND

Several investigations have indicated that certain types of cancer are high in Louisiana, particularly in South Louisiana. Stimulated by these statistics, many cancer studies have been conducted in Louisiana. In response to public concern, the State of Louisiana issued a report on cancer in 1984 which summarized studies conducted to date but did not critique the scientific merits of each study.

PRINCIPAL OBJECTIVE

The principal objective was to critically review the existing cancer epidemiology literature in Louisiana and synthesize this information by type of study and by the location of cancer in the body (cancer site).

STUDY SCOPE

The report critiqued more than 40 studies investigating many risk factors including environment, occupation and lifestyle. Four types of epidemiologic studies were identified:

1. Ecologic studies (a group of people rather than individuals are studied by census tract or county of residence).
2. Case-control studies based on information obtained from death certificates.
3. Case-control studies using information from direct interviews (more complete occupational, environmental and lifestyle exposure data).
4. Occupational cohort studies (mortality of exposed group of workers compared to an unexposed control group).

Ecologic studies and death certificate case-control studies were given less weight than other studies in the review due to their limitations. Most of these studies usually did not collect information on important factors that influence disease. These two types of studies are useful for hypothesis generation, but not for definitive risk assessment.

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CONCLUSIONS

Based on review of the existing epidemiology, the following conclusions were made:

- o The case-control studies using direct interviews revealed that smoking is the most important contributor to lung cancer in Louisiana. Diet was also identified as a lung cancer risk factor although the impact is much smaller than smoking. Exposure to asbestos in the cement, shipbuilding and related industries has been shown to be a significant occupational risk factor for lung cancer. Sugarcane farming was also an occupational lung cancer risk.
- o Diet is found to increase the risk of stomach and pancreatic cancer in certain Louisiana groups.
- o The employees at a small Louisiana alcohol plant were found to experience an increased risk for laryngeal cancer.
- o Brain tumors were found to be associated with a number of occupations including precision metal workers, electric and electronic repair workers and a variety of white collar professions.
- o Analysis of occupational studies of refinery and chemical workers in Louisiana did not show any excess of cancer of all sites combined or lung cancer.
- o Based on case-control studies with interview data, residential proximity to industries in Louisiana was not found to be associated with any significant cancer risk.
- o Due to limitations in data and study design, we have no conclusive information at this point regarding the association between drinking water and cancer in Louisiana.

SUGGESTIONS FOR FURTHER RESEARCH

- o Further ecologic or case-control studies without any detailed occupational or lifestyle information will not provide any further insight into cancer in Louisiana and are not recommended.
- o The most promising investigations are case-control studies with detailed occupational and lifestyle information obtained through interviews. To be meaningful, occupational or environmental studies must adjust for smoking and diet.
- o A state-wide tumor registry is necessary for the calculation of cancer incidence rates and the pursuit of population based cancer research. Furthermore, by using a state-wide registry, the problems associated with using death certificates will be minimized.

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- o Other studies that will likely provide further insight into Louisiana cancer are occupational cohort studies. To minimize the problem of limited study size, the feasibility of industry-wide cohort studies of workers with similar exposures should be examined.
- o An educational program of behavioral modifications should be considered. A substantial number of cancers can avoided if smoking and dietary risks are reduced.

CANCER SITES AND RISKS

Cancer of All Sites Combined

For cancer of all sites, the U.S. and Louisiana rates are comparable for white females and non-white females for 1978-81. For non-white males the 1968-78 rates were higher in Louisiana than the U.S., but the 1978-81 rates were lower in Louisiana than the U.S. White male rates are higher, primarily due to an excess in lung cancer among Louisiana white males. Lung cancer accounts for 78% of the combined cancer excess in Louisiana. Only occupational studies of refinery and chemical workers addressed cancer of all sites and summary analysis found no cancer excess.

Laryngeal Cancer

Laryngeal cancer rates are similar between the U.S. and Louisiana for all groups. Only two occupational studies have investigated laryngeal cancer in Louisiana. These studies have clearly shown that employees at a Louisiana chemical plant manufacturing alcohol experienced an increased laryngeal cancer risk.

Lung Cancer

Only white males show a substantial increase of lung cancer rates in Louisiana over the U.S. The gap between Louisiana and U.S. lung cancer rates has been decreasing since the late 1970s. Case-control studies using direct interviews revealed that smoking is the most important contributor to lung cancer in Louisiana. Diets low in fresh fruits and vegetables impart a mild increase in lung cancer risk. Occupational studies showed elevated lung cancer risk for sugarcane farmers and workers in asbestos related industries (cement and shipbuilding). Occupational studies of refining and petrochemical workers showed no lung cancer excess.

