ABSTRACTS OF PAPERS PRESENTED AT THE TENTH ANNUAL MEETING OF THE

Society for Epidemiologic Research

Seattle, Washington
June 15–17, 1977

CONTRIBUTED PAPERS

Cancer I
Chairman: P. Buffler

A retrospective study of risk factors related to oral cancer in women. R. B. Hayes,* G. M. Matanoski, I D. J. Bross (The Johns Hopkins University, School of Hygiene and Public Health, Baltimore, MD 21205 and Roswell Park Memorial Institute, Buffalo, NY 14203).

This case-control study of oral cancer utilized data collected on women upon admission to Roswell Park Memorial Institute, Buffalo, New York, between 1957 and 1966. The series included 201 cases with diagnosed oral cancer and 1988 non-neoplastic controls. The data were analyzed by age and by the consumption of alcohol and cigarettes as related to the risk of developing oral cancer. The relative risk of developing oral cancer with regard to tobacco exposure was found to be age dependent. Alcohol consumption, alone, did not increase the risk to a significant degree, nor in the group age 60+ did it markedly affect the risk in conjunction with cigarette use beyond the risk due to smoking alone. The results are discussed and contrasted with the results found in previous studies.


Women treated with x-ray therapy for acute postpartum mastitis have been followed for up to 34 years to determine if there is an excess risk of breast cancer. The incidence of breast neoplasms in these 571 women was compared with that of three control groups, totaling 990 women. The overall relative risk of breast cancer in the treated group was 2.2 for 10-34 years post-radiation. A linear dose-response relationship was observed for breast cancer, and the overall excess risk was about eight cases per million women per rad per year. Further analyses showed that carcinogenic action was not reduced by dose fractionation or by an older age at irradiation. Radiation dose vs. breast cancer latency, and the interaction of radiation with other risk factors for breast cancer are also examined. The implications for mammographic examinations are discussed.

Colorectal cancer and diet in blacks. L. G. Dales,* G. D. Friedman, H. K. Ury, S. R. Williams, S. Grossman (Kaiser Foundation Research Institute, Oakland, CA 94611).

In this case-control study, 105 San Francisco Bay Area blacks with colorectal cancer, plus three age-, race-, sex- and residence-matched controls for each case, were interviewed about past dietary habits and other traits. Two of the controls for each case were patients with other diseases from the same hospital, while the third was an outpatient taking a Multiphasic Health Checkup at a Kaiser-Permanente medical clinic. Dietary differences between the cases and controls were generally minimal. However, when analysis was limited to colon/rectosigmoid junction cancer cases and their controls, small and generally non-statistically significant, but suggestive elevations in cancer risk were associated with increased consumption of foods high in saturated fat (particularly pork), while increased consumption of foods high in fiber tended to be associated with a lower cancer risk. These differences in risk were found for both the case-hospital control and case-Kaiser Multiphasic Checkup control comparisons, and they tended to show consistent dose-response gradients. Beef intake was not associated with increased cancer risk. Among women, nulliparity was associated with about a three-fold increase in colorectal cancer risk. Disparity in socioeconomic status did not explain this difference.

Association of cancer mortality rates and trihalomethane levels in municipal drinking water supplies. K. P. Cantor,* R. Hoover, T. Mason and L. J. McCabe (National Cancer Institute, Bethesda, MD 20014 and US Environmental Protection Agency, Cincinnati, OH 45268).

Associations between site- and sex-specific county cancer mortality rates in whites and levels of trihalomethanes in drinking water were investigated using a multiple regression approach. Data from two 1975 EPA surveys of municipal water supplies served as exposure indices and their association with subsequent surveys was examined. Counties were stratified in several ways for the analyses, including percent of county population served by the
sampled supply, and region of the country. Positive associations were observed for several site-sex combinations including bladder, brain, lung, and colon in both sexes, and non-Hodgkin's lymphoma and kidney in males. Stomach cancer in females showed a negative association. The strength of association for stomach, colon, and lung cancer depended upon the specific predictor variables in the regression model. Bladder cancer mortality rates showed the most consistent association with a trihalomethane index, and the association persisted when rates were corrected for the presence of high-risk industries.

Cancer in asbestos mining and other areas of Quebec. S. Graham, M. Blanchet and T. Rohrer (SUNY at Buffalo, Amherst, NY 14226).

Previous investigators have found higher risks for mesothelioma and cancer of the colon and stomach among male factory workers utilizing asbestos. Employing incidence data from the Quebec Tumor Registry, the authors examined the relative risks of cancer at all sites for the years 1969-1973 in the asbestos-mining, rural, and metropolitan counties of the province. Male rates generally exceeded female, and the relative risks in the asbestos-mining counties of from 7 to 10 different sites of cancer, all of low incidence, were from 1.50 to 8.08 times those of other rural counties of the province for both sexes. Metropolitan counties exhibited equally high risk for many of these sites. The authors discovered higher male risks in asbestos mining counties for cancer of the pleura, peritoneum, lip, tongue, salivary gland, mouth, and small intestine, and for females, for cancer of the pleura, lip, kidney, salivary gland, and melanoma. Because of the likelihood of a long latent period for asbestos-related cancers, it is possible that the risks we observed are the product of occupational and environmental conditions of 20 to 30 years ago in the asbestos mining areas, which have since been altered. The similarities in risks for most cancers in asbestos mining and urban areas were noteworthy.

Cancer clustering around a coke oven. W. Graff and J. Lyon (Department of Family and Community Medicine, University of Utah, Salt Lake City, UT 84132).

A correlation between increased lung cancer mortality and exposure of workers to coke oven emissions has been reported. The authors studied the incidence and the geographic distribution of lung cancer among residents of a northern Utah county (Utah) surrounding a large coke oven. One hundred thirty-eight male cases of lung cancer, dying between 1966-1974, whose residence was Utah County at the time of diagnosis, were selected from the Utah Cancer Registry. One hundred eighty-four control cases were selected, using the same residential criteria, from cancer sites thought to be unrelated to coke oven emissions (i.e., Hodgkin's disease, multiple myeloma, and prostate cancer). The cumulative frequency of lung cancer cases was compared with the control cancer cases at 1.6, 3.2, 4.8, 6.4, 8.16, and 24 km intervals from the steel plant coke ovens.

Clustering analyses based on Monte Carlo simulations indicated a significant tendency for lung and bronchial cancer cases to cluster at 4.8 (p = .04), 6.4 (p = .04), and 8 (p = .05) km, compared to controls. Questionnaires and interviews with next-of-kin are being conducted to obtain residential, smoking, and occupational histories. Analysis of the data for clustering with adjustments for residential, occupational, and smoking histories are presented.

Nasal cancer among woodworkers in the US. L. A. Brinton, W. J. Blot, B. J. Stone and J. F. Fraumeni, Jr. (Environmental Epidemiology Branch, National Cancer Institute, Bethesda, MD 20014).

In a preliminary effort to determine cancer risks associated with the furniture-making industry in the United States, the authors identified counties where the industry was most heavily concentrated and compared mortality rates for 30 cancer sites among white males in these counties with rates in a control group of counties comparable in certain demographic and socioeconomic variables. Ratios of case to control county mortality rates were low for most cancers, but statistically significant excesses were seen for nasal cancer (including nasal cavity and sinuses), malignant melanoma, and multiple myeloma. Although woodworking and nasal cancer have been linked in England and several other countries, this study was the first indication of an association in the United States. To further investigate this issue, the authors obtained death certificates from the state of North Carolina, where the industry is most heavily localized, for all deaths from nasal cancer occurring during the period 1968-1975. Two control certificates (deaths from all other causes) were matched to each case. Based on a matched pair analysis of employment and industry, as reported on the certificates, cases had higher rates of employment as woodworkers, with a relative risk of about three. More definitive studies of this occupational group should help uncover the specific exposures and types of tumors that are involved.

Occupation and prostatic cancer. V. Ernster, W. Winkelstein, Jr., S. Selvin, S. Sacks and S. Brown. (University of California School of Public Health, Berkeley, CA 94720).

A case-control study was undertaken to determine whether certain occupational and geographic characteristics differ between men dying of prostatic cancer (PC) and matched controls. All PC deaths occurring in Alameda and San Francisco Counties over the period 1968-1972 (N = 804) were studied. For each case, multiple controls were computer-matched on sex, date of death, age (+2 years), and race (N = 2024). Other cancer and genito-urinary deaths were excluded from the controls. An additional set of PC cases and similarly matched controls was drawn from Alameda County, 1963-1967, and initially studied in order to refine analytic methods and develop specific hypotheses. This exploratory phase included use of non-independent statistical tests to generate hypotheses concerning occupation,
geographic factors, and death from PC. These hypotheses were tested on the larger 1968-1972 data set using the Mantel-Haenszel procedure for combining information from 2 x 2 data-tables. Data from death certificates for each subject included occupation, industry, birthplace and parental birthplace; and years in occupation, county, and state. Suspect occupations of particular interest include cadmium workers, electroplating and battery workers, painters, and gardeners.

Cancer II
Chairman: R. Crozier

Effect of widowerhood on prostate cancer mortality. P. Greenwald,* V Kirmss and W. S. Burnett (New York State Department of Health, Cancer Control Bureau, Albany, NY 12237)

Prostate cancer mortality rates are higher among widowed and divorced men than among single or married men of the same age groups. This plus the rarity of prostate cancer below age 40 suggests a need for focusing epidemiologic studies on the late middle age period. Thus, duration of widowerhood and causes of cancer deaths among predeceased spouses were examined in order to determine whether prostate cancer risk may be affected by a joint unfavorable environment prior to widowerhood or by changes in life after widowerhood. A retrospective case-control study of widowed men dying with prostate cancer was conducted using death certificates and the New York State Cancer Registry. The Study Group consisted of 169 widowers dying with prostate cancer, 444 matched controls dying of any cause except prostate cancer, and 148 matched controls dying of other types of cancer. Average duration of widowerhood and frequency of multiple wives were the same among prostate cancer widowers and controls. Predeceased wives of cases had breast cancer 9.9% of the time, as compared to 5.8% for controls. With endometrial cancer, the rates were 2.0% and 0.2%, respectively. There were no major differences between cases and controls in frequency of deaths from other types of cancer or non-cancerous conditions.

Association between breast cancer and malignant melanoma. B. S. Schoenberg* (NINCDS, NIH, Bethesda, MD 20014) and B. W. Christine (Connecticut State Dept. of Health, Hartford, CT 06115)

The experience of the population-based Connecticut Tumor Registry was analyzed for the occurrence in the same patient of breast cancer and malignant melanoma. 18140 patients with breast cancer were followed for the subsequent development of malignant melanoma of the skin or eye. Similarly, individuals with malignant melanoma of the skin or eye were followed for subsequent development of carcinoma of the breast. Survival experience for these cohorts was converted into person-years of observation (P.Y.O.) Appropriate incidence rates derived from the Connecticut Tumor Registry were applied to the P.Y.O. to obtain an expected number of individuals with both types of malignant neoplasms. Three individuals had both breast cancer and malignant melanoma diagnosed simultaneously; unfortunately, it is not possible to calculate an expected number of such events. Twenty-three individuals (all female) had both types of tumors diagnosed at least one month apart. Less than 14 such occurrences were expected (p < 0.05). The two tumors may be related through hormonal factors, particularly when considered with regard to the findings of other laboratory and epidemiologic studies.

Breast cancer risk and estrogen profiles. D. V. Vakil* and R. W. Morgan (University of Toronto, Toronto, Ontario M5S 1A8, Canada)

Women who have family history of breast cancer have higher risk of developing breast cancer than do women without such family history. The urine "estriol proportion" (E P.) the concentration of estriol (E 3) relative to the sum of concentrations of estrone (E 1) estradiol (E 2) and estriol (E 3) is inversely related to a population's breast cancer rate. To evaluate the relationship between these two breast cancer risk indicators, the urine estriol proportion was determined in 46 young women from breast cancer families (cases) and their matched controls, during the follicular and luteal phases of the menstrual cycle. Cases were separated into two categories: familial (breast cancer in mother and at least one other female relative) and nonfamilial (breast cancer in mother). The E P. values and pregnanediol (P'diol) did not differ between women from nonfamilial breast cancer families and their matched controls. In young women (<25 years) from familial breast cancer families the mean levels for E 1, E 2, E P , and P'diol were higher than their matched controls. Mean P'diol levels were higher in women over the age of 25 from familial breast cancer families compared to their matched controls (p < .05). These findings suggest that urine "estriol proportion" and pregnanediol are determinants of breast cancer risk in women from familial breast cancer families.


