

**PROGRAM
AND
ABSTRACTS**

**16th Annual Meeting of the
American Society of Preventive Oncology
March 14 - 16, 1992**

**Hyatt Regency
Bethesda, Maryland**

Program Chair: Marc Micozzi

Sponsored by: American Society of Preventive Oncology, a
conference grant from National Institute of
Health/National Cancer Institute, and The
University of Arizona College of Medicine
The Joseph W. Cullen Memorial Lectureship is
sponsored by Marion Merrell Dow, Inc.



ASPO

The American Society of Preventive Oncology is an active and growing organization that is striving to:

- promote the exchange and dissemination of information and ideas relating to cancer prevention and control;
- identify and stimulate research areas in cancer prevention and control;
- foster the implementation of programs in cancer prevention and control.

The Executive Committee members listed below are interested in hearing from prospective and current members.

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ASPO

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Anthony B. Miller, M.B., F.R.C.P.
Nathaniel L. Berlin, M.D.
Joseph F. Fraumeni, M.D.
Daniel G. Miller, M.D.
David Schottenfeld, M.D.
W. Thomas London, M.D.

ANNOUNCEMENTS

MESSAGES

Contact Judy Bowser at the ASPO registration desk if you expect or wish to leave a message.

CATERED MEALS

We have attempted to include a variety of items at each meal function so those of you preferring vegetarian fare may be easily accommodated. For this reason we have chosen the buffet method of serving whenever possible.

SPECIAL ACKNOWLEDGEMENT

The ASPO Executive Committee offers special thanks to Dr. Marc Micozzi, program chairperson, for his tireless efforts in arranging this meeting.

CONTINUING MEDICAL EDUCATION CREDIT

The University of Arizona College of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians.

This program meets the criteria for 20.5 hours in Category 1 of the Physician's Recognition Award of the AMA.

The 16th Annual Meeting Bethesda, Maryland, is sponsored by:

Office of Continuing Medical Education
University of Arizona College of Medicine
Arizona Health Sciences Center
Tucson, AZ 85724
Director: Michele Burpeau-DiGregorio, PhD
Phone: (800) 328-5868 or (602) 626-7832

The evaluation form at the back of this program must be completed in order to receive CME credits. Please turn it in to Judy Bowser before leaving.

AGENDA

Saturday, March 14

1:00 pm - 5:00 pm
Executive Board Room

**Joint Meeting of NCI Cancer Prevention Fellows
and Preventive Oncology Awardees**
Douglas Weed, MD, PhD
National Cancer Institute

3:00 pm - 6:00 pm

REGISTRATION

6:00 pm - 8:00pm
Cabinet/Judiciary Room

BUFFET DINNER - Diet Study Group
Co-Chairs: *Larry Kushi, MD, University of
Minnesota School of Public Health and
Gladys Block, PhD, University of
California - Berkeley*
Program: *Bruce Trock, PhD*
Fox Chase Cancer Center
*Epidemiologic and cancer prevention
considerations for regulations on food
health claims*

8:00 pm - 9:30 pm
Executive Board Room

**ASPO Executive Committee Meeting &
1993 Program Committee Meeting**

Sunday, March 15

7:30 am - 5:00 pm

REGISTRATION

7:30 am
Congressional Room

Chemoprevention Study Group Breakfast Meeting
**Components of a Chemoprevention Cooperative
Group**
Chair: *Rodger Winn, MD,*
M.D. Anderson Cancer Center

9:00 am

WELCOME

9:15 am
Cabinet/Judiciary Room

Joseph W. Cullen Awardee Address
Ellen Gritz, PhD
UCLA - Jonsson Comprehensive Cancer Center

10:00 am

REFRESHMENT BREAK

NOTES

AGENDA

10:15 am

SYMPOSIUM: Cancer Prevention and Screening in the Workplace

Organizer and Chair: *Paul A. Schulte, PhD,
NIOSH/CDC*

Impact of Human Genome Project on Cancer in the Workplace

*Sheldon Samuels, MPH
International Union Dept., AFL-CIO*

Cancer Surveillance in the Workplace: Leads for Prevention

G. Marie Swanson, PhD, Michigan State University

Screening for Occupational Bladder Cancer: An Historic Perspective for Future Research

Thomas Mason, PhD, Fox Chase Cancer Center

Cancer Awareness and Detection in the Workplace: An Example from One Company

Robert J. Zullo, MD, Merck and Company

12:00 noon - 1:30 pm
Congressional Room

LUNCHEON MEETINGS (choose one)

Tobacco Study Group

Organizer: *C. Tracy Orleans, PhD,
Fox Chase Cancer Center*

*Sally Oldham of Scenic America
Billboard Tobacco Advertising*

*Michael Pertschuk of the Advocacy Institute
Demonstration of the Institute's SCARC NET
and GLOBAL-LINK computer networks*

Women's Cancers Study Group

Chair: *Lewis Kuller, MD, University of
Pittsburgh*

Program: *Suzanne Haynes, PhD
National Cancer Institute
The NIH Women's Health Trial*

NOTES

AGENDA

1:30 - 4:30 pm

PRESENTED PAPERS

Chair: *Susan Devesa, PhD, National Cancer Institute*

1:30 pm

"Lung Cancer in Nonsmoking Women: Dietary Antioxidants"

Elizabeth Fontham, MD

Louisiana State University Medical Center

1:45 pm

"Is Human Papillomavirus Associated with Cervical Neoplasia in the Elderly?"

Jeanne Mandelblatt, MD, MPH

Memorial Sloan Kettering Cancer Center

2:00 pm

"Prediction of Abstinence from Smoking in Head and Neck Cancer Patients"

Ellen Gritz, PhD

UCLA, Division of Cancer Control

2:15 pm

"Field Defects in Colon Cancer: A Validation Study of the Proliferation Antigen, PCNA, in Demethylhydrazine (DMH)-Induced Colon Carcinogenesis"

Michael Wargovich, PhD

M.D. Anderson Cancer Center

2:30 pm

"Exploratory Analyses of Aspirin and Fatal Cancer in a Large Prospective Study"

Michael Thun, MD

American Cancer Society

2:45 pm

"Tissue and Diet Biomarkers of Lipids and Skin Cancer Risk"

Thomas Moon, PhD

Arizona Cancer Center

3:00 - 3:30 pm

REFRESHMENT BREAK

NOTES

AGENDA

- 3:30 pm **"Association of Abnormal Nipple Aspirate Cytology
and Mammographic Patterns"**
Marion Lee, PhD
UC - San Francisco
- 3:45 pm **"Changing Incidence of Breast Cancer as Related
to Size and Estrogen Receptor (ER)"**
Andrew Glass, MD, Kaiser Permanente
- 4:00 pm **"Sigmoidoscopy and the Incidence of Large Bowel
Cancer in Women"**
Polly Newcomb, PhD,
University of Wisconsin-Madison
- 4:15 pm **"Repeat Colorectal Cancer Screening"**
Ronald Myers, PhD, DSW, Fox Chase Cancer Center

4:30 pm

SYMPOSIUM: Does Moderate Alcohol Consumption Effect the Risk of Cancer?

Organizer: *Bill Blot, PhD,*
NCI - Biostatistics Branch
Chair: *Robert A. Hiatt, MD, PhD,*
Kaiser Permanente

Overview
Robert A. Hiatt, MD, PhD,
Kaiser Permanente

NHANESI Epidemiologic Follow-up Study
Arthur Schatzkin, MD, Dr. PH,
National Cancer Institute

**Results from a large multicenter case-control study
of breast cancer, and from meta-analysis**
Matthew Longnecker, MD, ScD, Dept. of
Epidemiology, UCLA School of Public Health

Noel Espina, PhD, Dept. of Microbiology,
New Jersey Medical School

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AGENDA

- 5:30 pm **Poster presenters depart for National Museum of Health and Medicine, Armed Forces Institute of Pathology, Washington, DC**
- 6:00 pm **Depart for National Museum of Health and Medicine, Armed Forces Institute of Pathology, Washington, DC**
- 6:30 pm **BUFFET** - hosted by National Museum of Health and Medicine Foundation
- POSTER SESSION**
Exhibit Your Poster at the National Museum of Health and Medicine
Chair: *Kathy Helzlsouer, MD, MSc,*
 Johns Hopkins University
- 8:30 pm **BEST POSTER AWARD PRESENTATION**
First bus returns to Hyatt Regency - Bethesda
- 9:00 pm Second bus returns to Hyatt Regency - Bethesda

Monday, March 16

- 7:30 am - 5:00 pm **REGISTRATION**
- 7:30 am
Cabinet/Judiciary Room **ASPO BUSINESS MEETING**
Presentation of Distinguished Service Award to:
David Schottenfeld, MD, MPH
University of Michigan - Dept. of Epidemiology

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AGENDA

MONDAY, MARCH 16 (cont.)

8:30 am

SYMPOSIUM: New Biomarkers and Chemopreventive Agents

Organizer: *Loic LeMarchand, MD, PhD,
University of Hawaii*
Chair: *Michael Wargovich, PhD
M.D. Anderson Cancer Center*

Mechanisms of Nutritional Carcinogenesis and Anticarcinogenesis
*John H. Weisburger, PhD, MD(hc),
American Health Foundation*

A Metabolic Approach to the Induction of Anti-estrogenic Activity: Therapeutic Applications
*H. Leon Bradlow, PhD,
Institute for Hormone Research*

New Biomarkers
John Potter, MD, PhD, University of Minnesota

New Chemopreventive Agents

Novel Strategies in Chemoprevention
Clement Ip, PhD, Roswell Park Cancer Center

New Chemopreventive Agents of Colon Cancer
*Bandaru S. Reddy, DVM, PhD,
American Health Foundation*

Progress in the Development of New Chemopreventive Agents at NCI
Vernon Steele, PhD, National Cancer Institute

Discussant
*Rodger Winn, MD, M.D. Anderson Cancer Center
Chemoprevention Study Group*

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AGENDA

10:00 am

REFRESHMENT BREAK

10:15 am

**DISTINGUISHED ACHIEVEMENT AWARDEE
ADDRESS**

*Nicholas Petrakis, M.D.
University of California-San Francisco
Department of Epidemiology*

10:45 am

**SYMPOSIUM: Improving the Communication of
Cancer Risks**

Organizer: *Barbara Rimer, DrPH,
Fox Chase Cancer Center/Duke Univ.*
Chair: *Caryn Lerman, PhD
Fox Chase Cancer Center*