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Pancreatic Cancer

There is little difference in pancreatic cancer mortality rates between Louisiana and the U.S. Case control studies using direct interviews show an increased risk for pancreatic cancer in Louisiana associated with smoking, diet, Cajun ethnicity, rural residence and low income. One refinery study reported a pancreatic cancer risk of borderline significance but no excess was found at two other similar refineries, so an occupational link is unlikely. No significant association was found between pancreatic cancer and residential proximity to industry.

Stomach/Digestive Cancer

Stomach cancer mortality is higher in Louisiana for non-white males and females. On the other hand, white male and female stomach cancer rates are lower in Louisiana than the U.S. A significant association was found between stomach cancer and diet in Louisiana. Industrial groups in Louisiana experienced a similar digestive cancer mortality as the U.S. An ecologic analysis showed a correlation between gastrointestinal cancer and surface drinking water, however; this correlation was most likely due to the confounding effect of diet, a major risk factor for gastrointestinal cancer.

Bladder/Urinary Cancer

Bladder cancer rates are similar between the United States and Louisiana for all groups. No major risk factors characteristic of Louisiana in general or Southern Louisiana in particular were identified.

Brain Cancer

Summary analysis of four occupational studies suggests that a small increase might exist in refinery and chemical workers. Another occupational study indicated a higher proportion of deaths among petrochemical union members due to brain tumors than in the general population. A series of case control studies found no significant brain cancer risk for the petrochemical industry, however; an increased risk was found among men exposed to microwave or radio frequency electromagnetic radiation. Other professions were also found to exhibit excess brain tumors: health services, educational services, national security, white collar professionals, health diagnosing professionals, writers, artists and entertainers.

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ENSR Health Sciences, formerly Environmental Health Associates, has over eleven years experience in providing high-quality occupational and environmental health services for clients nationwide. Our expertise includes epidemiology, corporate medical consultation, health risk assessment, toxicology, regulatory counseling, health surveillance, industrial hygiene, litigation support, health data systems, and health information services.

ENSR Health Sciences is a division of ENSR Corporation, a leading national environmental services firm, specializing in the areas of consulting, engineering, health sciences, field operations, technology to manage hazardous waste, construction management, and customized compliance and audit information services.

Otto Wong, Sc.D., F.A.C.E. is Chief Epidemiologist and Executive Vice President of ENSR Health Sciences. Dr. Wong was trained at the University of Pittsburgh Graduate School of Public Health. After graduation, Dr. Wong taught and conducted research for three years in the Division of Biostatistics and Epidemiology, Georgetown University School of Medicine. From 1978 to 1980, Dr. Wong was in charge of the epidemiology program at Tabershaw Occupational Medicine Associates. Before joining ENSR Health Sciences, Dr. Wong was Director of Occupational Research at Biometric Research Institute, Washington, D.C. At ENSR Health Sciences, in addition to his administrative duties, he participates actively in biostatistical analysis and epidemiologic evaluation in occupational and environmental studies. Dr. Wong's professional interests include biostatistics, epidemiology, quantitative risk assessment, health information systems and clinical trials. He has conducted more than 50 mortality studies in various industries.

Dr. Wong received his B.S. (magna cum laude) in physics and mathematics from the University of Arizona, M.S. in physics from Carnegie-Mellon University, and M.S. and Sc.D. in biostatistics from the University of Pittsburgh. He was elected to Phi Beta Kappa in 1970. Dr. Wong has published over sixty-five articles in various professional journals. Dr. Wong is a Fellow of the American College of Epidemiology and the Human Biology Council.

Donna E. Foliart, M.D., M.P.H. has served as an Occupational Physician/Epidemiologist at ENSR Health Sciences since 1982. Dr. Foliart is board certified in occupational medicine, and is a graduate of the University of California, San Francisco, residency program in occupational medicine. She received her B.S. in Biology from U.C.L.A. in 1974, her M.D. from U.C. San Francisco in 1978, and obtained a Masters of Public Health (Environmental Health Sciences) from U.C. Berkeley in 1981. Dr. Foliart designs, manages and evaluates occupational medicine programs. A major portion of her work at ENSR Health Sciences is devoted to critical reviews of the scientific literature in the areas of epidemiology, occupational medicine, and toxicology. She is an Assistant Clinical Professor, Department of Medicine, Division of Occupational Medicine at the University of California at San Francisco, and an Independent Medical Examiner for the State of California Workers Compensation Appeals Board.

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