From 1971 to 1974, all women attending the Interdisciplinary New Breast Clinics held at the Dr. W. W. Cross Cancer Institute were questioned on use of contraceptive and estrogenic hormones 85 per cent of all women registered with breast cancer in northern Alberta attend these clinics. Patients aged 30-79 were divided into three groups: 1) those with malignant disease (901), 2) those with benign breast disease proven by biopsy (1003), and 3) those with breast conditions not requiring biopsy (730). Since the malignant patients were older than the two benign groups, all data has been age-standardized. The malignant group reported similar ever use of contraceptive hormones to the benign group not requiring biopsy, while those with benign breast disease requiring biopsy reported reduced use. However, the malignant group was more likely to have
used contraceptive hormones in the past year and there was little difference in length of time the hormones were used. In contrast, both groups of benign patients were more likely than the malignant group to have used estrogens for menopausal symptoms. All three groups reported similar patterns of recent use and length of time used.

Controlled study of the association between oral contraception and hepatocellular adenoma. J. Rooks, H. Ory, K. Ishak, L. Strauss and J. Greenspan (Center for Disease Control, Atlanta, GA 30333)

Since 1971 there has been an apparent increase in reported cases of non-malignant liver cell tumors in reproductive aged women in the United States. Most of the women in the reported series had used oral contraception for several years. The Center for Disease Control conducted a case-control study of the association between oral contraceptives (OCs) and hepatocellular adenoma (HCA). Eighty live and nine dead women with this tumor diagnosed at the Armed Forces Institute of Pathology since 1960 were studied. Seventy-nine of the live cases consented to be interviewed. Three neighborhood women within three years of her age were interviewed as controls for each case. Preliminary analysis of data from 61 case-control sets shows that significantly more oral contraception was used by the cases than was used by the controls. The presentation includes quantification of this difference, analyses of data on other possibly related factors or co-factors, analyses by type and amount of estrogen contained in OCs used by cases and controls, and a brief description of the presenting signs and symptoms, length of hospitalization, death to case ratio and long term complications experienced by cases.

Is the replacement hormone therapy associated with breast cancer? N. W. Choi, N. A. Nelson and H. A. H. Abu-Zeid (University of Manitoba, Winnipeg, Manitoba, Canada R3E 0W3)

A matched case-control study of possible effects of replacement hormone therapy on the breast cancer cases occurring during the years 1975–1976 among Winnipeg females aged 35 to 64 has been conducted. The cases and controls have been matched on age (± three years) and neighborhood. One hundred and nine cases and their controls so far have been interviewed as controls for each case. Preliminary analysis of data from 61 case-control sets shows that significantly more oral contraception was used by the cases than was used by the controls. The presentation includes quantification of this difference, analyses of data on other possibly related factors or co-factors, analyses by type and amount of estrogen contained in OCs used by cases and controls, and a brief description of the presenting signs and symptoms, length of hospitalization, death to case ratio and long term complications experienced by cases.


The authors recently completed study of the association of oral contraceptive (OC) use and hepatocellular adenomas (HCA) strongly suggests that the association is one of cause and effect. Because of the suggestion in a previous study that this association might be confined to those OCs containing mestranol (ME) the investigators have evaluated the association separately for ME and ethinyl estradiol (EE) containing drugs. Their results show that from 1960 to 1976 the percentage distribution of ME and EE containing OCs among control women is virtually identical with national sales data. Among case women there is a markedly greater than expected proportion of ME users. These data are currently undergoing intensive analysis to determine the reason for the preponderance of ME use among the cases. The authors are evaluating the effects of secular trends, the effects of progesterational agents that are in combination with ME and EE and the possible confounding effect of exposure to hepatotoxins. Results of all these analyses will be available by conference time.

Reproductive cancer and hormone use D. T Wigle* and M. Grace (Health and Welfare Canada, Ottawa, Canada K1A 0L2)

Questionnaire data collected from women first attending any of the cancer clinics in Alberta during 1971–1973 were used to evaluate the relationships between the therapeutic use of hormones for contraception, menstrual irregularity or the menopause and the development of breast neoplasia or cancer of the cervix, uterus and ovary. The comparison group consisted of females with cancer of other sites. Ever-users aged 55–74 had significantly high relative risks of uterine cancer (2.2) and benign breast tumors (2.0) and a significantly low relative risk of cervical cancer (0.4). Current users aged 25–44 had significantly low relative risks of breast cancer (0.6) and benign breast tumors (0.7). The relative risk of uterine cancer among ever-users aged 55–74 increased with duration of use to a value of 4.9 for duration of at least five years. Data from the Saskatchewan and Alberta tumor registries revealed that uterine cancer incidence has increased significantly during the past 20–25 years particularly in the 55–74 age group. The results support the conclusions that oral contraceptive hormones reduce the risk of neoplastic breast lesions but exogenous estrogens increase the risk of uterine cancer and benign breast tumors.

Maternal and Child Health
Chairman: M. Meyer

Moderate maternal alcohol consumption and decreased infant birth weight R. E. Little (University of Washington, Seattle, WA 98195).
Maternal alcoholism during pregnancy may result in severe prenatal growth deficiency. In this prospective study, the relationship of moderate maternal alcohol consumption to infant birth weight is explored. Subjects were 263 paying members of a health maintenance organization who delivered single live children. Their alcohol consumption before pregnancy, and in early and late pregnancy, was estimated. In order to control for smoking, which is strongly correlated with both infant birth weight and alcohol use, a polynomial regression analysis using a sample stratified on smoking was employed. A regression equation was computed for each of the three periods in which drinking was estimated. Independent variables entered into the equation were maternal age, height, parity, daily cigarettes, alcohol use in the period, and gestational age and sex of child. The regression of birth weight on these variables revealed a significant relationship (p ≤ 0.01) with alcohol consumption in two of the periods. Ingestion of an average of 29.57 cc of absolute alcohol daily before pregnancy was associated with an average decrease in birth weight of 91 grams; the same amount ingested in late pregnancy was associated with a decrease of 150 grams. The associations were independent of the other variables entered into the equation, and, in particular, of tobacco use.

Etiologic inquiries into USA low birth weight epidemic. S. H. Lamm and A. Reid* (Consultants in Epidemiology, Washington, DC).

Between the years 1961 and 1971 there was an epidemic of low-weight births in the United States. The low birth weight ratio rose from 7.7% in 1960 to a peak of 8.3% in 1965-1966. By 1972 the low birth weight ratio had dropped back to 7.7% and has continued to drop since then. The epidemic is described for white and non-white births. The possibility that this epidemic is an artifact is considered and rejected. Possible explanations for this epidemic are sought in demographic, socio-economic, and programmatic changes. By univariate analysis the following factors have not been implicated: demographic factors including fertility trends, economic changes at the national level, and programmatic changes in family planning and abortion. Possible etiologic factors include smoking habits of women, and changes in prenatal care practices and delivery of services.

Maternal alcoholism during pregnancy may result in severe prenatal growth deficiency. In this prospective study, the relationship of moderate maternal alcohol consumption to infant birth weight is explored. Subjects were 263 paying members of a health maintenance organization who delivered single live children. Their alcohol consumption before pregnancy, and in early and late pregnancy, was estimated. In order to control for smoking, which is strongly correlated with both infant birth weight and alcohol use, a polynomial regression analysis using a sample stratified on smoking was employed. A regression equation was computed for each of the three periods in which drinking was estimated. Independent variables entered into the equation were maternal age, height, parity, daily cigarettes, alcohol use in the period, and gestational age and sex of child. The regression of birth weight on these variables revealed a significant relationship (p ≤ 0.01) with alcohol consumption in two of the periods. Ingestion of an average of 29.57 cc of absolute alcohol daily before pregnancy was associated with an average decrease in birth weight of 91 grams; the same amount ingested in late pregnancy was associated with a decrease of 150 grams. The associations were independent of the other variables entered into the equation, and, in particular, of tobacco use.

Assessment of death certificate and surveillance data for monitoring abortion mortality. W. Cates, Jr.,* J. C. Smith and J. E. Patterson (Center for Disease Control, Atlanta, GA 30333 and National Center for Health Statistics, Rockville, MD 20852).

In order to assess the usefulness of vital statistics data for monitoring secular trends in abortion mortality, the authors compared deaths classified by the National Center for Health Statistics (NCHS) under ICD code numbers 640-645 (abortion) for 1972-1974, and the abortion-related deaths reported to the Center for Disease Control (CDC) through its epidemiologic surveillance of abortion mortality for the same years. Results showed that the surveillance techniques had classified more deaths as abortion-related and had resolved more cases into the specific abortion categories of legal, illegal, and spontaneous, than vital statistics tabulations based on death certificates. Inadequate physician documentation on the death certificate was the main reason why vital statistics data were underreported and misclassified compared to surveillance enumerations. Thirty-three of the 46 deaths categorized by CDC as abortion-related but not by NCHS were in the legal abortion category. Although vital statistics data prior to 1973 probably have been sufficient to identify secular trends in abortion mortality, underreporting and misclassification will lessen their utility as legal abortion deaths become a greater percentage of total abortion deaths.

Evaluation of a screening program for lead poisoning in children based on blood lead levels. J. McCusker* (University of Rochester, Rochester, NY 14624).

This study attempted 1) to examine the validity of the blood lead test in terms of acute symptomatology and of subsequent developmental deficits and behavioral problems and 2) to assess the possibility that other variables and a history of pica might be used to improve the predictive value of the blood lead test. Cohorts from an original sample of 321 children screened in the Brownsville area of Brooklyn, NY, representing high (55 µg/m and over), intermediate (35-54 µg/m), and low (34µg/m and less) blood lead levels were followed for up to a year after the initial screen with repeat blood lead tests, interviews to obtain social, demographic and symptomatic information, and developmental evaluation (including the Vineland Social Maturity Scale and the Peabody Picture Vocabulary Test). The results indicated a certain validity to the blood lead test in terms of acute symptomatology, both gastrointestinal and neurologic. Decreased social maturity and increased behavioral symptoms were found at higher blood levels. The temporal relationship suggested by these data support the hypothesis that developmental and behavioral abnormalities (including pica) precede rather than follow the development of elevated blood lead levels. Age under four and a recent history of pica for paint or plaster were identified as significant predictive variables for subsequent blood lead level elevation.

Maternal characteristics and pregnancy outcome. George K. Tokuhata,* Virginia G. Collefree, Martha W. Smith and Edward Digon (Bureau of Health Research, Pennsylvania Department of Health, P.O. Box 90, Harrisburg, PA 17120).

Relationship between maternal factors and pregnancy outcome was evaluated on 6504 women in a total cross-sectional population covering urban, suburban and rural areas in Southcentral Pennsylvania. Maternal factors included employment, contraceptives, smoking, planning and feelings about pregnancy, body weight and gain during pregnancy, and medical and pregnancy histories. Outcome was measured by fetal/neonatal mortality, prematurity/immaturity, congenital anomalies, and low Apgar score at one minute. Maternal race and age, birth order and sex of the infant were taken into account.
Women who terminated employment during third trimester had lowest risks. Those who took oral contraceptive pills had higher risks of prematurity; feelings other than "happy" were related to prematurity. Body weight was inversely correlated to prematurity; so was weight gain during pregnancy. Rheumatic fever and diabetes were associated with fetal death. Venereal disease enhanced the chance of prematurity. German measles was related to congenital anomalies. Kidney disease, V.D., diabetes, and drug sensitivity were all related to low Apgar score. Previous premature births were related to current premature delivery, but not to other outcome measures.


Bivariate frequency distributions of live births are described using contour levels which are a function jointly of birth weight (BW) and gestational age (GA). These contour levels facilitate comparisons between bivariate BW-GA distributions. In addition to live birth distributions, fetal viability surfaces can be compared using the contour approach. Comparison of the distributions of 993,956 US white and 170,915 US black single live births with known BW and GA has shown a much higher frequency of preterm and low birth weight babies for the black population compared to the white. Nevertheless, the risk of a fetal death among low birth weight and preterm deliveries in the black and white population is the same for each combination of low BW and preterm GA. Contours of Norwegian live births show a much greater frequency of high birth weight babies than is the case for either US population. Norwegian fetal viability contours are examined also in relation to the US white and black contours.


Information on personnel, equipment and care facilities at all the maternity institutions in Norway has been related to perinatal mortality among all single births in Norway, 1967-1973, a total of 454,358 births. An obstetric score based on personnel and equipment, previously developed, has been used to divide the country into three groups of counties, with low, medium and high obstetric score. The birth weight specific perinatal, fetal and early neonatal mortality rates are compared between the county groups, showing significant differences in the mortality rates between the low score group and the two other groups. The relative difference in mortality increases as the birth weight increases beyond 3500 grams. The major component in the perinatal mortality difference is due to a difference in the early neonatal mortality (mortality in first week of life). Time trends indicate that the relative differences in perinatal mortality are not decreasing over the seven year period, but have rather increased slightly. Potential differences in the populations at risk in the three county groups are discussed.


