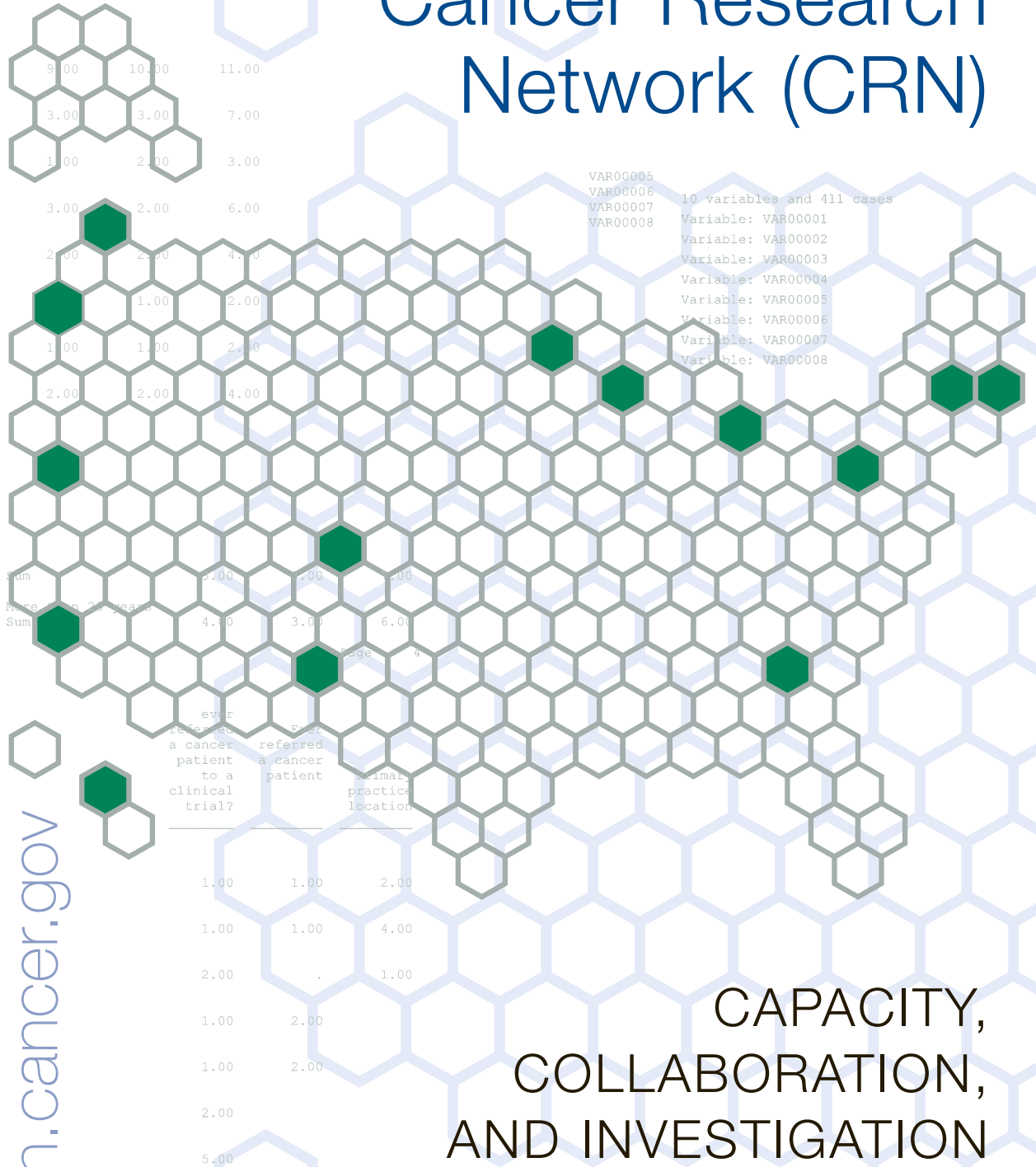


# The HMO Cancer Research Network (CRN)



<http://crn.cancer.gov>

## CAPACITY, COLLABORATION, AND INVESTIGATION

APRIL 2010 UPDATE



# The HMO Cancer Research Network (CRN)

CAPACITY,  
COLLABORATION,  
AND INVESTIGATION



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# LIST OF ABBREVIATIONS

- ACOSOG** = American College of Surgeons Oncology Group
- AHRQ** = Agency for Healthcare Research and Quality
- ARRA** = American Recovery and Reinvestment Act
- BCSC** = Breast Cancer Surveillance Consortium
- caBIG®** = Cancer Bioinformatics Grid
- CanCORS** = Cancer Care Outcomes Research and Surveillance Consortium
- CCRC** = Cancer Communication Research Center
- CDC** = Centers for Disease Control and Prevention
- CECCR** = Center of Excellence in Cancer Communication Research
- CER** = Comparative Effectiveness Research
- CERT** = Center for Education and Research in Therapeutics
- CISNET** = Cancer Intervention and Surveillance Modeling Network
- CRN** = Cancer Research Network
- cTAKES** = Clinical Text Analysis and Knowledge Extraction System
- CTSU** = Cancer Trials Support Unit
- CVRN** = Cardiovascular Research Network
- DCIS** = Ductal Carcinoma *in situ*
- ECOG** = Eastern Cooperative Oncology Group
- EMR** = Electronic Medical Record
- FDA** = Food and Drug Administration
- GHC** = Group Health Cooperative  
(Group Health Research Institute)
- GHS** = Geisinger Health System  
(Geisinger Center for Health Research)
- GO Grant** = Grand Opportunity Grant
- HFHS** = Henry Ford Hospital and Health System/  
Health Alliance Plan  
(Department of Biostatistics and Research  
Epidemiology and Center for Health Services Research)
- HIPAA** = Health Insurance Portability and Accountability Act
- HMORN** = Health Maintenance Organization Research Network
- HPHC** = Harvard Pilgrim Health Care Institute  
and Harvard Medical School  
(Department of Population Medicine)
- HPRF** = HealthPartners  
(HealthPartners Research Foundation)
- HPV** = Human Papillomavirus
- IRB** = Institutional Review Board
- KPCO** = Kaiser Permanente Colorado  
(Institute for Health Research)
- KPG** = Kaiser Permanente Georgia  