**Perceived Susceptibility and Adherence to Cancer
Control Practices**

Caryn Lerman, PhD, Fox Chase Cancer Center

Some Barriers to the Acceptance of Risk Messages

Neil Weinstein, PhD, Rutgers University

Communicating with Persons about Cancer Risk

*Patricia Kelly, PhD, Salick Health Care, Inc.,
Director of Medical Genetics
and Cancer Risk Counseling*

Communicating Abnormal Test Results

Electra Paskett, PhD, Bowman Gray

Communicating with Underserved Populations

*Loretta Lacy, PhD, University of Illinois at Chicago,
School of Public Health*

Discussant

*Barbara Rimer, DrPH,
Fox Chase Cancer Center/Duke University*

NOTES

AGENDA

12:30 pm
Chesapeake Room

LUNCHEON ADDRESS:
Larry Thompson, *Washington Post*
"Communicating Cancer Risks and Recommendations"

2:00 pm

SYMPOSIUM: Improvements in Early Detection of Breast and Colon Cancer

Organizer: *Douglas Weed, MD, PhD,
National Cancer Institute*
Chair: *Victor Vogel, MD
M.D. Anderson Cancer Center*

**Colon Polyps: Natural History and Methodology
Studies**

Harinder Garewal, MD, PhD, University of Arizona

Balance of symposium program to be announced

4:00 pm

CONCLUSION

NOTES

INVITED SPEAKERS

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ABSTRACTS

ORAL PRESENTERS

LUNG CANCER IN NONSMOKING WOMEN: DIETARY ANTIOXIDANTS. Elizabeth Fontham, Ralph Coates, Anne Dilley, Peggy Reynolds, Patricia A. Buffler, Anna Wu-Williams, Vivien Chen, Raymond Greenberg, Peggy Boyd, Toni Alterman, Donald F. Austin, Pelayo Correa

Most epidemiologic studies which have found a protective association between lung cancer risk and consumption of fruits, vegetables and their micronutrient constituents have been conducted in male smokers (1). This large, on-going, multicenter case-control study of lung cancer in female lifetime never-smokers provides the opportunity to evaluate these dietary factors in the absence of possible confounding by smoking (2). A total of 273 primary lung cancer cases and 774 controls selected from the general population, all of whom were lifetime never-smokers and self-respondents, were included in this analysis. Cases consumed fewer vegetables and some fruits. Dietary intake of vitamin C, with or without supplementation, was associated with a small reduction in risk, while no such effect was noted for total vitamin A, vitamin E or total carotenes. Individual carotenes were also evaluated. No reduction in risk of lung cancer was noted for any of the three highest quartiles of consumption of β -carotene, but about a 30% decreased risk was associated with high consumption of α -carotene. All dietary risk estimates were adjusted for age, race, study area, education, exposure to environmental tobacco smoke, family history of lung cancer, occupational exposures, cholesterol and total calories.

1. Fontham ET. Protective dietary factors and lung cancer. *Int J Epidemiol* 19: 33-42, 1990.
2. Fontham E, Correa P, et al. Lung cancer in nonsmoking women: A multicenter case-control study. *Cancer Epid, Biomarkers and Prev* 1: 35-43, 1991.

IS HUMAN PAPILLOMAVIRUS ASSOCIATED WITH CERVICAL NEOPLASIA IN THE ELDERLY?

J. Mandelblatt, MD, MPH, R. Richart, MD, L. Thoms, MD, P. Chauhan, MD, S. Matseoane, MD, P. Kanetsky, MPH, M. Traxler, MD, P. Lakin, NP

There have been no studies in the United States of HPV in elderly women. This study presents data from a cross-sectional study of HPV and cervical neoplasia among Black indigent women, aged 65 or more. HPV deoxyribonucleic acid (DNA) testing was performed using a modified dot-blot hybridization technique in 232 women with intact cervixes. The overall prevalence of HPV DNA positivity was 3.5% (95% confidence interval (CI) .9%, 6.0%), and the majority (50%) of HPV types detected were 31/33/35. There were 6 cases of histologically diagnosed cervical neoplasia (two intraepithelial neoplasia and four invasive) in this population. The crude odds ratio (OR) for histologic cervical neoplasia among HPV DNA positive women was 18.3 (95% CI 2.8, 120.3). When the odds were adjusted in a logistic regression model for the effects of age, prior screening history, current sexual activity and past use of methods to prevent conception, the odds ratio was 12.2 (95% CI 1.2, 122.9). Ever having a Papanicolaou smear had an independent protective effect (OR = .08, 95% CI .01, 1.0), and there was a trend for the odds of having cervical neoplasia to increase with increasing age (OR = 1.14, 95% CI .99, 1.3). Additional studies in other elderly populations and with larger samples are needed to confirm these findings. If confirmed, the results suggest that HPV may interact with an aged host to promote the expression of cervical cancer in elderly women, independent of past Papanicolaou smear screening.

PREDICTION OF ABSTINENCE FROM SMOKING IN HEAD AND NECK CANCER PATIENTS. Ellen R. Gritz, PhD, Clifford Carr, EdD, David Rapkin, PhD, et al.

A physician- and dentist-delivered smoking cessation intervention tailored to head and neck cancer patients was evaluated in a randomized controlled trial.¹ Newly diagnosed patients (N=186) with first primary squamous cell carcinomas of the oral cavity, pharynx and larynx were randomized into Usual Care or Intervention conditions. All patients received initial advice to stop smoking. Intervention subjects also received a quit smoking contract, tailored self-help manuals, and 6 monthly booster advice sessions. Providers were trained to deliver advice in a standardized format.

Preliminary findings from the Vanguard Cohort (N=91) revealed a 73.6% continuous abstinence rate across conditions at 1 year follow-up, supported by 94% cotinine validation. Predictors of continuous abstinence included readiness to change (p=.0003), medical treatment (p=.0047), and time to first cigarette in morning (p=.0233). While characterized by long-term heavy substance use,² these patients are responsive to smoking cessation advice delivered by their health care provider. The outcome of medical treatment largely determines the ability to continue smoking (i.e., total laryngectomy). Yet, a behavioral variable (readiness to quit) was a more powerful predictor of long-term smoking cessation in these patients.

1. Gritz ER, Carr CR, Rapkin DA, et al. A smoking cessation intervention for head and neck cancer patients. *C E B P*, 1:67-73, 1991.

2. Spitz MR, Fueger JJ, Goepfert H, et al. Cigarette smoking patterns in patients after treatment of upper aerodigestive tract cancers. *J Can Ed* 5:109-113, 1990.

FIELD DEFECTS IN COLON CANCER: A VALIDATION STUDY OF THE PROLIFERATION ANTIGEN, PCNA, IN DIMETHYLHYDRAZINE (DMH)-INDUCED COLON CARCINOGENESIS. Diane M. Potter, M.S. and M.J. Wargovich, Ph.D.

Prevention trials assume that high proliferative activity in the rectal mucosa is representative of cytokinetic change throughout the colon. Whether a generalized "field defect"¹ precedes colon cancer was studied in the DMH rat model. To test the hypothesis 83 male SD rats were injected once with DMH (100 mg/kg). Rats were killed every 5 wks for assessment of proliferative changes measured with a MOAb to PCNA². After 40 wks, we found 22% of the rats to have single colon tumors, paralleling development in man. We sought to associate proliferative defects with a regional presence of tumor within the bowel or to determine if a pancolonial proliferative abnormality preceded cancer. Results: 1) A significant increase in colonic PCNA labeling index is an early and consistent feature in DMH-treated rats; 2) high PCNA labeling is not regionally associated with the site of tumor; 3) PCNA positive cells in the upper 40%³ of the crypt are consistently observed in normal mucosa adjacent to colon tumors, but not found at distant sites. Upper crypt distribution of proliferating cells is the most sensitive marker associated with colon tumors.

1. Lippman et al., *JNCI* 82:555, 1990

2. Ogata et al, *Exp Cell Res* 168:475, 1987

3. Lipkin et al, *Cancer Res* 43:1899, 1983

Tissue and Diet Biomarkers of Lipids and Skin Cancer Risk. T. Moon, PhD, D. McNamara, PhD, A. Stark, R. Klein, B. VanLeeuwen. University of Arizona, Tucson, Arizona, 85724.

Fatty acid (FA) composition of subcutaneous adipose (SA) and buccal mucosal (BM) tissues, serum lipids and dietary intake for 228 melanoma (MEL) cases and 791 non-melanoma (NMEL) cases were compared with those of 893 controls from a population based study. Subjects at least 18 years old were interviewed and tissue obtained from 6/1/86 to 10/1/91. Significant associations with MEL and NMEL were observed for SA FA's. No significant associations were observed for dietary intake, estimated by frequency questionnaire. The odds ratio comparing the highest to lowest quartile for MEL was 0.42 (95% CI 0.19-0.92) for SA linoleic FA, 0.38 (95% CI 0.18-0.81) for SA arachidonic FA, and 3.57 (95% CI 1.43-9.17) for SA palmitic FA. Similar odds ratios were observed for NMEL and SA saturated FA's. The minimal association between dietary intake and skin cancer may indicate that absorption and metabolism of foods are not adequately reflected by dietary intake measures. The correlations between SA FA's, BM FA's and dietary intake were at most 0.35 and commonly much lower. The data indicate an association between risk of skin cancer and nutritional biomarkers but not dietary intake.

EXPLORATORY ANALYSES OF ASPIRIN AND FATAL CANCER IN A LARGE PROSPECTIVE STUDY. Michael J. Thun, MD, MS, Mohan Nambodiri, BS, Clark W. Heath, MD

Aspirin and other nonsteroidal anti-inflammatory drugs inhibit prostaglandin synthesis and tumor growth in several experimental systems (1). We have reported decreased risk of fatal colon cancer among persons using aspirin in a prospective study of 662,424 adults who provided information in 1982 on the frequency and duration of aspirin use (2). The present analysis examines the relation of aspirin use to other fatal cancers.

Mortality from all cancers combined was significantly lower among persons who used aspirin. Cancers of the digestive tract, including esophagus, stomach, colon, and rectum accounted for much of the decreased risk. Mortality at each site was reduced by approximately 40 percent for persons using aspirin 16 or more times per month. Reduced risk was also seen for cancer of the kidney and bladder (in men), and leukemia. Future research should examine the chemopreventive or therapeutic potential of these agents for specific cancers in humans.