The infant mortality rate in the United States has fallen steadily 24% over the six-year period 1968-1974, as have the neonatal and post-neonatal rates. However, cause-specific mortality rates have shown marked changes. Neonatal mortality rates from asphyxia, immaturity, respiratory infections and difficulty in labor and delivery leading to death by certain causes peculiar to infancy have shown sharp drops. With the exception of birth injuries there are reductions in the causes of mortality that may reflect better pre-natal and obstetric care. Congenital malformation mortality rates have changed little. Respiratory distress syndrome has shown an increase through 1972 and then a decrease. This may reflect changes in perinatal care or relabelling. A marked increase since 1971 in deaths from non-respiratory infections may reflect the increase in Group B Streptococcal sepsis of the neonate. Post-neonatal mortality rates show a marked fall in deaths due to respiratory infections, so marked it suggests a relabelling artifact. The hypothesis that this is due to better recognition of congenital heart disease deaths is not supported. There is, however, a concurrent rise in sudden infant death syndrome (SIDS), making SIDS since 1972 the leading cause of post-neonatal deaths. When respiratory infections and SIDS are combined, however, there is a slow decrease in the combined rate, consistent with that of the other causes of post-neonatal deaths. This finding serves to suggest that there is little specific change in this cause of death, only the label changes.

Epidemiology Methods and Statistics
Chairman: P. Spiers

Analytic methods in matched pair epidemiologic studies. B. Rosner and C. H. Hennekens* (Channing Laboratory, Harvard Medical School, Boston, MA 02115).

Two methods of analysis of matched pair epidemiologic studies are presented. The within pair differences between study and comparison individuals are evaluated with respect to additional confounding variables while simultaneously maintaining the matching. The effects of additional confounding variables are quantitated by their association with the response variable (i.e., exposure in a case-control study or disease in a cohort study). For a binary response variable a multiple logistic function is used and a method to estimate the odds ratio is given. For a continuous response variable multiple regression is used and a method to estimate odds ratios is given. For each method a numerical example is given which illustrates its utility.
Problems and criteria in the evaluation of clinical scales, as demonstrated by the Karnofsky scale. T. Hutchinson, N. F. Boyd and A. R. Feinstein (Yale Medical School, New Haven, CT 06510).

No general standards have been established for creating and evaluating the scales used to rate clinical phenomena. The authors have considered eight such standards and applied them to the well-known Karnofsky Performance Status scale. The standards refer to purpose; populational eligibility; choice and partition of constituent variables; operational definitions, aggregation of constituent elements; and partition and labelling of the final categories. The authors studied inter-observer variability in use of the Karnofsky scale when two pairs of physicians scored 60 patients on the scale's 10 numerical categories. Agreement was only 34% for one pair and 29% for the other. When the data were re-analyzed with the ten categories condensed into three, agreement rose to 74% and 71%. A major source of difficulty was the scale's omission of categories for certain aggregations of the constituent elements that were commonly cited in the patients' own assessments. Although operational definitions are not supplied, a pair of raters interpreted the main variables similarly. The main sources of observer variability in the Karnofsky scale thus appear to be inadequacies in aggregating the constituent elements and partitioning the final categories. The proposed standards can improve evaluation of other clinical scales as well as help in their original construction and testing.

The power of a test for seasonality S. D. Walter (Dept of Epidemiology and Public Health, Yale University, New Haven, CT 06510).

A test proposed by Edwards to detect a seasonal pattern in the frequency of an epidemiologic event has enjoyed widespread use in etiologic investigations, but up to the present time little has been known about the power of this method, save that it is more powerful than the usual \( x^2 \) test for heterogeneity of rates. After a brief description of the test calculations, and an outline of the derivation of the power estimates presented here, tables of power are given for two alternative patterns of seasonal variation: 1) a sinusoidal or simple harmonic model, characterized by the date of the maximum rate and the proportional change in rate from the average to the maximum, and 2) a model where the rate is constant in all months except one where an increase is observed. The tables may be used to evaluate the probability that cyclic variation of given magnitude will be detected by a study of given size, or alternatively to assess what sample size is required to detect seasonality of a certain magnitude with a defined probability.

The effect of errors of diagnosis and differential frequency of examination on reported rates of disease. J. J. Schlesselman (NICHD, National Institutes of Health, Bethesda, MD 20014).

Prospective observational studies of certain diseases such as cervical dysplasia and carcinomas in situ may employ screening programs to determine the incidence of disease in selected cohorts. Where errors of diagnosis occur, the true cohort experience will be distorted by an amount dependent upon the frequency of screening and the diagnostic error rates, false positives and false negatives. An analysis based upon a life-table approach is developed which applies to general models of "survival", and which allows one to calculate the amount of bias introduced through diagnosis errors and differential frequencies of screening. The analysis also provides for the adjustment of reported rates of disease so as to eliminate this bias.

Generalized measures of sensitivity, specificity and predictive value in epidemiological studies C. H. Goldsmith* (McMaster University, Hamilton, Ontario, Canada L8S 4J9).

The value of a diagnostic test has traditionally been judged by its ability to detect the presence or absence of the disease in question. Hence, two disease states and two test states have yielded a 2 x 2 or fourfold table of frequencies when a patient sample was studied. Sensitivity, specificity and predictive value measures have been used to summarize these tables. However, if a disease and its test have two or more mutually exclusive and exhaustive states, the traditional measures do not apply. For such a \( k \times k \) frequency table, \( k \) new measures of sensitivity, \( k \) new measures of predictive value, a prevalence distribution, a category distribution, a generalized sensitivity index and a generalized predictive value index have been defined. Each new measure or index reduces to the corresponding regular measure or index when \( k = 2 \). The new sensitivity and predictive value measures are related to measures of agreement such as Cohen's kappa. In each case, large sample variances and covariances have been determined so that hypothesis testing and confidence interval estimation may be carried out. The new measures and indexes are illustrated with data on coronary heart disease and psychiatric disorders from the literature, as well as data obtained from the McMaster Health Index Study.


The data resource of the Rochester epidemiologic project is unique in the sense that it contains the medical histories of all residents of the city of Rochester since the early 1900's. A diagnostic index allows excellent case ascertainment for all major diagnoses. The resource is available to all qualified investigators and has been the basis of over 100 publications. The Birth Control Family File (BCFF) is an extension of the computer retrieval system. It has as its purpose, expansion of the retrieval system for a large subset of the population. For each birth to local residents since 1950 both parents and all sibs will be included for a total of 75,000 persons. The index will allow retrieval for a broader class of diagnoses, for drugs, for a selection of diagnostic and therapeutic procedures and for automated family
linkage The BCFF will provide highly efficient methods for 1) identifying persons exposed to a specific drug, 2) selection of control groups and 3) study of familial association of disease. Future plans include studies of mild hypertension, anopic disease, mental retardation, and congenital malformations In the past, doctoral candidates from other institutions have used this resource and the BCFF will also be open to outside investigators

A problem in non-comparability of cancer morbidity and mortality rates from the same community. G. H Spivey* and E. Sloss (University of California, Los Angeles, CA 90024)

During a pilot descriptive study of the relationship between chlorinated drinking water and cancer, non-comparability of incidence and mortality rates was observed Incidence rates for selected sites (esophagus, stomach, colon-rectum, liver, kidney, bladder, other urinary, and lung) and communities (matched Los Angeles [L.A.] County communities with different water supplies) were obtained for the years 1972-1974 from the University of Southern California Cancer Surveillance Program Mortality rates for the same sites for 1967-1971 were derived from L.A County vital statistics tapes and the 1970 Census During examination of these rates for trends related to water supply, it became apparent that the incidence and mortality rates were not consistently related. Ratios of mortality to incidence (expected value 1) ranged from approximately 0.1 to 4.0 Rank correlations between incidence and mortality rates for different communities within the same cancer site indicated no significant correlation between the two rates Thus the incidence and mortality rates appear to arise from different populations. Since most of the cancers included in this study are rapidly and highly fatal, the discrepancy cannot be explained on the basis of high survival rates Discussion will focus on possible reasons for this non-comparability.

Cardiovascular

Chairman: R. Morgan

The risk of cigarette smoking in men with a prior history of myocardial infarction—results from the Coronary Drug Project. C. L. Meiernt, *S. Forman and J. Stamler (University of Maryland, Baltimore, MD 21201)

The relationship of five-year mortality to baseline cigarette smoking status as well as changes in smoking status have been examined among the 2789 men assigned to the placebo treatment group in the Coronary Drug Project (CDP). This long-term prospective follow-up study affords an opportunity to assess the importance of cigarette smoking as a risk factor in a population of post-myocardial infarction men. Results indicate that 38% of the men in the placebo treatment were cigarette smokers at entry. Of the 40 baseline variables examined, cigarette smoking is most highly correlated with white blood count (R = 0.337). The five-year mortality rate of smokers is 24.0% compared to 19.0% for nonsmokers. The five-year mortality rates, adjusted for age and sex using multiple linear regression, are 24.3% and 18.8% for smokers and nonsmokers, respectively. Excess incidence of definite nonfatal myocardial infarction, intermittent claudication, peripheral arterial occlusion, and congestive heart failure was observed for smokers compared to nonsmokers. The proportion hospitalized during five years is higher for smokers than nonsmokers.

Correlation of serum estradiol and testosterone concentrations with lipid levels in men. Robert B Wallace* and Barry M. Sherman (Departments of Preventive Medicine and Internal Medicine, University of Iowa, College of Medicine, Iowa City, IA 52242).

The observation that hyperestrogenemia may be a risk factor for myocardial infarction in men (Lancet 2:14-18, 1976) led the authors to examine the relationship between two sex hormones, estradiol (E2) and testosterone (T), as measured by specific radioimmunoassay, and two plasma lipids, cholesterol (CHOL) and triglyceride (TG), in 70 randomly selected, fasting males aged 30-49 years Blood pressure and relative weight were also measured on study subjects E2 levels above the 90th percentile (>= 50 pg/ml) were associated with significantly elevated mean TG and relative weight, but not blood pressure or CHOL. T levels were negatively correlated with TG and relative weight, but not with blood pressure or CHOL. There was no clear association between T and E2 concentrations. These changes are similar to those reported with administration of these hormones in pharmacologic doses and suggest, with other available information, that endogenous sex hormones may be important in the regulation of lipid metabolism and may also contribute to the refinement of risk estimates of coronary artery disease.

Psychosocial factors, host resistance, and mortality: Nine and a half year mortality study of adults in Alameda County, California. L. F. Berkman* (University of California, Berkeley, CA 94720).

This study demonstrates the predictive impact of social support systems and psychosocial resources on the risk of mortality. Investigation of five sources of social support and several measures of psychosocial resources predict subsequent differences in allcause mortality rates. The impact of these psychosocial predictors was found, in general, to be greater in men than in women and greater in younger than in older age groups. The study is based on the 1985 Human Population Laboratory Study of a random sample of adults living in Alameda County, CA. There were 6928 respondents, of whom 682 were found to have died in the follow-up period 1965-1974. Measures of sources of social supports were marriage, extended family and friends, job relationships, participation in organizations, and church attendance. Measures of psychosocial resources were isolation-depression, satisfaction with social roles, happiness, and ego-resiliency. The associations between these factors and risk of mortality are not attributable to any one cause of death nor do they appear to be due to such risk factors as smok-
HDL cholesterol and CHD risk in Evans County blacks and whites. H. A. Tyrro1er,* G. Heiss, S. Heyden and C. G. Hames. (University of North Carolina, Chapel Hill, NC 27514).

The negative CHD risk factor status of high density lipoprotein cholesterol (HDL) reported from several epidemiologic studies has been suggested in Evans County by the finding of higher levels of HDL in blacks, who have had lower incidence of CHD than whites. The present study explores the distribution and population determinants of HDL in this biracial community. A negative association of HDL to body mass was present for each race-sex group. Controlling for body mass, HDL was markedly higher in blacks than whites under age 45. The well known female excess of HDL was observed for both races in Evans County. However, in adults <45 years of age male blacks had higher HDL than white females. In males mean HDL was 63 mg% for blacks, 49 mg% for whites, a relative black increase of 28%. In women under age 45 mean HDL was 69 mg% for blacks, 55 mg% for whites, a relative black increase of 25%. The black HDL levels decreased with increasing age above 45 and by age 65+ males of both races achieved comparable values. The relationship of HDL to occupation, education and smoking habits are presented. The intercorrelations of lipids and lipoproteins with HDL are contrasted between the races. CHD risk, based on a multivariable logistic risk function, was empirically validated in Evans County. The association of HDL with this CHD risk score in blacks and whites is presented.