(Center for Health Research–Southeast)
- KPH** = Kaiser Permanente Hawaii  
(Center for Health Research–Hawaii)
- KPNC** = Kaiser Permanente Northern California  
(Division of Research)
- KPNW** = Kaiser Permanente Northwest  
(Center for Health Research–Northwest)
- KPSC** = Kaiser Permanente Southern California  
(Department of Research and Evaluation)
- LCF** = Lovelace Health System  
(Lovelace Clinic Foundation Research)
- MCRF** = Marshfield Clinic/Security Health Plan  
(Marshfield Clinic Research Foundation)
- MPCI** = Fallon Community Health Plan  
(Meyers Primary Care Institute)
- NCI** = National Cancer Institute
- NHGRI** = National Human Genome Research Institute
- NHLBI** = National Heart, Lung and Blood Institute
- NIH** = National Institutes of Health
- NLP** = Natural Language Processing
- NLST** = National Lung Screening Trial
- NSABP** = National Surgical Adjuvant Breast and Bowel Project
- PA** = Program Announcement
- PLCO** = Prostate, Lung, Colorectal and Ovarian Cancer  
Screening Trial
- RFA** = Request for Applications
- RTOG** = Radiation Therapy Oncology Group
- SEER** = Surveillance Epidemiology and End Results
- SELECT** = Selenium and Vitamin E Cancer Prevention Trial
- SIG** = Scientific Interest Group
- SWOG** = Southwest Oncology Group
- VDW** = Virtual Data Warehouse
- WHI** = Women's Health Initiative

The utilization of health care systems as a platform for basic, clinical, and population sciences research is a central component of the National Cancer Institute's (NCI) strategic vision. In the 11 years since the HMO Cancer Research Network (CRN) was initiated as a cooperative agreement, the network has provided a framework for leading and working with others to address some of the most perplexing cancer research challenges.

The CRN has evolved to encompass research organizations affiliated with 14 large health care delivery systems covering nearly 11 million individuals, conducted dozens of joint research projects, and published over 175 peer-reviewed papers. It has become a national cancer research resource through increased support for data standardization and dissemination that facilitates collaboration with researchers outside the network.