1. Pollard M, Luckert P. Prevention and treatment of primary intestinal tumors in rats by piroxicam. Cancer Research 1989;49:6471-6473.
2. Thun MJ, Nambodiri M, Heath CW. Aspirin usage and reduced risk of fatal colon cancer. NEJM 1991;325:1593-1596.

ASSOCIATION OF ABNORMAL NIPPLE ASPIRATE CYTOLOGY AND MAMMOGRAPHIC PATTERNS. Marion Lee, PhD, Margaret Wensch, PhD, Eileen King, MD, Edward Sickles, MD, Rei Miike, MS, Nicholas Petrakis, MD

Pattern and density of mammograms have been shown to be associated with proliferative histopathology and with subsequent risk of breast cancer. We recently found that epithelial atypical hyperplasia in nipple aspirates obtained 10 to 18 years earlier is associated with an increased risk of breast cancer. In the present study we attempted to determine if a similar association exists between nipple aspirate cytology and mammographic patterns. Using a modified breast pump nipple fluid aspiration was attempted in 321 volunteers recruited from the mammography clinic at the University of California. The cytology of nipple aspirate fluid (NAF) was classified according to the most severe epithelial changes present. Mammograms were classified by the Wolfe method and by a density scale (1,2,3,4) that roughly corresponds to the Wolfe classification. Preliminary analysis indicated a direct relationship between mammographic density and cytologic abnormality. The odds ratios of density grades 3 or 4 mammograms increased directly with increasing cytologic severity from: 1 (referent), 1.6 (normal), 1.6 (hyperplasia) to 5.7 (atypical hyperplasia), chi-square for trend, $p=0.08$.

These preliminary findings suggest that highly dense mammograms and the presence of epithelial atypical hyperplasia in NAF may be associated and are consistent with earlier studies of breast biopsy and corresponding mammographic findings. If confirmed by further studies, nipple aspirate cytology may be a useful adjunct to mammographic patterns in prediction of breast cancer risk.

CHANGING INCIDENCE OF BREAST CANCER AS RELATED TO SIZE AND ESTROGEN RECEPTOR (ER). AG Glass and RN Hoover, Kaiser Permanente (KP) and National Cancer Institute.

We studied 2103 cases of invasive breast cancer diagnosed, 1975-89, in the KP population-based Tumor Registry and abstracted pathologic size ($N=2100$), ER ($N=1731$), and stage at diagnosis ($N=2054$). The overall age-adjusted incidence of all cancers rose from 87.0 to 116.2/100,000 in the 15 years of observation. Localized disease rose 54%, regional 9.8% and distant disease fell 19%. Cancers among women less than 45 years at diagnosis declined 15%, (from 19.7 to 17.2/100,000) whereas those in women 45-59 and 60+ rose 20 and 36%, (from 210.1 to 246.9 and 287.0 to 463.0). The rate of ER+ cancers of all sizes increased (23.6 to 45.1 to 75.3) over the 15 years but ER- declined (23.5 to 30.8 to 25.7). Among ER+ cancers the largest increase occurred among those cancers <1.0 cm (600%), but there were increases of 300, 300 and 240% for cancers 1-1.9, 2-2.9 and >3.0 cm, respectively. At the same time, ER- cancers of all sizes rose 0-17% between the first and second five-year periods only to fall 10-18% in the last five years. Though recent increases in screening may have raised breast cancer rates in the late 1980's, they fail to explain the rising incidence since 1935. Nor can increased screening explain the recent and previously unreported decline in ER- cancers and the rising incidence of cancers of all sizes.

REPEAT COLORECTAL CANCER SCREENING. Ronald E. Myers, Ph.D., D.S.W., Thomas Wolf, M.A., Andrew Balshem, B.A., Eric Ross, Sc.D., Lois Millner, Ph.D.

This study was done to identify factors which influence adherence to repeat screening; determine if initial adherence is maintained when behavioral intervention is discontinued; and assess the effect of diagnostic evaluation on repeat adherence among persons with abnormal screening test results. These questions were asked in two-year randomized, controlled study of a random sample of 2,201 older adults in an IPA-type HMO. In Year 1, subjects received a fecal occult blood test (FOBT) kit and reminder letter. In addition, random assignment was made to interventions designed to encourage testing. In Year 2, 1,565 subjects remained eligible for screening, and received an FOBT kit and reminder letter only. Of this number, 41% were first-round adherers and 30% were second-round adherers.

Logistic regression analysis of repeat adherence ($n=1,565$) shows that first-round testing was a strong independent predictor for subjects 65 or older ($OR=10.8$) and those younger than 65 ($OR=10.9$). For younger subjects, however, a significant negative association between discontinuation of intervention and repeat adherence ($OR=0.5$) was also found. Among first-round screeners ($n=647$), age was significantly and positively associated with repeat adherence ($OR=1.6$); but, discontinuing intervention and having an abnormal FOBT were significantly and negatively related to repeat testing ($OR=0.5$ and $OR=0.4$, respectively). For first-round nonadherers ($n=918$), age was significantly and positively related to repeat testing ($OR=1.6$). Among FOBT(+) subjects ($n=88$), having complete diagnostic evaluation or CDE (colonoscopy, or barium enema x-ray plus flexible sigmoidoscopy) was not significantly related to repeat testing. These findings suggest that repeat screening is more likely among older adults; initial screening increases the likelihood of repeat screening; adherence levels are not maintained without intervention; and CDE is not a barrier to subsequent screening.

SIGMOIDOSCOPY AND THE INCIDENCE OF LARGE BOWEL CANCER IN WOMEN. PA Newcomb, BE Storer, PM Marcus. University of Wisconsin Comprehensive Cancer Center, Madison, WI 53706

Any mortality reduction conferred by sigmoidoscopy could occur both through the identification and treatment of adenomatous polyps, as well as by the early detection of tumors. To evaluate the efficacy of sigmoidoscopy in reducing the incidence of large bowel cancer we ascertained by telephone interview the sigmoidoscopy history of 640 women with cancer of the colon or rectum. Population controls interviewed for this ongoing study ($n=2042$) were randomly selected from Wisconsin driver's license lists and Health Care Financing Administration files. After adjusting for age and family history of colon or rectal cancer, cases were less likely to report a history of screening sigmoidoscopy than were control women. Relative to women who never received a sigmoidoscopy, the odds ratio (OR) of colorectal cancer was 0.53, and the 95% confidence interval (CI) was 0.42-0.66. The benefits conferred by sigmoidoscopy were greater for the descending colon ($OR=0.39$, 95% CI 0.58-0.26) than for colon sites out of reach of the sigmoidoscope. Tumors in the rectum were also significantly reduced ($OR=0.50$, 95% CI 0.66-0.40). Adjustment for dietary factors did not significantly affect this association. While this study was not able to rule out other lifestyle factors that might confound this association, the magnitude and anatomic specificity of effect suggest that the efficacy of sigmoidoscopy occurs in large part through the identification of precursor conditions.

ABSTRACTS

POSTERS

1. Differences in Smoking Habits and Readiness to Quit Among Low Income Pregnant Smokers. Fleisher, L., M.P.H.; King, E., R.N., Ph.D.; Masny, A., B.S., R.N.; Resch, N., M.S.; Harrop, C., B.S., Fox Chase Cancer Center, Philadelphia, PA 19111

To combat the alarmingly high smoking rates of over 40% in lower income pregnant women (1), programs need to include all smokers, not just those who are ready to quit. The Smoke Free Pregnancy Program consists of a brief stage-based counseling protocol delivered by prenatal clinic nurses and a self-help guide tailored for ethnically diverse low income pregnant smokers. Since smoking behavioral change is a process characterized by stages (2), assessing smokers readiness to quit enables the nurse to tailor her interventions accordingly. Data on smoking history, demographic characteristics, stage of quitting and documentation of the counseling intervention are collected at the prenatal visits. During the first year of the study, over 912 women were counseled; 34% were precontemplators, 34% were contemplators, 16% were ready to quit and 16% had already quit. Here, we characterize and compare smokers at various stages of quitting. For example, precontemplators smoked more cigarettes (KW=.0031), were more addicted (KW=.0044), smoked more years (KW=.001), were less likely to have quit during a previous pregnancy ($\chi^2 < .0005$), were less confident in their ability to quit (KW=.0001) and had more of their family and friends smoke (KW=.0046). These findings underscore that smoking characteristics differ significantly among smokers at various stages of quitting.

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IMPROVING MAMMOGRAPHY UTILIZATION BY HMO WOMEN 65-74
King, E., Ph.D.; Rimer, B., Dr.P.H.; Seay, J., M.P.H.; Balshem, A., B.A.; Ross, E., Sc.M.

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While the incidence of breast cancer increases with age (1), mammography utilization decreases (2). The purpose of this study was to test the incremental effect of two educational interventions on increasing mammography utilization among HMO women aged 65-74 who had not participated in the annual breast cancer screening program offered through their HMO. 548 women were accrued into the study and assigned randomly to one of three groups: (a) Control, which received a brief telephone survey; (b) Intervention Group 1, which received telephone counseling upon completion of the survey, and (c) Intervention Group 2, which received a personalized letter from the counselor within a week following the counseling. The 3 month follow-up survey data, verified by medical records, indicated that only 13% of women in the control group obtained subsequent mammograms, compared to 27% in Group 1 and 32% in Group 2. These results suggest that interventions to educate and counsel women about the need for mammography can be effective in improving utilization. Characteristics associated with mammogram utilization and actual mammogram results will be presented. Supported by NCI Grant CA51692.

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3 APPLYING PRETESTING STRATEGIES TO TAILORING CANCER PREVENTION AND CONTROL PROGRAMS FOR OLDER ADULTS. Behavioral Research Unit, Fox Chase Cancer Center

Behavioral interventions must be pretested systematically to improve their relevance and salience to older adults, the largest group at high risk for the most common and treatable cancers. The Cancer Control Science Program (CCSP) Project at the Fox Chase Cancer Center has as its overall goal to enhance adherence to primary and secondary cancer control regimens through the application of cost-effective, replicable behavioral interventions and state-of-the-art technology.

Pretesting strategies adapted from marketing research, such as focus groups [2], central-location intercept interviews, theater testing, in-depth interviews, gatekeeper review [3], and readability [1] testing were used to identify unique barriers and facilitators to adherence of the older adults targeted by four randomized community-based studies: **Clear Horizons** (self-help quitting program for smokers, 50-74); **Mobile Mammography** (worksite breast cancer screening for women, 40-64); **Colorecord** (colorectal cancer screening for HMO enrollees, 50-74); and **Check-up on Health** (physician-patient communication about cancer screening tests for working class adults, 50+). This session will present guidelines for developing targeted interventions and appropriate data collection instruments, using examples from these programs.