Questionnaires administered to 1242 women and 983 men in the Framingham Heart Study from 1965 to 1967 provided measures of personality type, social support, anxiety, and life events. Clusters of questions selected by a panel of experts, and verified by item and factor analysis, formed a scale of Type A behavior and other psychosocial states. Among women, Type A behavior was significantly correlated with emotional lability (.46), tension (.46), Reeder's daily stress (.46), and ambitiousness (.32). Women were less likely than men to be ambitious and exhibit Type A behavior, and were more likely than men to be emotionally labile, tense, and to suppress hostility. The prevalence of CHD was higher among women classified as Type A than Type B, prevalence rate ratios ranged from 4.3 to 2.2 for ages 45-64 and 65-74, respectively. Among housewives, rate ratios for uncomplicated angina and total CHD were 3.1 and 2.4, respectively. The comparable ratios for working women were 3.5 and 3.8. Thus, employment status did not greatly affect the association between CHD prevalence and Type A behavior. Implications of these findings are discussed, along with methodologic issues pertaining to scale development.

Breast cancer and reserpine use in a population of hypertensive and normotensive women. M. D. Farmer,* and R. Detels (University of California, Los Angeles, CA 90024).

The relationship between breast cancer, reserpine, and hypertension was investigated in a previously identified population of hypertensive and normotensive women. The negative findings are real and not due to the use of one particular study design. This approach is relatively fast and economical since it utilizes a previously identified cohort, and can be used as a general model for rapidly testing new hypotheses.

Estimated community impact of hypertension intervention in a high-risk population. Rita P. Ouellet,* Aristide Y. Apostolidis, George Entwisle and Patricia Dischinger (Department of Social and Preventive Medicine, University of Maryland School of Medicine, Baltimore, MD 21201).

Relative risks of cerebrovascular disease obtained from the Evans County data (where hypertension is defined as ≥160/95 mm Hg) were applied to the prevalence of hypertension in a black urban community in Baltimore. Thirty-eight per cent of the population were found to be hypertensive (average diastolic blood pressure ≥95 mm Hg or <95 mm Hg and on antihypertensive medication). Population attributable risks were calculated from the above relative risks. It was found that hypertension contributed 53% to cerebrovascular accidents in the males and 44.5% in the females. Evidence from Baltimore, however, shows that only 45% of the population remains active in an aggressive screening and treatment program. Applying the efficacy results obtained from the Veterans Administration Study to the proportion of actively treated hypertensives indicates that the effectiveness expected from intensive hypertension treatment would reduce morbidity from stroke by 33%.

Sample-size determination in total-community car-
Cancer III
Chairman: S. Sacks

Cancer mortality among active California Mormons. J. E. Enstrom (School of Public Health, University of California, Los Angeles, CA 90024).

Preliminary results among 350,000 California Mormons compared with all California whites show that the 1968-1972 standardized mortality ratio (SMR) for total cancer is about 50% for active males, about 65% for all females, and about 75% for all females. For active males the 1968-1972 SMR is about 25% for "smoking-related" cancer sites and about 65% for all other sites. These findings, based on Church records, have been largely confirmed by independent 30-year mortality follow-up on a 1945 cohort of about 1000 active California Mormon adults.

Comparison of Mormons with a 1966-1968 national probability sample of white nonsmokers indicates that the low Mormon cancer death rates can be explained by their smoking habits. Mormons are a health-conscious religious group, and they appear to use only about half as much tobacco, alcohol, coffee, and tea as the general population.

Active Mormons, defined here to be Church leaders who appear to use only about half as much tobacco, alcohol, coffee, and tea as the general population. Also, Mormons do not use about half as much tobacco, alcohol, coffee, and tea as the general population.
rate in each of the race-sex groups. In addition, in white males lower rates occurred in the Northeastern and Mountain areas. Small positive correlations occurred between county rates and the degree of urbanization and years of schooling in whites. The positive association between county rates and urbanization also occurred in non-whites, but schooling was not significantly associated. Only the rates for white males and females were correlated (r = 0.10), suggesting some degree of etiologic heterogeneity for the race-sex groups. Positive correlations were found with the proportion of the population employed in the following industries. Food (WM, WF, NF), printing and publishing (WM, WF), and machinery (WM, WF, NF). In addition, positive correlations with fabricated metal products, primary metals, apparel, and textile industries occurred for NM.


Hutterites are a genetic isolate following an agrarian lifestyle based on the religious principles of communal holding of property, adult baptism and pacifism. In a 1969 census, 12,136 (72%) of the 16,931 Hutterites in North America lived in the Canadian provinces of Alberta (36%), Saskatchewan (10%) and Manitoba (25%). Due to their distinctive lifestyle, large family size and inbreeding, Hutterites are a unique population in which to study environmental and familial influences in cancer. A survey of all records on the cancer registries in Manitoba, Saskatchewan and Alberta has located over 200 Hutterites diagnosed with cancer. The most frequent sites during the period 1942 to 1975 were breast (30 cases), skin (29), stomach (23), leukemia (18), rectum (12) and prostate (12). Only two cases of cervical and five cases of lung cancer were reported. The overall incidence of cancer in Hutterites was 25% less than expected, after population-adjusted rates were calculated from the cancer registries. The incidence of stomach cancer and leukemia was higher. These results are consistent with an emerging pattern of cancer incidence in farm areas. These data are discussed in terms of the Hutterite lifestyle and compared to results from low incidence and rural populations.


A retrospective investigation comparing associated risk factors in 181 newly-diagnosed cases and a matched group of controls obtained from hospital records and a mailed questionnaire was carried out with the main objective of exploring the independent roles of alcohol and tobacco consumption in the etiology of esophageal carcinoma. Several factors were found to be associated with esophageal carcinoma. Some of these factors include a history of regular exposure to chemicals, toothlessness without prosthetic replacement, family history of esophageal cancer, family history of G I. cancer and family history of cancer. Both smoking and alcohol consumption were found to be associated with esophageal cancer. The association was stronger for smoking than for alcohol. Among non-smokers, alcohol was not found to be associated with the disease. However, in the presence of alcohol the risk of developing esophageal cancer increased in smokers. The amount of tobacco and/or alcohol used was very important in determining the strength of the association. Heavy smokers who were heavy drinkers had a relative risk value of 10.52. The importance of controlling for alcohol and smoking use independently and in combination when testing for the relationship of esophageal carcinoma and a suspected attribute will be discussed.


Data from the Connecticut Tumor Registry have been used to calculate mortality rates and stage-specific (in situ, localized, non-localized) incidence rates for endometrial cancer for the period 1960-1974. Although the incidence of invasive endometrial carcinoma remained relatively stable in Connecticut between 1935 and 1969, the 1970-1974 age-adjusted incidence rate is about 15% higher than rates for the two preceding quinquennia. This excess is entirely due to an increase in localized disease; women in age groups 50-54, 55-59, and 60-64 show the largest increments. For example, the rate of localized disease in women aged 50-54 at time of diagnosis was 33% higher in 1970-1974 than in either 1960-1964 or 1965-1969. Rates of carcinoma in situ have also shown a substantial increase. In contrast, the incidence of non-localized disease remained stable and mortality rates declined over the 15-year period. These results are consistent with a hypothesis of earlier diagnosis. Although the likely effect of estrogen use on the incidence of endometrial cancer cannot be denied, the authors suggest that the possible effects of other factors such as changes in diagnostic practices and in the rates of hysterectomy and errors in diagnosis could be substantial and must be considered.


Brain tumors are the second leading cause of childhood cancer but few data are available on their epidemiologic characteristics. A study was therefore conducted of all children 0-19 years of age hospitalized for primary brain tumors from 1960 to 1974 in the Baltimore area. Demographic and medical data were abstracted from hospital records. Cases were also ascertained from death certificates, tumor registries and pathology records. During 1960-1974, 169
cases were identified. The average annual incidence rate was 1.4 per 100,000 children 0–19 years old, with peak incidence in 5–9 year olds. Most tumors were infratentorial and were astrocytomas. In males, incidence rates tended to decline during 1960–1974, while in females incidence increased slightly. The race ratio (W:B) of incidence rates fell from 1.4 in males and from 2.7 in females in 1960–1964 to 0.8 in 1970–1974. The sex ratio (M:F) declined in whites from 1.9 in 1960–1964 to 0.7 in 1970–1974. A similar trend was seen in blacks. For whites, the sex ratio ranged from 1.2 to 1.5 for all age groups, but was 0.7 in 10–14 year olds. A lower sex ratio at puberty was also seen in blacks. The incidence in whites was about twice as high in upper socioeconomic status (SES) as in lower SES children, but blacks showed no such difference. The possibility that environmental factors may account for the differences by sex, race and SES is being investigated in a case-control study.

Infectious Diseases
Chairman: J. Maynard

Antitoxin responses in geriatric persons to tetanus-diphtheria (Td) toxoid immunization. F. L. Ruben,* J. Nagel and P. Fireman (Montefiore Hospital and Children’s Hospital, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213).

The annual diphtheria case-fatality ratio and average annual tetanus incidence in the US is highest in the over 60 years age group. Currently there is little data for meaningful recommendations regarding Td prophylaxis in the elderly. The authors studied a group of 27 individuals, mean age 75 years (range 61 to 94 years), after obtaining informed consent from them and their relatives. Td toxoid at a dose of 0.5 ml was given to most persons on two occasions seven months apart. Sera were collected before, 21 days after dose one, and one month after dose two. Before toxoid 26% and 59% of persons had antitoxin levels for tetanus and diphtheria respectively which were protective (≥0.1 antitoxin units for each). After one toxoid dose, the percentages protected rose to 42 and 87 among vaccinees. After dose two, all persons immunized had protective levels. The geometric mean antitoxin titers for tetanus and diphtheria before toxoid and after the second dose were 0.4 and 2.46 for tetanus and 07 and 6.80 for diphtheria. No persons had significant side effects after either dose. These data suggest that many elderly persons lack protection against tetanus and diphtheria, that two doses of Td toxoid would confer immunity to virtually all such individuals, and that Td toxoid is safe for the elderly.

Catecholamine activity and reported morbidity: A longitudinal study of infectious disease episodes. H. William Gruchow (University of Waterloo, Waterloo, Ontario, Canada).

In a previous cross-sectional study, elevated urinary vanillylmandelic acid (VMA) levels were found to be associated with the reporting of chronic disease conditions, while non-chronic (infectious) conditions were associated with lower VMA levels. The present study is a longitudinal follow-up in which daily VMA levels were obtained for a cohort of 47 subjects over a 30-day period. As in the previous study, subjects who reported chronic health problems had significantly higher (p < 0.05) VMA levels than those with only acute infectious disease episodes. However, the daily mean VMA values for the study population were positively correlated with the prevalence of infectious disease symptoms (r = .573, p < 0.01), and analyses of individual VMA profiles revealed the presence of a VMA spike, at least one S.D unit above the mean, preceding the onset of symptoms in 17 of 20 reported episodes. The spikes were characteristically followed by substantially lower VMA levels associated with the onset of symptoms. These findings suggest that the levels of catecholamine activity may have a role either in the etiology of infectious diseases, or in the manifestation of infectious symptoms.

A prospective study of Escherichia coli in endemic diarrheal disease. Marc Gurwith,* Dorothy Hinde, Roger Gross and Bernard Rowe (University of Manitoba School of Medicine, Winnipeg, Manitoba, Canada R3E 0Z3).

The isolation rate of Escherichia coli of the traditional infantile enteropathogenic serotypes (EEC) was studied prospectively in two groups: Group 1 consisted of children with diarrhea, and controls without gastrointestinal disease, matched for age and inpatient and outpatient status. Group 2 consisted of families entered in a prospective study of rotavirus infections. In Group 1, EEC were found in 13 (6%) of 226 children younger than 12 months and 9 (6%) of 139 children 12 to 35 months of age, but in only 1 (2%) of 56 older than 3 years with diarrhea. EEC were found in only 1 of 421 age matched controls (p < 0.01 for children <12 months, and for children 12 to 35 months). In Group 2, EEC were present in 7 (18%) of 38 specimens during diarrhea episodes compared to 5 (1%) of 492 specimens obtained when there was no diarrhea (p < 0.001). The EEC were not enterotoxigenic. In the total 36 EEC identified, there were at least 17 different serotypes. The most common serogroup was 0111, but this included four different serotypes, based on flagellar (H) antigens. Thus, EEC were significantly associated with endemic diarrhea, even though no enteropathogenic mechanism was apparent.

Purified cholera toxoid as a primary and booster antigen in man. M. Levine,* D. Nalin, D. Hoover, J. Libonati, J. Craig and N. Pierce (Univ. of Maryland School of Medicine and Baltimore City Hospitals, Baltimore, MD; and Downstate Medical Center, New York, NY).

Because of the poor efficacy of parenteral cholera toxoid in a field trial, the immunogenicity and efficacy of oral toxoid was investigated in three studies using free-living, adult volunteers. In Study I (16 adults) primary immunization was parenteral (200 mcgs) in seven and via jejunal tube (2 mcgs) in nine. All individuals received toxoid boosters (2 mcgs) via jejunal tube 28 and 56 days after primary immunization.
Infant botulism and its possible relation to the sudden infant death syndrome: A preliminary report

Infant botulism was first appreciated as a unique syndrome in California in 1976. Infant botulism differs from classic food-borne botulism (ingestion of the preformed neurotoxin) in that ingested spores of *Clostridium botulinum* apparently germinate and produce botulinum toxin in the infant intestine. Preliminary findings suggest that at a minimum, several hundred cases of infant botulism severe enough to require hospitalization occur annually in the United States. Since *C. botulinum* spores are distributed worldwide, infant botulism may soon become recognized internationally as a significant pediatric infectious disease problem. The clinical syndrome of infant botulism includes poor sucking and swallowing ability, ophthalmoplegia, ptosis, generalized hypotonia, and on occasion, sudden respiratory arrest. These clinical observations, plus the known potency of botulinum toxin and the strikingly similar age distribution of 19 confirmed infant botulism cases to SIDS cases, all prompted exploration of the possibility that infant botulism causes some cases of the sudden infant death syndrome (SIDS).

Prediction of death and bacterial infection during hospitalization using admission white counts, BUN, age and underlying disease. J. Freeman* and B A Rosner (Channing Laboratory, Boston City Hospital, Harvard Medical School, and Boston Collaborative Drug Surveillance Program (BCDSP), Boston, MA 02118).

A systematic analysis was made of outcome-related clinical information contained in individual combinations of age, underlying disease, BUN, and total and differential white blood cell counts on 12,047 BCDSP patients. These combinations of admission laboratory values contained significant information predictive of death in uninfected patients, and predictive of bacterial infection (*p < 0.001*)

Patients were classified as having bacterial infection if they received systemic antibiotics for moderate or severe infection, and also had a discharge diagnosis of bacterial infection. 78% of patients determined to have bacterial infections by standard definitions would be correctly classified using this scheme. The proportions of neutrophils in the differentials and the total white counts were arranged in a 3 x 8 contingency table within strata. The information content of an outcome or confounding variable was estimated by partitioning total chi square for association and heterogeneity. This provides a direct estimate of the relative and absolute risk of bad outcome for any individual, and improves discrimination.

Otitis media in a well-defined community. R. Biles,* P A. Buffer and A. A. O'Donnell (University of Texas Medical Branch, Galveston, TX 77550).

A community study was undertaken in the tri-ethnic community of Galveston using four major medical facilities and patients aged 0–9 years treated at these facilities during 1975. 4393 children were identified (77% of total population aged 0–9 years), a stratified random sample (1018) selected, and medical records reviewed. No overall sex or ethnic differences were observed in association with otitis occurrence. 357 (35%) of the sample had at least one case of otitis during 1975, yielding a conservative annual incidence rate of 27% for this age group, a rate significantly higher than comparable British reports, and an age-specific pattern much different than British studies. Susceptibility to otitis was evaluated in terms of recurrence patterns by age of initial diagnosis. Infants who received an initial diagnosis of otitis within the first 12 months experienced significantly more otitis events during a subsequent 2-year follow-up period than children who received an initial diagnosis after one year of age (*p < 0.005*). Seasonal patterns of incidence were comparable with those reported in other studies, but analysis of children with repeated episodes by month of birth indicated an increased susceptibility for children born in the late summer and fall (Aug.–Dec.) and a decreased risk for those born in March–May. This has not been previously reported, but may be due to differences in environmental or other factors within the post-natal period.
Lung function in areas of moderate and low oxidant pollution R. Detels,* A. Coulson, D. Tashkin and S. Rokaw (University of California, Los Angeles, CA 90024).

A survey for chronic respiratory symptoms and functional impairment was completed in 3465 residents of an area exposed to oxidant pollutants and in 4516 residents of an area exposed to low levels of pollutants. Tests included questionnaire, spirometry, whole body plethysmography and the single breath nitrogen test (ΔN\textsubscript{max} and closing volume). A 3% sample was reexamined at UCLA. Cough, cough with sputum and presence of any symptom were reported more frequently in the low pollution area. Results of FEF\textsubscript{25-75} and FEF\textsubscript{50-75} were essentially similar in the two areas and the ΔN\textsubscript{max} slightly worse in the low pollution area. FEV\textsubscript{1}, FVC, V\textsubscript{max}, V\textsubscript{50}, V\textsubscript{75} and CV were consistently better in the low pollution area. Differences were greatest in adults 18-59 years of age and lowest in children 7-17 years. Comparisons of results in the 3% sample suggested no greater variability existed between laboratories than between two physicians interpreting results of questionnaire, physical examination and lung function. Comparison of these same tests with more sophisticated tests in the UCLA laboratory suggested the FEF\textsubscript{25-75}, FEF\textsubscript{50-75}, V\textsubscript{50}, V\textsubscript{75} and ΔN\textsubscript{max} were reasonably reliable, reasonably specific and more sensitive than FEV\textsubscript{1} and FVC, which the present authors, as others, have found to be the most specific tests. The results suggest that residence in the area exposed to oxidant pollution may be associated with impairment of certain measurable aspects of lung function.

An epidemiologic survey of welders. C. R. Buncher,* E. A. Emmett and R. R. Suskind (University of Cincinnati, Cincinnati, OH 45267)

An epidemiologic study of the cutaneous, ocular and respiratory systems in 77 welders, 75 workers in the vicinity of welding operations ("exposed"), and 58 parts and tool employees (control) who worked in another area has been completed. The employees were group matched based on an initial questionnaire. A few baseline differences were observed, for example age (welders 43 ± 1, exposed 48 ± 1, control 44 ± 1), but most variables were not significantly different (e.g., cigarette smoking, height, weight, wearing glasses). No significant eye disease resulting from occupational exposures was noted, although a higher prevalence of dust in the conjunctival sac was noted in welders. Small cutaneous scars from thermal injury and acute erythema were more common in the welding group. Welders reported a greater prevalence of cough in the morning and at other times. Both welders and exposed reported more phlegm. The observed/expected FEV\textsubscript{1} and MMF were reduced in smokers compared to nonsmokers. The observed/expected FEV\textsubscript{1} and FVC were lower in welding and exposed groups. There were indications of an interaction between smoking and occupation in these lung variables.


Epidemiologic investigations during the past three decades in Great Britain and the United States have documented elevated risks for bladder cancer among workers in the rubber industry. A retrospective cohort mortality study, however, indicated no striking excess of bladder cancer mortality in four major rubber companies in Akron, Ohio, for the period 1964-1973. An SMR of 113 was calculated (58 observed, 51.4 expected based on U.S. mortality). Despite the absence of an overall bladder cancer excess, a case-control study was conducted among the same population in order to search for "high risk" work areas within the industry. 232 cases of bladder cancer were identified from hospital record and death certificate reviews for the years 1958-1974. For each case, two age, race, sex and company matched controls were selected from the rosters of hourly rubber workers. Preliminary analysis showed that neither age nor calendar year of initial hire was associated with bladder cancer risk. Workers exposed for periods of two years and longer to one specific work area were at increased risk (odds ratio = 3.1). Analyses of the effect of age at first exposure to this and other work areas, and estimation of latency periods are currently underway.


Although the nature of the occupation of firefighting suggests particular health hazards, previous mortality and morbidity studies in firemen have produced conflicting evidence for an increased risk of cardiovascular disease, respiratory disease and accidental deaths. Survival experience since 1915 has been examined in 8556 Boston firefighters, comprising all male members of the City Fire Department with three or more years of service. Cause of death from the death certificate for 2515 deceased firefighters coded by the 7th revision of the ICD has been compared with the rates for the white male
populations of Massachusetts and of the United States. Among all firemen, deaths from all causes were 95% of expected for United States white males. SMRs were markedly reduced (less than 50) for infectious disease, diabetes, rheumatic heart disease, chronic nephritis, blood diseases and suicide. The SMRs for all accidents and for all cardiovascular diseases were less than 100. Slight elevations over expected deaths were observed for respiratory diseases, peptic ulcer, and cancer of the rectum. These findings suggest entry selection procedures and sociological attributes of membership of the fire department to a greater extent than they suggest important occupational hazards.

Four year prospective study of workers exposed to TDI D. H Wegman,* J. M. Peters, A. W. Musk, L. J. Fine (Harvard School of Public Health, Boston, MA 02115) In 1972, 112 workers exposed to toluene diisocyanate (TDI) were examined for acute pulmonary function changes during a work shift. A dose-response relationship was demonstrated. The cohort was re-studied in 1974 to determine whether there was accelerated loss of pulmonary function, and if so, whether there was an exposure level below which this did not occur. Available employees (57) were retested before and after work on the first day of the work week. The subjects were placed in three exposure groups (<0.0015; 0.0020-0.0030, 2:0.035 ppm). Differences by exposure group were not statistically significant. The middle exposure group was intermediate (42 ml/yr exceeding expected by 3 to 4 fold. The decrement in pulmonary function (FEV1) was shown in 1976, exposure levels were, on average, one half those of the units studied during 1976. The ratio of scrub typhus to infection with R. tsutsugamushi was 30%. Non-immune personnel, when infected, were more likely to develop scrub typhus than those who had previously been infected. There was a correlation between clinical illness and high antibody titers developed in response to the infection.

Health Services and Neurological Epidemiology Chairman: F. Gearing

Use of health services in a rural community Multivariate perspectives. C. E. Franti,* J F. Kraus, N. O. Borhani and S. Johnson (University of California, Davis, CA 95616). Patterns of utilization of health care services by 1808 adults (17–64 years of age) in a rural county of California were studied. Data had been collected from 1091 households during the Yolo County Health Survey in 1970 "Use of services" (during the previous year) included number of hospitalizations, total number of days hospitalized, number of physician visits, number of visits to a dentist, and an index indicating whether the interviewee perceived that health care services (whether used or not) were available. Sixteen demographic, economic, and "style of living" variables were used as were two indices measuring symptom sensitivity and health status. Using multiple regression techniques, age, sex, and economic variables were important predictors of the extent of use of each of the services. Styles of living, as measured by number of meals eaten per day, degree of use of alcohol and tobacco, use of automobile seat belts, attendance at religious services, and pet ownership, also were potentially useful descriptors of health care utilization in this rural community. Use of dental services was found to occur independently of use of medical or hospital services. Factor analysis was used to study the interrelationships among the predictor variables, and the relationships are described.

Care process and patient outcome in diabetes mellitus Fredric J. Romm* and Barbara S. Hulka (University of North Carolina, Chapel Hill, NC 27514).
The relationship between the process of medical care and patient outcomes is the central issue in health services research. The authors examined this relationship in 244 patients with adult onset diabetes mellitus who were under the care of internists and family physicians. Process measures included physician awareness of patients' concerns; communication of information from physician to patient; medication-taking behavior; physician adherence to basic care criteria, and extent of patient utilization of services. Outcomes, measured after a 6-month follow-up period, were diabetic control status and patient satisfaction with medical care. Control variables included practice and physician characteristics, patient age, sex and socioeconomic status, and duration of illness. Multiple regression analyses, with the respective outcome measures as dependent variables, showed that the combination of process variables explained less than 9% of the variance in either outcome. Communication of information from physician to patient was significantly (p = .005) associated with satisfaction, but explained only 4% of the variance in patient satisfaction. While the authors do not suggest that something in the process of care of diabetic patients affects short-term outcome, they did not find a process variable in this study that was strongly predictive of patient satisfaction or diabetic control.

Health outcomes of patients in the St. John's randomized trial of the family practice nurse L. W. Chambers, A. West, C. V. Ho, G. Hunt, B. Lawlor and R. Power (Memorial University of Newfoundland, St. John's, Newfoundland, Canada A1B 3V6).

In order to assess the effectiveness and safety of the primary care provided by a family practice nurse, a randomized clinical trial was conducted in a large urban family practice between June 1975 and May 1976. Before and after the trial, standardized measures of physical, social and emotional function were administered by lay interviewers to 572 patients who received conventional care by the family physician and to 296 patients who received care mainly from the family practice nurse. At the start of the trial, measurements of disability revealed that the groups were comparable (p > .01) in the two groups of patients with respect to all three health outcome measures. At the end of the study, the health outcomes of the two groups of patients were found comparable (p > 0.01) with some indication that patients receiving family practice nurse care had slightly better physical function than the patients receiving conventional care. These results corroborate the evidence derived from other controlled trials that family practice nurses/nurse practitioners provide effective care.