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4

COST-EFFECTIVENESS OF ALTERNATIVE STRATEGIES TO INCREASE ADHERENCE TO COLORECTAL CANCER SCREENING. Jerrold Hill, Ph.D., Eric Aguiar, M.D., Thomas A. Wolf, M.A., Ronald Myers, Ph.D., D.S.W.

In 1989 and 1990, Fox Chase Cancer Center designed and implemented alternative strategies for increasing adherence to colorectal cancer screening by fecal occult blood tests. The strategies, which are combinations of educational and reminder messages delivered by mail or telephone, were implemented as part of a screening program conducted by an IPA-type HMO (1). Baseline adherence for the existing program was 24%. Adherence increased under the various strategies, ranging from 27% to 48%. This study examines the cost-effectiveness of the strategies (2).

Excluding diagnostic evaluation, the existing screening program costs \$4.35 per eligible person. Under the various strategies, cost ranges from \$4.88 to \$12.18 per eligible person. Telephone plus print messages have the greatest impact on cost and appear to have the greatest impact on program adherence. It was determined that adherence can be doubled through the use of the most effective strategy, while the cost per added year of life increases by only 50%. These findings suggest that the benefits of increased adherence can be achieved without sharply escalating costs.

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BREAST CANCER SCREENING IN RURAL POPULATIONS: LOGISTICAL AND ATTITUDINAL VARIABLES

Sparks, B., RN, MSN, Given, B., RN, Ph.D., Ragheb, N., MPH., and Swanson, G. M., Ph.D., MPH.

Access to cancer screening facilities is often inadequate for rural women. This problem is documented by Liff et. al., who found that rural dwellers were twice as likely as urban dwellers to have unstaged malignancies (1). Urban-rural inequities in health have been alleviated in some areas by community based networks such as Cooperative Extension Services (CES) (2). We performed a pilot breast cancer screening study for rural women in 4 counties of Michigan, to determine what logistical and attitudinal variables support enhanced screening in this group. Rural women ≥ 40 years of age were offered free or reduced rate mammograms at ACR community facilities, secondary to breast exams by local volunteer providers. CES agents publicized and organized each county program. Response by county was dependent on CES efficiency and local provider willingness to participate. One hundred sixty one subjects who expressed interest filled out questionnaires provided by CES agents and 104 of these were screened, 54 (59%) of whom had household incomes of $\leq \$20,000$. Results indicate that rural women most likely to have mammograms in this program had the following characteristics: had mammogram in last 5 years (69%), did not have breast symptoms (66%), had personal physician (69%), and did not have insurance (71%). Eleven (11%) of subjects had abnormal films. Logistical issues such as clinical accountability for a decentralized study will be addressed.

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5

THE DISINTEGRATION OF CANCER PREVENTIVE SERVICES AND ILLNESS CARE IN PRIMARY PRACTICE. S.Fontana, R. Love.

The integration of preventive services and illness care in clinical practice has been advocated as an efficient way of providing comprehensive care. This approach provides a contact for persons who might not volunteer for a screening program and where a physician has familiarity with the patient's needs and attitudes. The purpose of this presentation is to report on the integration of cancer preventive services in primary care practice. Subjects were 2,033 men and women 50-64 years of age who answered a mailed questionnaire. These subjects were drawn from a larger sample of regular patients who received care from one of 14 group practices located in the Midwest. Odds ratios with 95% confidence limits were calculated for various screening services by chronic disease status. For men and women with diabetes, high blood pressure, or heart disease, the odds of being asked if they smoked were 1.09, 1.22, and 1.60, respectively. The odds of being given 3 cards for a stool sample, having a rectal exam, or having a sigmoidoscopy ranged from 0.65-1.11 for persons with these chronic diseases. In contrast, the odds of being talked to about diet was 6.67, 2.95, and 1.53. These data reinforce the importance of addressing provider-related barriers along with other strategies for providing preventive services.

Acknowledgement: This work funded by the American Cancer Society PBR-51 and through National Cancer Institute 5 R25 CA47785-04

7 KNOWLEDGE, ATTITUDES, AND PERSONAL PRACTICES REGARDING PREVENTION AND EARLY DETECTION OF CANCER. Roberd M. Bostick, MD, MPH; J. Michael Sprafka, MPH, PhD; Beth A. Virnig, MPH; John D. Potter, MD, PhD.

To determine population knowledge, attitudes and personal practices regarding prevention and early detection of cancer, cross-sectional surveys were conducted in random population samples of 25 - 74 year-old men and women in the upper-Midwest (N = 4,915) in 1987 - 1989 (1). Four-fifths of respondents believed cancer to be preventable. Knowledge of warning signs / symptoms of cancer and of leading causes of cancer, however, were low. Over 95% of women had had a Pap smear, a clinical breast exam or had performed a breast self-exam; 65.7% of those aged 50 - 65 years had had a mammogram. Among men and women aged 50 - 65 years, 77% had had a digital rectal exam; 52.5%, a fecal occult blood test; and 48.3%, sigmoidoscopy. Conditions are favorable for an increase in screening mammography including: favorable attitudes toward cancer prevention, strong consensus among policy-making organizations regarding mammography guidelines, and high levels of adherence to these recommendations by women who have ever had their first mammogram. Challenges now are acceptance of guidelines by physicians (2), mammogram affordability / availability, and demonstration of efficacious, cost-effective, and reliable colorectal / prostate cancer screening tests.

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8

Adherence Enhancement Training Methodologies Lisa Giordano, M.A. & Lee Sennott-Miller, Ph.D.

The ability to address adherence failures in clinical trials is one which is seldom approached in a behavioral and systematic way (1). Clinical interveners are often times technically trained on carrying out the research protocol, but not on methods of counseling participants for specific adherence failure problems. Critical to the success of any adherence enhancement approach is the way the methods are transferred to the clinical staff who regularly interact with participants. To address this issue, regular training sessions should be conducted which focus on problem-solving adherence failures and developing the inductive skills necessary for facilitating behavior change in participants. A structured-learning approach (2) was developed in the context of a colon cancer prevention study which focused on: a) modeling b) role-playing c) valiative feedback, and d) follow-up assessment of skills at regular intervals. Specific aspects of the counseling session and examples of training sessions are addressed in this presentation.

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SCREENING AND MANAGEMENT OF PATIENTS WITH NON-PALPABLE BREAST CANCERS.

Carlo E. Grossi, M.D., Reza Sabet, M.D., J. Soltani, M.D., R. Holtzman, M.D., R. Weiser, M.D., S. Glasberg, M.D., P. Kalaria, M.D., E. Berman, M.D., H. Ginsburg, M.D., A. Mizrachy, M.D., P. Narasimhan, M.D.

Purpose to examine the screening of patients in an HMO setting for detection of non-palpable breast cancer. In our HIP/HMO group of 160,000 patients, mammography has been offered for the last 15 years. We are now performing over 10,000 mammographies per year for the last 5 years; in 1991 - 14,500. In April, 1989, we established a dedicated Breast Consultation Service with coordinated care by Surgery, Radiology, nurses, pathologists and oncologists. Over 2400 patients have been seen per year. The non-palpable suspicious lesions referred for biopsy have risen from 93/year to 150/year. The biopsy detection rate of cancer in non-palpable lesions is 22% of suspicious radiological lesions. This is a detection rate of 0.0019 per patient screened. 16% of detected cancers are in-situ cancers. Patient education and breast consultation service have resulted in higher detection of early breast cancer in our HMO population.

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From Departments of Surgery, Radiology, Pathology, Oncology; LaGuardia H.I.P. Hospital, Forest Hills, New York 11375 and Queens-Long Island Medical Group.

Reduction of Difficulty in Adherence Enhancement Lee Sennott-Miller, Ph.D., Lisa Giordano, M.A.

Adherence problems in clinical trials are often caused by structural or environmental difficulties amenable to behavioral intervention. In the context of cancer prevention trials, a reduction of difficulty approach is being used which is grounded in value-expectancy theory (1) with value operationalized as the perceived effectiveness of a recommended activity/regimen, and expectancy as its perceived difficulty. At the point adherence becomes marginal, a difficulty reduction intervention is implemented that can last from 10 to 30 minutes (2). It begins with an interview in which the intervener and participant review a list of common problems and suggested remedies to assist in uncovering the nature of the problem(s). The participant is also encouraged to add to the list if other problems are indicated. Once the barrier is identified, the subject and intervener agree on specific changes that will be attempted in order to overcome it and increase adherence. Follow-up telephone calls are made to participants to assess their performance status and determine if the intervention was successful at reducing difficulty.

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ESSENTIAL ELEMENTS OF PRENATAL SMOKING CESSATION
INTERVENTIONS: RECOMMENDATIONS OF AN NCI EXPERT
ADVISORY PANEL. Susan E. Sullivan, PhD, Thomas J.
Glynn, PhD, and R. Louise Floyd, DSN, RN

One million women are smokers when their pregnancy is confirmed, and most will continue to smoke unless effective smoking cessation advice and assistance are provided (1). Capitalizing on a rare opportunity to work with a highly motivated group, health care providers are in a unique position to facilitate cessation (2) and contribute to achieving national objectives for reducing smoking prevalence among pregnant women (3). Given that no systematic interventions are widely used with pregnant smokers in prenatal or other routine health care visits, one strategy for initiating a national effort is to develop intervention recommendations from clinical and research experience. An NCI Advisory Panel developed several recommendations around such issues as identifying/reaching the target group, how to communicate prevention/cessation messages, how efforts can be initiated by providers and institutionalized as standard practice in health care settings, and how to disseminate materials and programs. Supporting evidence is presented for each recommendation.

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MAMMOGRAPHY QUALITY ASSURANCE: LEGISLATION AND ACCREDITATION BY STATE. Martha M. McKinney, Ph.D. and Lou Fintor, M.A., M.P.H.

Over the past five years, 38 states and the District of Columbia have passed laws requiring third-party payers to either provide coverage for screening mammography or to offer mammography coverage as an optional benefit. These laws, along with the explosive growth in the number of dedicated mammography units, made screening mammograms much more accessible to age-eligible women. However, the laws vary greatly in the extent to which they address the quality and safety of mammography and the qualifications of the personnel performing and interpreting mammograms. This study tracks the passage of mammography reimbursement legislation in the various states and compares state laws with respect to the number and types of quality assurance areas addressed. States are also compared with respect to the proportion of mammography units that received American College of Radiology (ACR) accreditation. The legislative and accreditation trends illustrate the dynamic nature of the mammography quality assurance movement. An analysis of state mammography reimbursement laws indicates that equipment standards and radiation protection are the quality assurance areas most commonly addressed. Approximately one-third (31%) of the nation's 11,521 mammography units currently have ACR accreditation, and this percentage continues to rise. Two of the states with the highest percentages of ACR-accredited units (Michigan and Kentucky) both require that mammograms be performed on dedicated equipment meeting ACR standards. The regional distribution of total units, ACR-accredited units and a diffusion curve show that the rate of accreditation is slow while state legislative activity with respect to quality control is high.

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SENSITIVITY, SPECIFICITY, AND POSITIVE PREDICTIVE VALUE OF SALIVARY COTININE AMONG PREGNANT WOMEN.

Neal Richard Boyd, Jr., EdD, MSPH and Richard A. Windsor, PhD, MPH

The purpose of this study is to report the quality of biochemical measurement of smoking status among pregnant women participating in a smoking cessation trial, providing insight about sensitivity, specificity, positive predictive value, and the accuracy of self-reports with salivary cotinine. Self-reports of smoking status were obtained at baseline, mid-pregnancy, and end of pregnancy from experimental (n=400) and control (n=44) patients (1). Salivary cotinine was used to biochemically validate self-reports at each data collection point with a value of ≤ 30 ng/ml indicating cessation (2). Sensitivity, defined as the percentage who self-reported to smoke at the end of pregnancy and had a positive cotinine value, was 86%. Specificity, defined as the percentage who self-reported cessation at the end of pregnancy and had a negative cotinine value, was 74%. Positive predictive value, defined as the percentage who had a positive cotinine value and self-reported to be a smoker at the end of pregnancy, was 93%. A source of measurement error is the disagreement between the self-reported number of cigarettes smoked and salivary cotinine. Linear and nonlinear methods were used to examine this relationship with the latter method accounting for more variance. This study revealed that the measurement quality of pregnant women's smoking status would be enhanced if information about time, intensity, and duration of the last exposure were obtained to use in conjunction with salivary cotinine.

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DEVELOPING AN INTERNATIONAL DATABASE FOR BREAST CANCER SCREENING. Ann Coleman, RNCS, PhD; Sam Shapiro, Philip Prorok, PhD; Larry Kessler, ScD; Melvin Greberman, MD

In December 1988, the NCI and FDA co-sponsored a workshop in Bethesda, MD. Experts from 11 countries, the WHO, and the UICC concluded that an international database could be valuable in assessing the contents, progress, and effectiveness of screening programs (1). Subsequently, a questionnaire regarding the contents of the database was sent to workshop participants. In August 1990, participants identified a need for standard terminology and definitions to be used in collecting data, some changes in contents and scope of tables for data collection, and clarification of purposes, procedures, and products of the effort. From September 1990 through June 1991, preliminary work was done to meet these needs (2). In July 1991 participants from 9 countries and the WHO agreed on a glossary and table forms for collecting and recording data and on a document on purpose, goals and objectives, and products. Participating countries are in the process of developing ways and means to establish and use the database.

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ASSESSMENT OF PASSIVE EXPOSURE TO CIGARETTE SMOKE AMONG PREGNANT WOMEN. Neal Richard Boyd, Jr., EdD, MSPH, and Richard A. Windsor, PhD, MPH

Very little data are available to document the exposure to passive cigarette smoke among pregnant women (1). The purpose of this study was to determine the quality of measurement of passive exposure to self-reported cigarette smoke biochemically validated by salivary cotinine. A sample of 814 smokers and 480 never smokers participating in a smoking cessation trial provided baseline self-reports and saliva samples to document active and passive exposure to cigarette smoke. Self-reported passive exposure was assessed by four questions derived from an NCI consensus meeting on instrument development by investigators of smoking and women's trials. A salivary cotinine >30 ng/ml was used to indicate smoking status: sensitivity = 84%, specificity = 98%, and positive predictive value = 90%. Among never smokers, no differences in the mean salivary cotinine values existed between those who were passively exposed versus those not exposed. However, among smokers, those who were also passively exposed had significantly greater mean salivary cotinine values than those not exposed to passive smoke. The passive exposure data from never smokers contradict reports in the literature which document differences between cotinine levels for passively exposed and not passively exposed individuals in non-pregnant samples (2). Revision of self-reported passive exposure questions need to include: environment -- open or closed, quantity, and duration of exposure to smoke.

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A COMPARISON OF BREAST CANCER SCREENING ATTITUDES AND BEHAVIORS IN YOUNGER AND OLDER WOMEN. Roshan Bastani, Ph.D., Annette Maxwell, Dr.P.H., Irene Prabhu Das, MPH, Alfred Marcus, Ph.D., UCLA

Mammography screening continues to be grossly underutilized, especially in women older than 65 years¹. A random digit-dialing telephone survey was conducted with 802 women ≥ 40 yrs in Los Angeles County to obtain baseline information on utilization of screening mammography and related attitudes². A follow-up interview was conducted one year later. Women were divided into 3 groups: 40-49 yrs (N=277), 50-64 (297) and 65 yrs and older (228). Although age is the most important risk factor for breast cancer, women 65 yrs and older felt significantly less susceptible than women in the younger age groups. Older women were also more likely to have health insurance, be white and unmarried, and have lower levels of income and education. At baseline, older women were less likely to have had a screening mammogram according to the age specific guidelines. However, older women were more likely to have received a screening mammogram during the 12 months follow-up period, thus eliminating the original age differences in utilization. The presentation will focus on attitudes and barriers predicting mammography utilization within the 3 age groups.

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A STATE TUMOR REGISTRY AS A TOOL FOR CANCER CONTROL RESEARCH. Roshan Bastani, Ph.D., Annette Maxwell, Dr.P.H., Irene Prabhu Das, MPH, UCLA, Jonsson Comprehensive Cancer Center

Breast cancer (bc) screening behaviors in relatives of bc patients are not substantially different from those of women in the general population¹. Informing women of their risk factors for developing bc may encourage them to participate in screening². To investigate this hypothesis, we obtained information regarding 2,500 randomly selected bc cases from the California Tumor Registry. After obtaining physician consent to contact their patients, 2154 bc cases were asked to identify and give permission to contact their mothers, sisters, and daughters for enrollment in the study. Of the 1,371 relatives identified, 1,043 were eligible (≥ 30 yrs and free of bc) and willing to participate. Risk factors were obtained through a telephone interview with the relatives. The intervention group (randomly assigned) received feedback regarding their risk factors and were assigned a summary risk label. To date, 15% were classified as being at "slightly", 59% as being at "moderately" and 26% as being at "substantially higher risk". The study methodology and the risk classification will be described in greater detail.

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LOW-COST SCREENING MAMMOGRAPHY IN ETHNICALLY DIVERSE COMMUNITY CLINICS: PATIENT ATTITUDES, KNOWLEDGE AND PRACTICE. M Wrensch, D Bahrs, M Lee, J Luce, J Murphy.

In 1990, the Women's Cancer Network of San Francisco coordinated Breast Health Days at 12 local community and city clinics. Participants (n=562) were given information about breast health and cancer prevention, taught breast self-exam, and received a screening mammogram for \$10. Information on the participants demographics, health history, attitudes, knowledge and practices concerning cancer causes and prevention was obtained for 389 women who completed exit interviews. 93% of the women were over age 40 and represented diverse ethnic groups: 28% were white, 18% African Americans, 18% Asian, 16% Latina, 12% Filipina and 8% other. Most women were low-income; 60% had household incomes less than \$10,000 per year. Statistically significant differences among ethnic groups were observed with regard to reasons for not previously getting a mammogram and beliefs about cancer causes and prevention. For example, 29% of Latinas and 50% of Asians reported never having heard of mammograms compared to 4% of whites and African Americans, $p<.0001$. Over 70% of non-Asian women believed fats caused cancer while only 38% of Asian women reported such belief ($p<.0001$). 80% or more of non-Latina women reported believing that eating green vegetables prevented cancer while fewer than 70% of Latina women reported such beliefs ($p=.03$).

Our project indicates the feasibility and usefulness of providing low-cost screening mammography in ethnically diverse community clinics and suggests the need for ethnic tailoring of education and screening efforts.

20
Building Capacity to Conduct Cancer Control in a
Metropolitan Health Department: Los Angeles County
N Herman-Shipley, L Breslow, S Stoyanoff, W McCarthy

Cancer control has been described as efforts "to close the gap between what we know and what we do" in dealing with human cancer.¹ The emphasis is on prevention, screening and early detection and includes diagnosis, treatment, rehabilitation and continuing care to minimize morbidity and mortality from the disease.²

The Los Angeles County Department of Health Services (LACDHS) developed a capacity-building program in cancer control which could serve as a model for state and county health agencies. In collaboration with the Jonsson Comprehensive Cancer Center, Division of Cancer Control (DCC), UCLA, projects in 3 NCI priority areas were designed and implemented under the auspices of the LACDHS: smoking cessation; cervical and breast cancer screening. DCC staff provided the expertise while LACDHS staff, using existing resources and newly acquired equipment, adopted new procedures to institutionalize efforts in cancer control.

Since the LACDHS serves an ethnically diverse, low income population whose cancer incidence, survival, and mortality parallel that of such groups across the nation, the design and implementation of successful cancer control mechanisms in this setting have considerable potential for other health departments.

¹ Interview with John R. Heller, former Director of NCI. A History of Cancer Control in the United States 1946-1971, March 1977 USDHEW 78-1516, PHS, NIH, NCI.

² Working Group Report: National Cancer Program Planning Conference: Summary Report for Cancer Control, June 1975, USDHEW, PHS, NIH, NCI.

21 SURVIVAL AND RELAPSE FROM BREAST CANCER
FOLLOWING A LOW-COST SCREENING PROJECT.
Victor G. Vogel, MD, MHS; Melissa Bondy, PhD; Susan Halabi
MPH; Julie A. Lord.