A descriptive survey of all burn injuries resulting in admission to the 223 hospitals in Upstate New York for 1974 and 1975 has provided the first measure of the incidence of burn injury in a large and representative population in the United States. Marked differences in incidence rates among seven geographic regions of the state were shown. Burn patients were found in hospitals of all types and sizes. Certain demographic characteristics such as race were notably different from region to region, as well as characteristics such as type of burn and proportion of occupational injuries. Hospitals treating burns have been separated into experience categories, i.e., those treating 0-9, 10-19, 20-29, 30-39, and 40+ patients per year. Demographic characteristics, lengths of stay, case/fatality rates, types of burn injury, and other variables are compared among experience groups. The findings are important for identification of local and statewide burn injury prevention priorities, and for development of a possible state policy, guidelines, or minimum requirements for hospitals providing specialized burn treatment services.


Deaths from ALS 1963-1967 were matched against military files to identify 504 World War II veterans; controls were chosen from a file of men with National Service Life Insurance and matched on year of birth, date of entry into service, and branch of service. Hospital records of 33 deaths from ALS were reviewed by Dr. Kurtzke and 32 accepted as definite ALS. Military records were abstracted for information on preservice demographic and other variables, from the examination for service, on the medical history during World War II, and on variables characterizing the military career. Comparisons were made with attention to three- and four-digit detail of codes for preservice occupation and industry, defects found at induction, military occupation, and diagnoses in service. There was a slightly suggestive (p = 0.10) deficit of blacks with ALS, and several differences in preservice occupations, but a very clear-cut excess of trauma in the ALS cases, with 163 diagnoses vs. 115 in the controls (p < .01). The preservice histories of trauma and of surgical operations also differentiated the two groups. There was a suggestive excess of men in the ALS group giving a preservice history of active participation in baseball, but no significant difference in aggregate scores of preservice sporting activity.


Migration history among American-born white migrants with multiple sclerosis was obtained in Los Angeles (LA) County, California, and King and Pierce (K-P) Counties, Washington. Denominators were calculated by obtaining residence histories from probability samples of the general population in the two areas. Overall prevalences of definite and probable multiple sclerosis with onset after migration were low among migrants from the southern US.
Alcohol, Trauma and Diabetes
Chairman: P. Bennett

The objective of the study was to indicate the proportion of premature mortality in Canada (expressed in terms of potential years of life lost before age 70 (PYLL)) due to each of the two risk factors, smoking and hazardous drinking. The method is to review epidemiologic studies and use existing data to estimate relative risks for each cause of death where the factor (either smoking or hazardous drinking) has been shown to be causally related. Then, for each cause, the fraction of deaths attributable to each factor is obtained using (when possible) current Canadian prevalence estimates for smoking and hazardous drinking. Finally, the corresponding years of life lost (PYLL) for each factor and its related causes are calculated, which then provides the total PYLL for smoking and hazardous drinking (with an appropriate range of values). Difficulties concerning the definition of each risk factor (particularly hazardous drinking) and the possible interaction of two or more factors are discussed. The eventual aim of this approach is to rank all risk factors and thus define priorities for the prevention of premature death.

Screening for alcohol-related problems in an outpatient Ob-Gyn clinic. Marcia Russell* and Lewis Bigler (Research Institute on Alcoholism, Buffalo, NY 14203)

As part of a program to evaluate the Ob-Gyn medical setting as a point of intervention for alcohol-related problems in women, a self-administered questionnaire including items on sociodemographic characteristics, drinking patterns, and problems related to the use of alcohol was given to 499 of 565 women (88%) seen consecutively in the Ob-Gyn outpatient clinic of a general hospital between June 1 and August 13, 1976. In addition, the 4-question CAGE screening instrument was administered to the subjects by the examining doctors, and determinations of blood alcohol and serum zinc levels were
made in the 62 women (12.4%) who gave blood. Diagnostic interviews with alcoholism counselors were conducted in a sample of the subjects to verify the screening procedures, and the medical charts of all subjects were reviewed for references to alcohol-related problems. Heavy drinking as defined by the QFV Index of Cahalan et al. (1969) was reported on the questionnaire by 13.4% of the women; 15.6% reported one problem related to their own drinking, and 7.2% reported more than one problem. Data on the CAGE were missing for 38% of the subjects. Of the 62% screened, 11 (12.2%) reported one problem and 15 (3%) reported 2 or 3. Blood alcohol levels were not elevated in any subjects, though ten women who were tested were classified as heavy drinkers.


In Canada, much interest is currently being focused upon Canadians' ability to affect change in the so-called life style risk factors. One classic example is the use of automobile seat belts. While the installation of seat belts in new cars has been mandatory for many years, it was not until January 1976 that the Province of Ontario enacted legislation to make their use compulsory. At the same time, many highway speed limits were reduced. One year after the introduction of this controversial bill, gross fatality statistics for the Province indicate a quite dramatic effect. This paper presents an analysis of the apparent effect of the law in the urban community of Hamilton. Since few speed limits were changed within the city, a before/after comparison of road traffic accident data should isolate the impact of the seat belt component of the law. Data are available from the Hamilton Police for 1975 and 1976. The analysis includes the use of seat belts by drivers involved directly or indirectly in an accident, the injuries sustained, driver characteristics (including breathalyzer data), accident type (rear end, single car, etc.) and road conditions.


Through the cooperation of the local coroner's office, Sacramento County Health Department, and State Department of Vital Statistics, death records and coroner's reports from 1925 to 1976 were examined for evidence of suicides. In the event that cause of death as determined from the coroner's investigation differed from that on the death certificate, the coroner's records, which were generally found to be complete, were favored. To enhance quality of data, a replicate system of case ascertainment was used and duplicate checking of data abstraction was done. Suicides among nonresidents and deaths from "undetermined" causes were excluded, but suicides among transients (those with no known address) were included. Rates (per 10^6 persons) for males decreased from 74.2 in 1925-34 to 19.3 in 1955-64; and for females from 13.6 in 1925-34 to 6.2 in 1945-54. Sex-specific rates were 21.4 and 10.5 for males and females, respectively, in 1965-74. Age-specific rates for persons 15 years or older declined rapidly during the late 1930's and 1940's, and, among persons 15 to 44 years of age, they rose during the period 1965-74. Secular trends in age-sex- and agerace-specific suicide rates are described. Changes in sex-race-specific rates are notable, and cohort effects are seen.

Familial relationships of obesity and hyperglycemia in the Pima Indians P. J. Savage,* P. H. Bennett and M. Miller (National Institutes of Health, Phoenix, AZ 85014 and Cleveland, OH).

Although obesity and maturity-onset diabetes are known to be associated, obesity is generally thought to be an independent factor which increases the risk of diabetes. This association has been examined in 1249 Pima Indian children and young adults and their parents. Fathers (F) and mothers (M) were divided into diabetic (D) and non-diabetic (N) on the basis of 2 hr plasma glucose levels (2 hr PG) < 200 mg/dl. The percent desirable weights (PDW) and 2 hr PGs (Mean ± SEM) of their offspring are given. The offspring of two diabetic parents (genetic prediabetics) were significantly more obese than the offspring of nondiabetic parents (p < 0.001), and those with one diabetic parent were intermediate. Since obesity in the genetic prediabetics occurred before abnormalities of glucose tolerance, the results suggest that the development of obesity may be in part an inherited precursor of diabetes.

Lessons learned in monitoring for treatment effects in the Diabetic Retinopathy Study G. L. Knatterud* (University of Maryland, Baltimore, MD 21210).

Practitioners of cooperative clinical trials have adopted the term "data monitoring" to refer to the mechanism and process of evaluating the accumulating data to determine whether there is any evidence of beneficial or adverse treatment effects in a clinical trial during the course of the study. The necessity and importance of this activity is obvious to all, but the approaches that are used are perhaps as varied as the trials themselves. The approach utilized for data monitoring in the Diabetic Retinopathy Study as well as a brief summary of the results for the primary endpoint, severe visual loss, observed at each Data Monitoring meeting prior to adoption of a protocol change in January, 1976 will be presented as the framework for discussion of the following three issues: 1) Should the treatment groups be coded in the evaluation of treatment effects? 2) Are early trends predictive of later trends? 3) Is such decision-making symmetrical, that is, will the same decision be made and will it be made at the same time if the results indicate beneficial treatment effects as would be the case if the results indicate adverse treatment effects?

Application of a method of cluster analysis to the classification of diabetic status in Pima Indians. N. B. Rushforth,* W. Mackay, J. Knoke, P. Jones, P.
A cluster analysis was applied to a sample of 250 Pima Indians, in whom plasma glucose and insulin were determined fasting, one and two hours after a 75 gm carbohydrate load. A model of a mixture of two bivariate Gaussian distributions was used for the joint distributions of the log values of glucose and insulin. The mixture was assumed to consist of a "normal component" and a "diabetic component," each characterized by parameters for the means, s.d. and corr. coeff., and a mixture parameter (proportion in the normal component). Maximum likelihood estimates of the parameters were obtained iteratively by a modified Newton-Raphson method. Probabilities of misclassification for normals classified as diabetics, and diabetics as normals were estimated. For pairwise combinations of glucose and insulin values probabilities for normals classified as diabetics ranged from 2-10%, those for diabetics from 7-12%. These results provide an adequate model to describe the joint distribution of glucose and insulin and objective criteria for classifying diabetic status, with acceptable probabilities of misclassification.

Respiratory symptoms and disease related to alcohol consumption and smoking, M. D. Lebowitz (University of Arizona, Tucson, AZ 85724)

Prevalence rates of respiratory symptoms and disease determined in 2858 adults in a stratified random community population in Tucson were compared to alcohol consumption levels and smoking habits in that population. Age, sex, ethnic group and education were controlled. All data were obtained by self-completion questionnaire and standardized spirometry. It appears that a combination of heavy drinking and heavy smoking are generally related to higher symptom and disease prevalence rates than heavy smoking alone. Lung function abnormalities showed the same relationship with smoking and drinking, especially in the younger age groups. Heavy drinkers who had never smoked also had higher rates of productive cough and wheeze. Thus, alcohol consumption appears to have an independent as well as combined effect (with smoking) on respiratory problems.

POSTER SESSIONS

Congenital heart disease in Ontario neonates, 1975. David Cook, Vera Rose, John Fay, Mok-Dock Li, Frank Sellars, Teruo Izukawa, H. Connor Mulholland and Richard D. Rowe (Divisions of Cardiology and Perinatology, Hospital for Sick Children, Toronto, Ontario, Canada M5G 1X8).

A prospective descriptive evaluation of structural and nonstructural congenital heart disease in neonates assessed at the Hospital for Sick Children during 1975 was linked to a similar retrospective evaluation made by staff at the other three major cardiac referral and treatment centers in Ontario. 310 neonates were seen with structural heart malformations. Rate of ascertainment varied considerably and diminished markedly with distance from a center. Neonates with "critical" disease (defined by catheterization or by death as a neonate) were singled out. Rates diminished in parallel fashion with rates of ascertainment (r = .813, p < .0001), but rates in the four cities where centers are located were comparable (average of 1.8 neonates with critical disease per 1000 live births). Using this rate and an estimate of 1975 births from the Registrar-General, 222 neonates with critical disease should have been assessed; 165 were seen at the four centers. Low rates of referral from areas distant from a center, in the absence of facilities for intensive neonatal cardiac assessment in those areas, lead to a conclusion of "unmet need" in Ontario.

Strategy analysis of a new non-invasive cardiac diagnostic technique: Whether and how it should be used. David Cook, Andrew Blackwood, Kenneth Bloom and Constance Williams (Division of Cardiology, Hospital for Sick Children, Toronto, Ontario, Canada M5G 1X8).

A technique has been developed to estimate the gradient in aortic stenosis in children from two echocardiographic indices and the arm blood pressure. Cut-off points can be chosen so that this test is 100% sensitive at picking the children with high (>50 mm Hg) gradients. Enthusiastic adoption of new techniques without analyzing how to meld them with existing regimens may do more harm than good to the patient population, or may result in no change other than increased costs of rendering care of the same quality. Several simple techniques that the authors call "strategy analysis" were used to examine the estimation method for general applicability and to suggest how it might best be integrated with existing diagnostic techniques. Graphing percentage of true-positive (negative) tests among all positive (negative) tests over a range of possible prevalence of high gradients showed the technique was widely applicable. Simple decision trees, using outcome probabilities from this Hospital, suggest situations in which using the estimation technique would degrade the standard of care and point to the conditions under which the technique might be most effectively and safely used.

The NHLBI Mapping Project R. Fablitz* and M. Feinleib (National Heart, Lung, and Blood Institute, Bethesda, MD 20014).

Maps of age-adjusted mortality rates by county for the United States are presented for cardiovascular disease. Mortality data for the period 1968-1971 included 35-74 year old, white and nonwhite, males and females. Two methods of displaying the mortality data on a univariate map are presented. In addition, the relationship of cardiovascular mortality rates to demographic characteristics of the county is shown using a technique of bivariate mapping. Usefulness and problems of the various methods of mapping are discussed. Finally, the results of a regression analysis of county mortality rates on county characteristics obtained from the Census Bureau are presented.
Hodgkin's disease in an isolated Newfoundland district. W. Marshall et al., presented by S. Buehler (Memorial University of Newfoundland, St. John's, Newfoundland, Canada A1B 3Y6)

Three immunodeficiencies, seven Hodgkin's disease, and seven other lymphomas diagnosed within a 20-year period in an isolated population of 1500 on the west coast of Newfoundland were investigated. Through interviews, questionnaires, and a special medical clinic, an extensive pedigree and a census were completed, social contacts among Hodgkin's patients established, and clinical and laboratory data obtained. Eighty-five per cent of the population, as well as all of the patients, descend from a single founder couple. The inbreeding coefficient for the patient group is 0.0305; for the sex- and age-matched control group it is 0.0050. Direct contact was established among five of the seven Hodgkin's patients; the remaining two cases, in a separate community, were linked through an intermediary contact. HLA typing on 848 samples showed no haplotype shared by all patients but W18 increased in 1st and 2nd degree relatives SOD 1-2 and two rare Ig allotype variants were discovered; neither these nor red cell markers were found in association with lymphoma. IgA and IgM were elevated in close relatives of patients. Preliminary analysis indicates low antibody titers of Varicella zoster and possibly increased titers to Epstein Barr virus in the population.

Trends in breast cancer incidence in a population based registry (1953-1975) L. A. Gaudette, P. W. Lees and M. Grace (Alberta Cancer Registry of the Toronto General Hospital for the years 1966 to 1971. Carcinoma was subdivided into the following groups according to its histopathology: lobular (small cell), lobular (mixed cell), intraductal, medullary, papillary, mucinous, adenocarcinoma and carcinoma (type not differentiated) An association between certain histologic types and certain genetic and epidemiologic descriptors was noticed. Patients who had histopathology of lobular type had their menarche at a later age compared to other types (p < 05) A higher proportion of patients having histologic types of lobular, carcinoma (type not differentiated) and adenocarcinoma had familial breast cancer. Intraductal and papillary types were more common in premenopausal patients. Estrogen usage was higher in patients who developed adenocarcinoma or lobular (mixed cell) type or mammary carcinoma. There is a distinct possibility that there are specific subtypes of mammary neoplasia and that they differ morphologically from each other. Identification of these differences may increase the understanding of the basic process of breast cancer development and indicate directions for future study.

Correlates of illicit drug use during pregnancy C. Distasio*, P. Van Natta and E. Goldberg (University of Maryland, School of Nursing, Baltimore, MD 21201, School of Hygiene, Johns Hopkins University, Baltimore, MD 21205).

Preliminary findings are reported from a retrospective study of intergenerational psychosocial and physical pathology in families of drug-addicted, urban, black women who were interviewed post-partally. The design included two case groups with individually matched controls: heroin addicts (HA) and methadone maintenance patients (MM). Cochran's Q test was used to analyze the differences in proportion of cases/controls reporting illicit use of marijuana (Mj), glue, minor tranquilizers, stimulants, sedatives, opioids, and Darvon. Methadone controls (MC) reported no drug use, heroin controls (HC) reported heavy Mj use, HA and MM reported heavy use of opioids, as well as Mj, HA, MM, and HC had similar distributions of emotional and total Cornell Medical Index (CMI) scores, almost all of which exceeded normal values. Almost all the emotional and total CMI scores for the MC were in the normal range. The higher CMI scores in the HA, MM, and HC may be associated with the presence of reported alcohol problems. The distributions of emotional and total CMI scores were similar for the HC and MC reporting no alcohol problems. The interrelationships between drug and alcohol abuse and emotional and physical health of the study respondents and their infants will be explored when data collection is complete.

Intergenerational substance abuse. P. Van Natta, E. Goldberg and C. Distasio (School of Hygiene, Johns Hopkins University, Baltimore, MD 21205; University of Maryland, School of Nursing, Baltimore, MD 21201)
The purpose of this study is to identify characteristics present in the families of opioid addicts that would lead to proper planning for preventive intervention. Relationships between alcohol and drug abuse in two generations are explored using data from a retrospective study of drug-addicted, urban, black women and their mothers. The design specifies post-partum interviewing of two case groups (heroin addicts, HA, and methadone maintenance patients, MM), individually-matched controls, and mothers of cases and controls. Their responses to questions about personal alcohol problems, drinking problems of close relatives, family composition, and ever use of illicit drugs were analyzed using McNemar's test. Based on preliminary data, there is no evidence that presence of an alcohol problem in the mother is a risk factor in heroin addiction. There is no evidence implicating ever drug use as a risk factor. For the MM, there is no evidence implicating either of these as a risk factor. The intergenerational patterns of alcohol problems in case and control families were examined by Smith and Pike's test for aggregation in a stratified population. No aggregation is found. Further work on the reasons for the risk factor difference between HA and MM is in progress.

Relationship between alcohol consumption and exercise Betty M Meyer* (Institute for Aerobics Research, 11811 Preston Rd, Dallas, TX 75230)

The common mythology that long distance runners are prodigious drinkers of alcoholic beverages is explored in a study of 227 men aged 30-49 years who recorded daily exercise over a period of at least six months in 1974-1975. Reports of drinking and smoking habits and some anthropometric measures were also available. Distance jogged per month varied between 1.9 km and 611.6 km (mean 64.9) or between 1.2 mi and 380.0 mi (mean 40.3 mi). Aerobics points per month ranged between 10 and 2128 with median 150. Ethanol consumption averaged 195.1 cc (6.6 oz) per week, minimum 0, maximum 798.5 cc (27 oz). Those with aerobics points greater than the median had a weekly ethanol consumption of 187.7 cc (5.67 oz) and those under the median 223.9 cc (7.57 oz) (p < 0.05). Correlation of ethanol per week with distance jogged was -.17 (p < .05) and with aerobic points was - .18 (p < 01). Ethanol correlates positively with number of cigarettes smoked, weight, and percentage of body fat. The less active men drank more beer and liquor than the more active, but wine consumption did not differ. In this group, increased exercise was associated with decreased alcohol consumption.


The study is based on 440,450 single births occurring in Norway, 1967-1973, with known gestational age. The information was collected through a notification system known as the Medical Registration of Births, which covers all births occurring in Norway and is made available through the Medical Birth Registry of Norway, which allows for linkage between births and infant deaths. The life table is based on a cohort of women still pregnant at a gestational age of 16 completed weeks, and states for each subsequent week the number of pregnancy terminations, the outcome, and the number of women still pregnant. Seven outcomes of pregnancy are considered: fetal death prior to labor, fetal death during labor, death within 24 hours, death 1-6 days, death 7-27 days, death 28 days-1 year, and survival of one year or more. The data in the life table provides information on the probability of pregnancy termination in each week of gestation (after 16 completed weeks), and the probabilities of the various outcomes. The life table is accompanied by graphs to illustrate these probabilities. Some graphs are presented separately by parity. The perinatal life table is considered as an extension of the commonly used descriptive statistics and is of value in monitoring health changes and in comparing perinatal mortality between populations. It also provides information on pregnancy termination and outcome, which has some clinical application.

Epidemiologically Oriented Computer System (EPOX). R P. Beasley and C. C. Lin (University of Washington, Seattle, WA 98195; and U.S. Naval Medical Research Unit 2, Taipei, Taiwan).

EPOX is an extensive series of generalized flexible programs designed by epidemiologists to use on the new relatively cheap office mini computers (e.g., Wang 2200). The programs which are stored on cassette tapes are conversational utilizing a keyboard or TV-like display and do not require knowledge of computers or programming. The system is designed to deal with the multiple variables, large number of cases and continuous update problems of the epidemiologist. Data can be entered (or corrected) from cards or directly from the keyboard and are stored on cassette tapes. Output may be printed or displayed on the console as the user chooses. Large volumes of data can be stored, processed and analyzed easily. The system is intended to function as an office tool permitting the investigator to enter and analyze his own data without the delays and difficulties of dealing with a data processing center. Examples of EPOX programs are: 1) data entry, display or correction, 2) data cleanup aides, 3) data listing, 4) statistical analysis, 5) tables, 6) histograms, 7) scattergrams, 8) age adjustment and 9) control selection. All EPOX programs utilize data code sheets so that processing is specified by variable number. A great strength of the EPOX system is that complex Booleans can be specified so that the processing can be conditioned.

Epidemiologic analysis with programmable calculators. K. J. Rothman, J. D. Boice* and P G. Smith (Harvard School of Public Health, Boston, MA 02115; Bureau of Radiological Health, Rockville, MD 20857; and Oxford University, England)

Programmable pocket calculators have ushered in an era in which tedious computations pertinent to
epidemiologic analyses can be easily performed. A magnetic program card and a single keystroke can solve equations (e.g., iterative solution of likelihood equations) that previously required a large computer. The expanded programming capacity, improved function storage and reduced cost make programmable calculators extremely useful analytic tools. The range of epidemiologic analyses that can be handled by a particular calculator (the Hewlett-Packard 67) are presented. Several programs, available on request from the authors, are also presented and briefly described. Existing programs include: odds ratio estimation and testing for a set of 2 × 2 tables (includes Mantel-Haenszel test, test for heterogeneity, maximum likelihood estimation of odds ratio, and approximate confidence limits); Mantel extension test and standardized risk ratios for a set of 2 × 2 tables; case-control matched analysis with fixed or variable matching ratio and with the factor of interest taking multiple values; sample size and power computation, exact p-value for a 2 × 2 table and Poisson distributed variable; chi-square for trend (proportions); incidence rate ratio estimation for stratified cohort data; risk difference estimation and testing for stratified cohort data; confidence limits for Poisson variables; analysis of seasonal variation, and others.

Cancer patterns in tri-cultural New Mexico. Robert W. Buechley* and Charles R. Kay (Cancer Research and Treatment Center, School of Medicine, University of New Mexico, Albuquerque, NM 87131).

The Indian (10%), Spanish (40%) and remainder (50% called Anglo) populations of New Mexico have disparate patterns of cancer incidence only partly attributable to gradients in development levels. Cancer gradients can be predicted by level-of-living for many sites of cancer. Increases with development in breast, colon and lung cancer typically outweigh declines in stomach and cervical cancer. Los Alamos County, affluent and science-based, has much higher breast cancer attack rates than the U.S. average. Spanish males, but not females, are anomalously low on lung cancer, despite real declines in stomach cancer. Anomalies, not predicted by level of development, include: 1) tenfold excess of gallbladder cancer rates in all Indian groups and in some Spanish populations; 2) one third the expected lung cancer in Spanish men; and 3) high lung cancer in Spanish women of recent Mexican extraction. These anomalies are being tested against genetic and smoking-level hypotheses.

PLENARY SESSIONS

Chairman: Dwight Janerich

New methods of sampling and analysis to remove bias in case-control research: No association found for estrogens and endometrial cancer. R. I. Horwitz* and A. R. Feinstein (Yale U. Sch. of Med., New Haven, CT 06510).

In three previous case-control (trophoc) studies, an increased risk of endometrial cancer was found for exogenous estrogen exposure in post-menopausal women. In those studies, the results were compared in two patient groups chosen by conventional methods that make no provision for the biases arising from differences in disease-detection rates, hospital referral patterns, and clinical susceptibilities to the cancer. These biases can be minimized with new analytic methods, in which cases and controls emerge "naturally" from a single group of patients who all received the appropriate diagnostic procedure. The results are then stratified according to the clinical manifestations that evoked diagnostic attention. Applying these techniques in a new study, the authors found an odds ratio of 1.3 among demographically matched cases and controls who all received dilatation and curettage because of bleeding. For a similar analysis of a separate group who all had hysterectomy, the odds ratio was 99. By contrast, the odds ratio was 7.9 when the authors chose cases and controls arbitrarily from a tumor registry. Trohoc studies are currently compromised by an absence of suitable analytic attention to sources of bias. With improved scientific methods, no association is found between exogenous estrogens and endometrial cancer.

Chairman: J. Gale


From the record linkage system of the Mayo Clinic, more than 2000 women residents of Rochester were identified with their first diagnosis of hypertension between 1950 and 1968. They were followed through the records until terminating at the diagnosis of breast cancer, death, or the most recent record entry, if still alive and at risk. Information on drug use was abstracted in detail to permit assessment of the influence of alternative definitions of reserpine use, resembling those previously reported by others. Marked differences in numbers of "users," variously defined, were noted. Analysis involves the comparison of observed numbers of cases of breast cancer to expected numbers computed on the basis of age and time-specific community incidence rates established previously. For the entire hypertensive cohort, contributing an average of 10.8 person years of followup from their diagnosis, the risk ratio of observed to expected was 1.18. In contrast, the risk ratio for persons never using any antihypertensive drug (488 patients followed for an average of 8.4 person years) was 1.17 and the ratio for those ever exposed to reserpine (501 patients followed for an average of 10.3 person years) was 1.20. This study lends no support for the postulated etiologic relationship between reserpine use and breast cancer.