In 1987 64,459 women had screening mammography in a statewide project sponsored by the American Cancer Society, Texas Division. Mammograms were offered for \$50 at 306 participating screening centers evaluated in a prospective performance review (1). Four years later, we ascertained the disease and vital status of the 214 women diagnosed with breast cancer. In 1987, 34 women (16%) had carcinoma in situ, 136 (64.2%) had T1 primary tumors, and 42 women (19.8%) had T2 or larger primaries. Forty-seven percent had lesions detected by mammography only. By clinical-pathological staging, 16% were Stage 0, 56% stage 1, and 28% were stage 2 or higher. Relapse-free survival by stage at 4 years was 94% for stage 0 and 1, and 84% for stage 2 or higher. Overall survival was 94% at four years. The risk of relapse was higher in those women younger than 50 years or older than 65 years at the time of diagnosis compared to women 50 to 64 years old at diagnosis. These data indicate that community radiology centers that undergo prospective performance review can detect early, curable breast cancer. Furthermore, screening can be offered to entire populations at low cost (2) without adversely affecting either the stage of the cancers detected or the subsequent survival of the cases.

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PERCEPTIONS OF PERSONAL BREAST CANCER RISK: CORRELATES OF PREDICTORS AND CONSEQUENCES. Heather Bryant, MD, PhD, Zeva Mah, M Sc.

One of the predictors identified for the likelihood of carrying out preventive behaviours is the individual's perception that she is at risk for the disease in question. As part of the baseline activity prior to inauguration of a provincial screening program, we carried out a population-based survey of rural and urban Alberta women aged 40 to 74. A random selection procedure was used to reach women for this telephone survey. Of 1741 eligible households reached, 1350 women participated, for a response rate of 78%; these analyses of risk perception include 1273 women for whom age is available and appropriate. The family history of breast cancer, but not knowledge of a friend's breast cancer, was strongly associated with the women's assessment of their personal likelihood of developing breast cancer ($p < 0.001$). Age was inversely associated with perception of risk; despite the much higher breast cancer incidence among older women, it was the younger women who were far more likely to believe themselves at risk ($p < 0.001$). Women who believed themselves to be at higher risk were more likely to have had a mammogram, and to plan on one in the next two years ($p = 0.002$); this effect remained after controlling for age. However, they were neither more likely to believe that this cancer could be cured if found early, nor to be practicing breast self examination. The implications of these findings for public education programs, and the interactions of these effects with the significant inverse association with age, will be discussed in greater detail.

22 AN INTERVENTION TO IMPROVE SURVEILLANCE BEHAVIORS IN HIGH RISK WOMEN. Kathryn M. Kash, Ph.D., Marilyn Halper, M.P.H., Jimmie C. Holland, M.D.

Anxiety interfered with surveillance behaviors in women with a family history of breast cancer (1). A pilot psychoeducational support group, modeled after previous work with cancer patients (2), was conducted to reduce anxiety related to breast cancer. Ten participants (ages 34 to 72) were randomly selected from women attending a high risk breast surveillance program. Group sessions met for one and a half hours each of six weeks. The group intervention goals were to: 1) increase knowledge of risk status; and 2) reduce anxiety and decrease fears about breast cancer and its consequences. A significant finding from the pre, post, and one year follow-up evaluation measures was that perceived susceptibility to develop breast cancer decreased ($p < .02$). 100% had their mammograms as scheduled and came in for a six-month clinical breast examination as compared with only 60% adherence prior to the group. All women reported decreased anxiety about breast cancer. We concluded that decreasing perceived susceptibility improved adherence to breast cancer early detection behaviors.

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QUALITY OF LIFE AND SMOKING CESSATION IN HEAD AND NECK CANCER PATIENTS.

Clifford R. Carr, EdD, Ellen R. Gritz, PhD, Cindy Chang, MS

Quality of life and its association with smoking cessation in head and neck cancer patients was assessed in a randomized controlled trial to test the efficacy of a provider-delivered smoking cessation intervention. While the primary outcome for this study is smoking cessation, factors affecting the ability to achieve abstinence were studied. These quality of life factors include physical (global¹ and disease-specific²) and psychological (mood disturbance³) functioning and alcohol consumption.

Data collected on a Vanguard Cohort (N=91) of subjects completing a one-year followup interview were analyzed. Global functioning, normalcy of diet and ability to eat in public significantly improved from 1 to 12 months post-treatment and understandability of speech improved somewhat. Total mood disturbance, tension, depression, anger and confusion were significantly lower at 12 months than at 1 month and vigor was higher. Alcohol consumption decreased markedly over the 12 month followups. Compared to all others, Continuous Abstiners consumed more alcohol at baseline and less at 1 month, had less tension and depression at baseline, and had more vigor at 12 months.

In conclusion, quality of life improved and associations between continuous abstinence and several quality of life indicators were identified.

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STRESS AND SMOKING AMONG RNs ENROLLED IN A STOP SMOKING PROGRAM. Barbara A. Berman, Ph.D., Laura L. Read, Ph.D., Alfred C. Marcus, Ph.D., Ellen R. Gritz, Ph.D.

The role of stress in smoking cessation and relapse is unclear. The belief that smoking reduces stress may play a role in tobacco use¹ although smoking may relate more to the need to demarcate "break time" than to reduce stress. There is evidence that women experiencing greater workplace strain are less likely to relapse.²

The relationship between smoking and occupational stress among 149 Registered Nurses enrolled in a self-help smoking cessation program was analyzed.³ Data regarding demographics, smoking history and status, stress-related coping behavior and the Nurse Stress Index was collected. Little evidence was found for an association between stress, current smoking dosage, likelihood of cessation, or relapse. Nurses reporting higher levels of stress were more likely to smoke when needing stimulation than when nervous, frustrated or bored. These findings suggest a complex link between nurses' smoking and work-related stress, with important implications for intervention.

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3. Gritz ER, Marcus AC, Berman BA, Read LL, Kanim LEA, Reeder SJ. Evaluation of a worksite self-help smoking cessation program for registered nurses. *Amer J Health Promotion* 3:26-35, 1988.

Despite major advances in treatment and survival from cancer over the past several decades, the nation's poor, of which Blacks comprise one-third, have not demonstrated such improvement. Cancer survival rates among the socioeconomically disadvantaged remain 10 to 15 percent lower than that of the general population¹. Many factors, including health knowledge and beliefs, risk-promoting lifestyles, and limited access to health care have been proposed as explanations for the observed discrepancies. This study compares cancer screening knowledge and practices between two inner city neighborhoods matched on low socioeconomic status (SES), but one predominantly White, the other predominantly Black. Data was obtained from a self-administered health survey completed by female members of senior citizen groups prior to viewing Check-Up On Health, a health education slide-tape show about cancer screening. Of the 1358 women 462 (34%) were Blacks, and 896 (66%) were White. The mean age was 72 for Whites and 71 for Blacks. Less than 50% of both groups had completed a high school education. Black women reported higher rates of adherence to screening for cervix, breast and colorectal cancer. The rate for recent PAP smear was 66% for Whites and 80% for Black women, ($p < .001$) for mammography 42% vs 52% ($p < .001$) and for stool blood test 33% vs 46% ($p < .001$). Levels of knowledge about cancer and its treatment were similar in both groups. Most of the differences in screening persisted after controlling for age and education. However, screening was significantly related to an individual's source of primary care. In the Black community one-third of all residents received their care in a university, VA, or public health clinic setting, whereas in the White community 90% of care was provided by private practitioners. Screening rates for each cancer site were significantly higher for women receiving care in the clinic setting. This data suggests that when SES is held constant, the quality and preventive health orientation of the care available in a community rather than its racial profile, may influence the practice of screening behavior.

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A Community Survey on Cervical Cancer Screening Among Young Hispanic Women in the Southwest. Buller D, Modiano M*, Meister J, Zapien J, Lash S, Villar-Wertler P, Hunsaker F, Alberts D. The University of Arizona, Arizona Cancer Center.

The rapidly growing Hispanic population has a higher incidence of certain cancers and a large number of cancer risk factors (1,2). While several barriers discourage preventive behavior, sociocultural factors can be utilized to increase prevention (3,4). A survey of 355 Hispanic women 18-40 years old in Tucson, Arizona examined compliance with cervical cancer screening guidelines and the relationship of psychological, social, and cultural variables to compliance. Nearly one-quarter of Hispanic women were not in compliance with screening guidelines, even though most knew what a Pap smear is and does. Many women did not know the risk factors for cervical cancer or when a woman should have a Pap smear. One-quarter had not heard of cervical cancer and many did not know where the cervix is. Analyses are discriminating noncompliers from compliers on access and financial barriers, attitudes toward prevention and the health care system, and sociocultural factors endemic to the Hispanic community to develop a culturally-sensitive intervention employing peer educators to increase Pap screening among young Hispanic women.

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*sponsor member

This paper presents findings from a two-part study examining correlates of differences in cutaneous melanoma survival and risk-taking behavior. In Part I, hospital Tumor Registry data were used to assess histological, stage, site, treatment and age variations in survival between men and women newly diagnosed or treated between 1984 and 1990. Cox proportional hazards models showed histology to be a significant predictor of survival in women but not men and type of treatment to be a significant predictor of survival in men but not women. In Part II, gender differences in the use of sun-screening preparations controlling for other known risk factors were evaluated in skin cancer screening program participants. Logit models showed that despite similar scores on sun sensitivity, sun exposure, and screening outcome measures, females reported a higher proportion of personal or family history of skin cancer, whereas men were less likely to use sunscreen preparations. Results are discussed in terms of differential targeting for prevention and screening programs.

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Pre-diagnostic selenium and colorectal cancer risk;
a sequential cohort nested study with multiple controls
and nails stored in a biobank.

The aim of the study was to test, with as few unique biosamples having to be destroyed, whether selenium levels are decreased already before the clinical detection of colorectal cancer, using nail clippings from the DOM breast cancer screening program.^o

Therefore a sequential test procedure was used ($\alpha = 0.5$, $\beta = 0.2$ and $d = 0.5$) on selenium levels as determined by INAA in nailclippings from cases and 4 age matched controls^{oo}. Already after the first 11 cases detected, it could be decided that selenium levels were not significantly decreased pre-diagnostically. This results refutes a chemo-preventive potential for selenium supplementation in the reduction of colorectal cancer.

Results were similar to the results of the fixed sample size approach, employing all 37 cases detected during the entire follow-up period of all cohort members who had provided a toenail clipping in the past. These ^{ooo} results agree with a cohort study that used banked serum

-There is no role for selenium as a chemo-preventive substance in colorectal cancers among Dutch women.
-As expected from previous simulation studies performed, the sequential-cohort-nested approach with multiple controls can lead to a substantial reduction in both the number of case/biosamples to be compared/destroyed and the duration of follow-up of a cohort to reach a conclusion.