The impact of fetal monitoring on neonatal death. R. Neutra, P. S. Fienberg and E. Friedman (University of California, Los Angeles, CA 90024).

The authors have analyzed the labors of 16,529 viable liveborn fetuses using multivariate techniques to control for differences in monitored and non-monitored women. A log linear model controlling for the effects of confounding risk factors and...
Comparison of questionnaire and biochemical measures of tobacco exposure. T. M. Vogt,* S. Selvin and S. B. Hulley (University of California, Los Angeles, CA 90024).

Seventeen smoking questionnaire variables were tested for the magnitude and interaction of their associations with two objective measures of tobacco exposure, expired air carbon monoxide (CO) and serum thiocyanate level (SCN) in 142 men. The strongest questionnaire predictor of biochemical measures was cigarette smoking frequency which showed a dose-response relationship and accounted for 22% of the total variance in SCN and CO levels.

In stepwise multiple regression analysis, only two of the remaining 16 variables contributed significant additional information: the recency of the last cigarette and the longest period the subject had stopped smoking in the past. The latter may be an index of the smoker's bond with his cigarette, and a measure of the relative exposure he has to each cigarette. The remaining 14 questionnaire variables contributed small and not statistically significant increments to the total multiple \( R^2 \) of .50. The lack of independence of questionnaire measures of dosage such as depth of inhalation, amount of each cigarette smoked, use of filter, etc., in predicting CO and SCN was confirmed by an analysis of covariance. The findings suggest that questionnaires explain half of the variability in the biochemical measurements, and that smokers are frequently unaware of their actual degree of exposure. It is concluded that the use of CO and SCN can refine our understanding of the relation between tobacco and disease.


Because an earlier cross-sectional study suggested an association between absenteeism and the awareness and treatment of hypertension, the authors carried out the following longitudinal study. The screening of a random sample of 6000+ Canadian steelworkers yielded 230 men whose diastolic pressures remained \( \geq 95 \) mm Hg over the next three months. Seventy per cent of these men were unaware of their hypertension and none were being treated. After clinical evaluation at the mill and referral to a source of care, 60% were started on antihypertensive drugs. Absenteeism information for one year periods before (PRE-YEAR) and after (POST-YEAR) this labelling and initiation of treatment were obtained from an independent source. PRE-YEAR absenteeism was higher among aware than non-aware hypertensives (\( p < .05 \)). In addition, absenteeism rose substantially when treatment was initiated (\( p < .05 \)). These longitudinal results support earlier cross-sectional observations and have major implications for programs of hypertension screening and treatment.

Chairman: R. Detels

A case-control study of oral contraceptive use and non-fatal myocardial infarction in American women. L. Rosenberg,* C. H. Hennekens, B. Rosner, C. Belanger and F. E. Speizer (Channing Laboratory, Harvard Medical School and Harvard School of Public Health, Boston, MA 02115).

A series of 159 cases of reported hospitalizations for myocardial infarction (MI) occurring before menopause, and 3180 premenopausal controls were selected from a cohort of married, female, registered nurses 30 to 55 years of age, residing in 11 of the larger states in the U.S. Information was collected by mail questionnaire about oral contraceptive (OC) use as well as a large number of other variables. The proportion of current OC users was higher among the cases (13%) than among the controls (8.9%).

There was no evidence of association between duration of OC use and hospitalization for MI. After adjusting for the possible confounding effects of other variables using multiple logistic regression analysis, the relative risk of hospitalization for MI among current OC users compared with never users was 1.8 (95% confidence limits 1.1 to 3.0). The consistency of the findings from this case-control study of American women with those from two case-control studies of British women and a descriptive study of vital statistical data lends credibility to the belief that the association between current OC use and MI is causal.

A biological and stochastic model for breast cancer risk. M.-C. King* and N. L. Petrakis (University of California, Berkeley and San Francisco, CA)

The authors propose that breast cancer risk is determined by two sequential processes 1) Accumulation of mutant or initiated cells in breast ductal epithelium beginning at puberty. The rate of accumulation of initiated cells varies among women, based both on different exposure to environmental mutagens which may be secreted into breast ducts and on genetic factors influencing level of breast...
secretory activity and susceptibility to mutagenic attack. 2) Promotion of a few of these initiated cells to malignant growth. The endocrine stress of pregnancy increases the probability of promotion, regardless of the age of the pregnant woman. However, following pregnancy in a young primipara, severe engorgement and milk-stasis regression occurs, so that many ductal and alveolar cells—including initiated cells—are lost. In an older primipara, pregnancy is not accompanied by such extreme involution, so that fewer initiated cells are lost. Thus by about age 40, an older primiparous or nulliparous woman will carry a larger population of initiated cells than a woman of the same age with an earlier first pregnancy. However, the probability of promotion of any initiated cell to malignant growth will be higher for the parous women than for the nulliparous woman. The mathematical model uses a branching process to describe division and accumulation of initiated cells and a Poisson process to describe the probability of promotion of any initiated cell to malignant growth. Using the probability function derived from these processes, the authors predict the relative risk of breast cancer by age for early primiparous, late primiparous, and nulliparous women and test the epidemiologic implications of biologic hypotheses about breast cancer etiology.

**PROFESSORS' PRIZE IN THE HISTORY OF EPIDEMIOLOGY**


The 19th century is generally viewed as the period during which epidemiologic field studies were first initiated. Epidemiologists have regarded this development as consisting of isolated contributions of a few select pioneers John Snow, William Budd, Peter Ludwig Panum, and William Farr. However, a review of the 19th century medical, public health, and statistical literature has revealed more epidemiologic activities than is presently appreciated. Further, these activities were inter-connected, either in terms of teacher-student or professional relationships. These interconnections are reviewed and it is hypothesized that developments in the 19th century of epidemiology actually represent the "Greening of Epidemiology". These developments were essentially initiated in France, shortly after the French Revolution, by Pierre Charles-Alexandre Louis, who popularized the statistical approach to medicine. Two of Louis' students, William Augustus Guy and William Farr, conveyed his ideas to England, where they profoundly influenced a newly-founded organization, the Statistical Society of London. Gradually, statistics permeated the English medical community. Eventually, the statistical approach to medicine was used in an attempt to determine the etiology of cholera, a devastating disease that had invaded England in the 19th century. Physicians formed a society, the London Epidemiological Society in an effort to deal with the cholera pandemic and then expanded its interests to encompass all "epidemic diseases." The society provided a forum for the presentation of a variety of original epidemiologic concepts and methods and the epidemiologic approach to disease, thereby providing the foundation for modern epidemiologic reasoning.

**ANNUAL INVITED ADDRESS**

Mammary cancer in women: A model of multi-stage neoplasia. Brian MacMahon (Department of Epidemiology, Harvard School of Public Health, Boston, MA 02115).

The distinction between initiation and promotion in carcinogenesis implies that the process of cancer induction is a discontinuous one. More recent models of lung cancer induction in man postulate several stages but retain the implication of discontinuity—transitions between stages being effected by different events, some of which may be related to cigarette smoking and others not. Human breast cancer may provide a useful model for the study of carcinogenesis generally, in that different risk factors are involved at different ages—perhaps reflecting different causal complexes responsible for transition from stage to stage. There is evidence of causal factors operating pre-conceptionally, in infancy and childhood, in early and late reproductive life and post-menopausally. Prenatal life and the menopausal years must also be considered as potentially significant. Further understanding of the causal variables at different ages may clarify whether it is more appropriate to think of carcinogenesis in humans as a discontinuous or continuous process.
SYMPOSIA

SUDDEN INFANT DEATH SYNDROME

A symposium on Sudden Infant Death Syndrome (SIDS) was chaired by Dr. Dwayne M. Reed (Chief, Epidemiology Branch, NICHD/NIH, Bethesda, Maryland). The participants and the titles of their talks were as follows:


SCORING SYSTEMS FOR THE STUDY AND PREVENTION OF UNEXPECTED INFANT DEATH. Carpenter, R. G.* (London School of Hygiene and Tropical Medicine, London, England).

AN ATTEMPT AT THE CONTROL OF POST PERINATAL MORTALITY USING AN "AT BIRTH" SCORING SYSTEM. Emery, J L * (Children's Hospital, Sheffield, England).

RISK FACTORS IN SUDDEN INFANT DEATH. Kraus, J. F.,* Franti, C. E., Borhani, N. O. (University of California, Davis, California).

MENOPAUSAL ESTROGENS AND ENDOMETRIAL CANCER

A symposium on menopausal estrogens and endometrial cancer was chaired by Dr. Noel S. Weiss (Department of Epidemiology, School of Public Health and Community Medicine, University of Washington, Seattle, Washington). The participants and the titles of their talks were as follows:

ENDOMETRIAL CANCER HISTOPATHOLOGY AND SURVIVAL IN RELATION TO EXOGENOUS ESTROGEN. Smith, D. C, Bauermeister, D., Prentice, R * (Mason Clinic and Virginia Mason Hospital, Seattle, Washington).


METHODOLOGIC ISSUES IN EPIDEMIOLOGIC STUDIES OF ENDOMETRIAL CANCER AND EXOGENOUS ESTROGENS. Hulka, B. ,* Hogue, C , Greenberg, B. (Department of Epidemiology, School of Public Health, University of North Carolina, Chapel Hill, North Carolina).


ESTROGENS AND ENDOMETRIAL CANCER


EPIDEMIOLOGY OF ALCOHOL

A symposium on Epidemiology of Alcohol was chaired by Dr. Jacob A Brody (Chief, Epidemiological and Special Studies Branch, NIAAA/NIH, Rockville, Maryland). The participants and the titles of their talks were as follows:

LONGITUDINAL STUDIES OF PROBLEM DRINKING. Roizen, R. (School of Public Health, University of California, Berkeley, California).


THE FETAL ALCOHOL SYNDROME. Streissguth, A (Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, Washington).

ALCOHOL CONTROL POLICIES THE CANADIAN PERSPECTIVE. Whitehead, P. C. (Department of Sociology, University of Western Ontario, London, Ontario, Canada).

THE SOCIAL CONSTRUCTION OF A LEGAL OFFENSE: THE CASE OF DRUNK DRIVING. Gusfield, J. R. (Department of Sociology, University of California, San Diego, California).

ON CONSIDERING ALCOHOL AS A RISK FACTOR IN SPECIFIC DISEASES. Brody, J A. (NIAAA/NIH, Rockville, Maryland).

CLINICAL TRIALS IN CARDIOVASCULAR DISEASE

A symposium on Clinical Trials in Cardiovascular Disease was chaired by Dr. Stephen B. Hulley (Director, MRFTT, San Francisco, California). The participants and the titles of their talks were as follows:

EPIDEMIOLOGIC CONSIDERATIONS IN UNIFACETOR CVD RISK FACTOR TRIALS. Tyroler, H A. (School of Public Health, University of North Carolina, Chapel Hill, North Carolina).

LIFE STYLE INTERVENTION IN CLINICAL TRIALS. Syme, S. L. (School of Public Health, University of California, Berkeley, California).

CONTROLLED TRIALS OF THE DIET-LIPID-CHD HYPOTHESIS: RANDOMIZATION BY INDIVIDUAL AND BY GROUP. Sherwin, R. (University of Maryland Medical School, Baltimore, Maryland).

THE COMMUNITY-BASED MODEL OF LIFE-STYLE INTERVENTION TRIALS. Farquhar, J. (Stanford University Medical School, Palo Alto, California).
STATISTICAL ASPECTS OF TRIALS RANDOMIZED BY INDIVIDUAL AND BY BATCH. Cornfield, J. (Department of Statistics, George Washington University, Washington, DC).

POLITICAL ASPECTS OF TRIALS RANDOMIZED BY INDIVIDUAL AND BY BATCH Henderson, M. (University of Washington, Seattle, Washington)

SWINE FLU IMMUNIZATION PROGRAM

A symposium on the Swine Flu Immunization Program was chaired by Dr. Michael A. W. Hattwick (Center for Disease Control, Atlanta, Georgia). The participants and the titles of their talks were as follows:

I. Things We Didn't Know a Year Ago
   A. FLU FINDING AND INTRODUCTION TO EPITREK. Hattwick, M. A. W. (Center for Disease Control, Atlanta, Georgia).
   B. OF PIGS AND PEOPLE. Easterday, B.
   F. REACTIONS: ADVERSE AND ADVENTITIOUS. Retailhau, H. F. (Center for Disease Control, Atlanta, Georgia).

II. Lessons for Next Time. Open Discussion with
   Dr. Alan Hinman (Center for Disease Control, Atlanta, Georgia)
   Mr Harold Schmeck (New York Times, Washington Bureau, Washington, DC)
   Dr. Jim Chin (California State Department of Health, Berkeley, California)