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^{oo} van Noord PAH et al. Int.J.Epi. 1985;16S:318-22
^{ooo} Shober SE et al. Am.J.Epi. 1987;125:1033-41.

- 31 EFFECT OF OLTIPRAZ UPON SURVIVAL AND UPON DETOXICATION PATHWAYS IN A HUMAN COLON ADENOCARCINOMA CELL LINE. Peter J. O'Dwyer, Margie L. Clapper, Fox Chase Cancer Center, Philadelphia, PA 19111.

Oltipraz is a synthetic dithiolthione with chemopreventive activity in carcinogen-induced neoplasia of liver, lung and colon. Oltipraz administration is associated with increased activity of several Phase I and II enzyme systems in the lung and liver of treated animals. To characterize the pharmacologic determinants of oltipraz' effects in colon cells, we investigated the effects of varying concentration-time exposure conditions in HT29 cells *in vitro*. Using the MTT assay, we found that oltipraz concentrations in excess of 10 μ M resulted in decreased cell survival. The IC_{50} for a 24 hour exposure to oltipraz was 100 μ M. A 24 hour exposure of HT29 cells to oltipraz elicited a dose-related increase (maximal at 100 μ M) in the activities of glutathione transferase (GST) (132%) and DT diaphorase (DTD) (180%). The observed increase was greater with a 48 hour drug exposure: at 100 μ M the increase in DTD was 210%. On incubation of the cells in drug-free media, the increased enzymatic activities continued to increase up to 96 hours. We conclude that oltipraz produces significant increases in the activity of detoxication pathways in a colon cell line. The observed concentration-response characteristics and time-course have implications for clinical chemoprevention studies, and will be investigated further in humans.

- 30 DIET AND COLORECTAL CANCER: A CASE-CONTROL STUDY IN HAWAII. Loic Le Marchand, Jean H. Hankin, Laurence N. Kolonel, Lynne R. Wilkens. Cancer Research Center of Hawaii.

In order to better understand reasons for the marked ethnic differences in colon cancer rates in Hawaii, the authors are conducting a large population-based case-control study on the island of Oahu. Data from dietary interviews with 418 colon cancer cases, 174 rectal cancer cases and 592 age-, sex- and ethnicity-matched controls have been analyzed in a preliminary fashion. Calories and fat intakes were positively associated with risk of colon cancer. The odds ratio for the highest compared to the lowest tertile of caloric intake was 2.2 (1.3-3.7) for men and 2.0 (1.2-3.5) in women. Alcohol intake from beer, wine or hard liquor was positively associated with colon cancer in both sexes, but not with rectal cancer. Nitrite consumption increased risks of colon and rectal cancers in both sexes. Physical activity was weakly protective against colon cancer in both sexes. However, crude or dietary fiber, calcium and carotenoid intakes were not associated with risk. Obesity five years prior to diagnosis in men and at age 35 in women was positively associated with risks of colon and rectal cancers. Calorie-adjusted and sub-site- and ethnic-specific analyses will be presented.

32 EXCESS OF SMOKING-RELATED CANCERS IN URBAN RELATIVE TO RURAL AREAS OF IOWA. Chuck Lynch, MD, PhD, Bob Oppliger, PhD, Leon Burmeister, PhD, Carla Van Hoesen, BA, and Dan Olson, MS

Several previous studies have evaluated urban-rural differences in cancer mortality (1) and occasionally cancer incidence (2), but rarely have both outcomes been simultaneously evaluated. We evaluated urban-rural differences in cancer incidence and mortality among Iowa residents between 1973 and 1988 using data from a statewide cancer registry. An address algorithm was used to assign cancer cases at time of diagnosis either to municipal addresses comprising urbanized areas based on 1980 census data or to rural route addresses comprising rural areas. Standardized incidence (SIR) or mortality (SMR) ratios were calculated. The analysis involved 88,841 incident cases and 42,114 deaths. When evaluating cancer at all sites in urban relative to rural areas, there were 15,210 excess incident cancers and 6,390 excess cancer deaths in urban areas. Of this excess, smoking-related cancer sites accounted for 47.9% of incident cancers and 62.4% of cancer deaths, while smoking-alcohol-related cancer sites accounted for another 6.5% of incident cancers and 7.2% of cancer deaths. These results suggest that lifestyle factors, particularly cigarette smoking, have a great impact on Iowan's cancer incidence and mortality.

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33 DIFFERENCES IN CANCER MORTALITY BETWEEN FARMERS AND NON-FARMERS IN RURAL AREAS OF IOWA. Chuck Lynch, MD, PhD, Leon Burmeister, PhD, Bob Oppliger, PhD, Carla Van Hoesen, BA, and Dan Olson, MS

In a recent evaluation of urban-rural differences in cancer incidence and mortality among Iowa residents between 1973 and 1988, only lip cancer among males showed significantly elevated rates in rural areas. Studies of cancer among farmers have found excesses for Hodgkin's disease, leukemia, non-Hodgkin's lymphoma, multiple myeloma, and cancers of the lip, stomach, prostate, skin (nonmelanotic), brain, and connective tissues (1,2). Farmers in Iowa predominantly reside in rural areas. Given our urban-rural cancer findings, a question arose as to how well the rural areas represent the farming population. To evaluate this among males, we used occupation as coded on the death certificate, identified 8,718 farmers and non-farmers in rural areas, and compared cancer site differences between them using a PMR analysis. The PMRs were significantly higher among farmers for multiple myeloma, chronic lymphocytic leukemia and cancers of the lip, stomach, colon and rectum, pancreas, breast, and prostate gland. The findings indicate that the cancer experience in rural areas of Iowa is not synonymous with that of the farming occupation, despite the fact that Iowa is an agricultural state in which farming is the major occupation in rural areas.

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35 ON THE MULTIVARIABLE ANALYSIS OF VALIDITY AND RELIABILITY. Steven S. Coughlin, PhD

Multivariable methods have recently been proposed for the estimation of sensitivity and specificity, proportion agreement, and other commonly employed measures of agreement (1,2). The use of the logistic model to analyze data from validation or reliability studies offers several advantages over existing methods as highlighted in this presentation. Covariates may be included in the regression equation to obtain adjusted or subgroup-specific estimates of these measures. To determine the statistical significance of differences across subgroups, hierarchical models may be fitted which are identical except for the covariate(s) representing the subgroups of interest. The variance at a particular covariate level may be calculated following general methods of asymptotic variance estimation. Potential limitations include possible interaction with disease status in validation studies and a lack of precision of the estimates. Further, the failure to include all of the important covariates in the model may result in an over-simplified or misleading impression of the pattern of agreement in the data. Despite some practical problems, these modeling approaches provide a useful means of evaluating and adjusting for explanatory covariates related to agreement.

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34 ATTRITION, AND REASONS FOR ATTRITION, IN A SKIN CANCER CHEMOPREVENTION STUDY. Cartmel B, Moon TE and Levine N. In long term chemoprevention studies attrition is of importance and interest since it affects the power of the study, and it also gives researchers insight into the problems that may be encountered in a phase IV study. In a double blind randomized study of the prevention of skin cancer in a high risk population, 2,298 subjects (679 females) were randomized to receive vitamin A (25,000 I.U.) or a placebo. The median age at randomization was 63; females (median age 61) were significantly younger than males (median age 63). Thirty four percent of subjects (772) discontinued the capsules prior to the completion of the study. No significant difference in attrition was seen by sex or age alone. No difference in attrition was seen between treatment arms for males, however a difference was observed for females (38% vs 30%). Subjects have been categorized by the reason given for discontinuation of the capsules. The categories include: 1) symptoms consistent with retinoids (e.g. dry skin) (22%); 2) symptoms not consistent with retinoids (9%); 3) death (7%); 4) subject unwilling or unable to continue taking the capsules (60%); and 5) lost to follow up (2%). Attrition does not appear to be related to age or sex alone, but for females may be related to treatment.

Efficacy of Secondary Prevention of Primary Hepatocellular Carcinoma (PHC). Alison A. Evans, ScD, Tianlun Zhou, MD, Fu-min Shen, MD, W. Thomas London, MD

Screening methods for cancer detection are best evaluated by randomized, controlled trials, but rarely are (1). We are testing the efficacy of α -fetoprotein (AFP) followed by ultrasonography (US) to reduce mortality from PHC in an endemic area of China (>200 deaths/100,000/yr; 80% of cases in hepatitis B virus (HBV) carriers; 5-yr survival <5%). Resection of solitary, small tumors may improve survival, but whether AFP and US screening to detect such tumors improves outcome is unknown (2). The trial: 10,000 male HBV carriers >35 yrs old are randomized to a monitored or a "usual care" group and followed for 5 yrs. (Approximately 235 cases of PHC are expected in each group in 5 yrs.) The monitored cohort receives AFP screening every 6 mos; abnormal AFPs (>20 ng/ml) trigger US examinations. Possible PHCs in both groups are referred to Shanghai Medical University for definitive diagnosis and treatment. We will estimate: a) the effect of screening on reduction of PHC and all-cause mortality; b) predictive values of each component of the program; c) proportion of resectable tumors in monitored and unmonitored groups; and d) natural history parameters of PHC (length of detectable pre-clinical phase, lead time gained by screening, and proportion of screen-detected cancers that progress to clinical cancers). This trial may be a model for evaluating the efficacy of secondary prevention methods for other cancers.

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CANCER SCREENING TRIALS: ISSUES IN DATA MONITORING

Barbara L. Wells, Ph.D. and Philip C. Prorok, Ph.D.

Effective screening tests for cancer are an integral component of the goal of reducing the cancer mortality rate in the U.S. Although it is crucial to monitor cancer screening trials to assure they proceed according to protocol and yield an optimal amount of information, little has yet been done to study monitoring methodologies on primary and secondary prevention trials. This report investigates the relevancy of applying clinical trials methodology to screening trials, as well as applying the findings to selected screening trials conducted to date (1,2). Information will be presented in several categories, including: protocol/design compliance, adverse effects, data processing, and treatment comparisons/evidence of an intervention effect. The National Cancer Institute is about to launch a large trial to test the effectiveness of screening tests for four cancers. It is expected that in the future additional screening tests will be developed and those will also undergo trials to assess their over-all effectiveness. This report provides the basis for important issues to be considered in the design and conduct of such trials, as well as community-wide screening programs.

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CYTOGENETIC ANALYSIS FOR COLON NEOPLASIA-GENETIC PREDISPOSITION? GL Jackson, JI Hughes, VL Hopwood, VM Heckel, S Pathak, Cancer Prevention Center, Kelsey-Seybold Foundation and UT MD Anderson Cancer Center, Houston, Texas

Accumulative genetic mutations lead to colorectal cancer.¹ The purpose of this study is to evaluate lymphocyte chromosome defects as a potential marker for colorectal neoplasia, both adenomas and carcinoma. Cytogenetic studies of peripheral lymphocyte cultures were performed on the following groups: 1) adenomatous polyp - 20 patients, 2) colorectal cancer and polyps - 18 patients, 3) colorectal cancer only, no history of polyps - 11 patients. Chromosome 5 abnormalities were found in 35% of Group 1 and 38.9% of Group 2. Chromosome 17 rearrangements were not observed in the polyp only group, but were found in the other groups- 22.2% in Group 2, and 9.1% in Group 3. Chromosome 12 rearrangements were found frequently in all three groups (30, 22.2, and 18.2%, respectively.) We therefore conclude that lymphocyte metaphases may possibly be used to identify individuals predisposed to develop colorectal neoplasia.²

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DETECTION OF p53 ALTERATIONS, OCCURRENCE OF SECOND MALIGNANT NEOPLASMS, AND FAMILY HISTORY OF CANCER IN PATIENTS WITH ASTROCYTOMAS. Melissa Bondy, PhD., Koji Oka, PhD, Janet Bruner, MD, Hideyuki Saya, MD, PhD

Alterations of the p53 tumor suppressor gene have been associated with astrocytomas and a wide variety of other tumors. This study evaluated whether family history of cancer or other clinical characteristics such as age, sex, occurrence of second primary malignancies or histology were associated with tumor p53 alterations. We obtained tumors from 16 patients with gliomas and evaluated loss of tumor heterozygosity (LOH) of the p53 gene using PCR-RFLP analysis. We contacted the patient's families and obtained a detailed family history of cancer for all of their first (parents, siblings, and offspring) and second-degree relatives (aunts, uncles and grandparents). Since 2 of the 16 patients were from outside the U.S. it was impossible to obtain their family history. We found that a high proportion of the tumors had LOH of p53 (9/14) and overexpressed an abnormal p53 protein. Of the 14 patients we contacted, 7 (50%) reported having at least one first-degree relative affected with cancer, and LOH of the p53 gene was a significant indicator of family history in 5 of the patients. For 4 of the 14 patients, the brain tumor was the second malignant neoplasm, and all of those cases showed p53 LOH. None of the other clinical characteristics were associated with p53 LOH. Although these results are descriptive, and the numbers are small, they suggest genetic heterogeneity may be related to p53 mutations and that p53 may play a critical role in development of astrocytomas and may increase the risk of a second malignant neoplasms.

Predictive Testing for Germ Line p53 Mutations in Li-Fraumeni Syndrome Kindreds. Garber JE, M.D., Patenaude AF, Ph.D., Diller LR, M.D., Friend SH, M.D., Li FP, M.D.

Li-Fraumeni Syndrome (LFS) is a familial cancer syndrome of diverse neoplasms at young ages.¹ Alterations in the germ line p53 gene have been shown to be the basis for cancer susceptibility in some of these families² and in some cancer patients without a history suggestive of LFS. Analysis of germ line p53 provides a marker of cancer susceptibility, and the ability to identify a population at extremely high risk of developing several types of cancer, including breast cancer and pediatric tumors.

We have designed a program for predictive testing (evaluation of potential carriers who have never had cancer) for p53 alterations in unaffected members of LFS kindreds. Based on the Huntington Disease model, the program includes psychological assessment, genetic counseling and education about LFS, implications of positive and negative results and potential influence of test results on insurability, family relationships and life choices. After disclosure of results, counseling is provided regarding avoidance of carcinogens and physician/patient education about cancer risk and a program of surveillance is recommended.

As new cancer genes are identified, predictive testing is likely to become more common. We must anticipate the resultant needs for support, education, and counselling to facilitate the ultimate goal of cancer prevention in these extremely high risk individuals.

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2. Malkin D, Li FP, Strong LC, et al. Germ line p53 mutations in a familial syndrome of breast cancer, sarcomas, and other neoplasms. *Science* 250:1233, 1990.

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ADP-ribose Transferase as Biomarker for Breast Cancer Risk Assessment. Jennifer J. Hu, Marianne Berwick, *Neil Dubin, and George C. Roush. Cancer Prevention Research Institute, *New York University Medical Center, New York, NY.

Previous studies by different laboratories have suggested that human NAD-dependent ADP-ribose transferase (ADPRT) is involved in a variety of important biological functions: DNA replication, DNA repair, cell transformation, and differentiation. The measurement of ADPRT activity induced by hydrogen peroxide in human mononuclear leukocytes (HMLs) has been implicated in cancer risk assessment. Decreased ADPRT activities have been associated with cancer of the colon, lung and breast. Our laboratory has focused its application on human risk assessment and possible intermediate biomarkers for cancer intervention studies. We have studied the factors which may contribute to inter-individual variation in ADPRT activities. Preliminary data suggest that inter-individual variation of ADPRT activities is closely correlated with the difference from HMLs but not from the plasma; however, plasma contributes some variation to the enzyme assay. Whether the factors present in HMLs or plasma may reflect cancer susceptibility requires further investigation. We have also evaluated a more direct measurement of ADPRT by stimulating the cells with a short double stranded oligonucleotide, namely EcoRI linker. The newly developed assay can eliminate the problem of an individual differential responses to H₂O₂ due to varying levels of endogenous antioxidant systems. Preliminary results have demonstrated a 2-3 fold difference in ADPRT activities among normal individuals. The comparison of ADPRT activities measured by the newly developed method as opposed to the routine measurement by H₂O₂ activation should be useful in determining which is the more valuable biomarker for breast cancer susceptibility.

43 OCCUPATION, ETHNICITY AND BLADDER CANCER RISK. H. ANTON-CULVER Ph.D., A. LEE-FELDSTEIN Ph. D. AND T. H. TAYLOR Ph.D.

The purpose of this study is to examine patterns of bladder cancer incidence by ethnic group, and to estimate the increased risk associated with occupation and smoking. This case-control study includes 1470 bladder cancer cases from a population-based cancer registry and a population-based control group. Males in machine trades and processing occupations had estimated relative risks of .28 ($p < .01$) and .65 ($p < .01$) respectively; and females in machine trades and housewives had estimated relative risks of 8.7 ($p < .01$) and 5.3 ($p < .01$) respectively when compared to professional/technical/managerial occupations. The incidence rate for non-Hispanic whites was twice the rate for Hispanics and Asian/Pacific Islanders. Within each ethnic group the male to female ratio was 4:1. This observation may indicate biological differences in the etiology of bladder cancer between the two sexes which have not yet been identified. In comparison to non-smokers male current smokers were 4 times as likely ($p < .01$) and female current smokers were 3.1 times as likely ($p < .01$) to develop bladder cancer. Among both male and female current smokers an increasing relative risk was associated with increasing amount smoked per day. Our data confirm the association of bladder cancer risk with smoking (1) and identify and measure associations between occupation and bladder cancer (2).

1. D'Avanzo B, et al. Cigarette smoking and bladder cancer. *Eur J Cancer* 1990;26:714-8.
2. Silverman DT, et al. Occupational risks of bladder cancer in the United States: I. White men. *JNCI* 1989;81:1472-9.

42 Measurement of ADPRT Activity in Human Mononuclear Leukocytes with and without Plasma. Berwick M, Hu J, Pero R, Roush GC. Cancer Prevention Research Institute, 36 E. 22nd Street, N.Y.C.

Variations in the DNA repair process could lead to cancer susceptibility in humans. Adenosine diphosphate ribosyl transferase (ADPRT) in human mononuclear leukocytes reflects DNA repair and has been reported as inversely related to cancer (1, 2). In a study designed to distinguish the effects of plasma solutions on levels of ADPRT, samples of blood were obtained from 26 women 55 years of age or older with breast cancer, benign breast disease, or with no complaint related to the breast. Standard assays for both activated and constitutive ADPRT were conducted on duplicate samples using both 1 percent and 0 percent plasma. In every instance, the ADPRT at 1% plasma was higher than the ADPRT at 0% plasma. The mean of the activated ADPRT at 1% plasma was 4061 (s.e. 2130), while the mean at 0% plasma was 2737 (s.e. 2026). Data were then analyzed for inter-individual variation using analysis of variance, calculating the intra-class correlation coefficient (ICC).

The plasma effect on ADPRT was highly significant statistically. Compared to ADPRT values for either 0% or 1% plasma, the plasma effect of ADPRT explained nearly as much of the differences among the 26 participants (e.g., 68% vs. 98% and 94% for activated ADPRT).

While Pero has published data showing that plasma affects ADPRT levels, this is the first time that the effects of plasma on individual differences have been quantitated, suggesting an important plasma effect on this DNA repair enzyme.

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- (2) Roush GC, Lund-Pero M, Powell J, Pero RW. Family history of cancer and adenosine diphosphate ribosyl transferase (ADPRT). 1990. (unpublished manuscript).

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Prostate Cancer Incidence Rates: Effect of Race and Urologist Density. Paskett ED, Case DL, Konen JC. Black men in North Carolina have the highest mortality rate from prostate cancer in the nation. We examined 1990 tumor registry incidence data for prostate cancer in men over age 60 in 8 counties in North Carolina to investigate 1) racial differences in incidence rates by the proportion of black men in each county, and 2) the relationship of incidence rates to the number of urologists in the county per 1,000 men aged 60 and older. A total of 1,240 cases were abstracted, with 14% of the cases occurring in black men. Our analyses were restricted to those six counties in which we had obtained complete reporting of all incident cases for 1990. Contrary to earlier studies [1,2] there was no relationship between incidence rates and availability of urologists in a county. We also found higher incidence rates among black men compared to white men in counties with a higher proportion of black men over age 60 ($p=.05$). The results imply that prostate cancer incidence rates are related more to socioeconomic factors than race and are not due to detection biases associated with urological procedures.

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2. Konen JC. Master of Science in Public Health; Thesis: The Relationship Between the Incidence of Prostate Cancer and the Distribution of Urological Practices in Utah. University of Utah, 1984.