Originally conceived as a "population laboratory" centered in community-based health care systems, the CRN is able to harness these organizations' data and health information systems, as well as their clinical staff and enrolled populations to conduct cancer etiology, epidemiology, and health services research. It allows for large, multicenter, multidisciplinary intervention research that addresses the spectrum of cancer control, including studies of prevention, early detection, treatment, survivorship, surveillance, and end-of-life care. The CRN is also uniquely positioned to study the quality of cancer care in community-based settings.

The generation of new research ideas is a core value of the CRN, and partnership is at the heart of every project. Through innovative research initiatives, strong leadership, and teamwork with top cancer experts across the country, the network has come to stand as a model for data sharing and collaborative research.

This publication was conceived as an important tool for laying out the CRN's goals and challenges by describing the CRN's research agenda, accomplishments, capacity, and future research potential as well as serving as a "user's guide" for potential collaborators. It is our hope that readers will gain a greater understanding of how to become partners in this scientific community, how to work successfully with CRN members, and how to utilize the CRN's unique research resources and scientific expertise. Readers will then have a greater capacity to undertake research projects that will both benefit the research community and advance knowledge crucial to the progress of cancer control in the United States.

I thank the many colleagues and investigators involved in the CRN, and our partner, the Agency for Healthcare Research and Quality, for their expertise, dedication, and enthusiasm in ensuring that the CRN continues to respond to NCI's priorities for the diffusion of cancer care innovations into practice and health services.

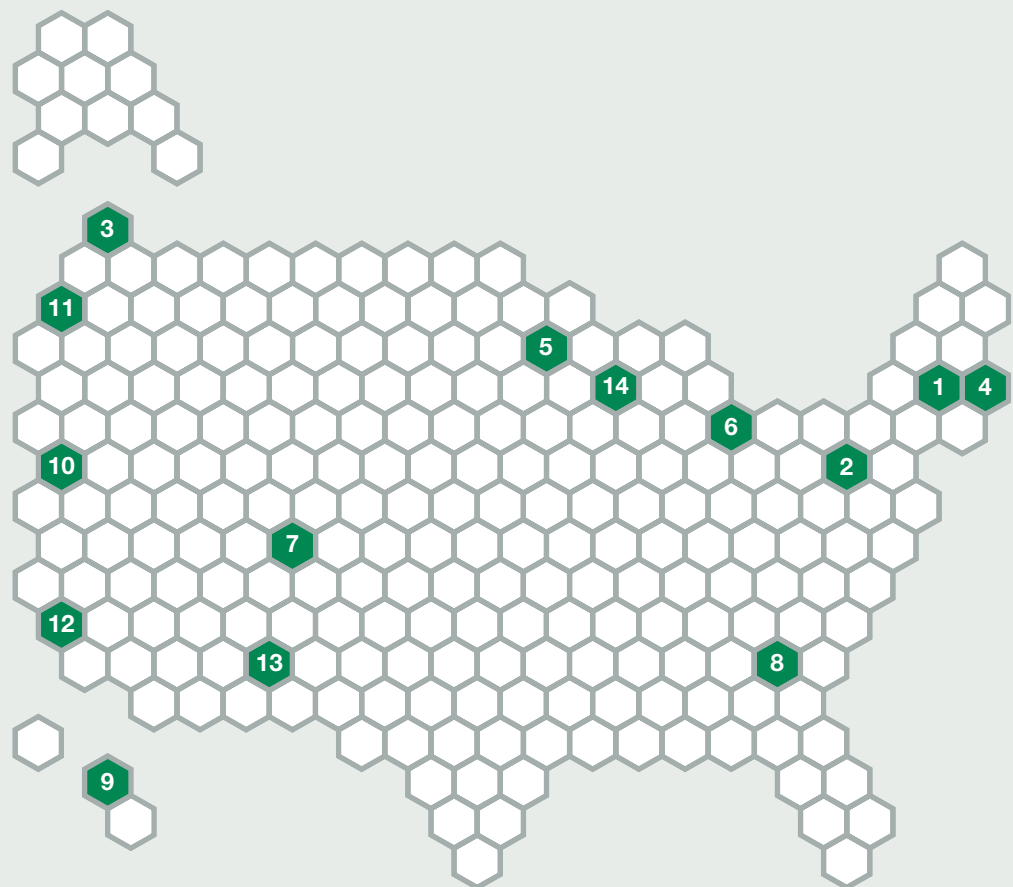


Robert T. Croyle, Ph.D.

*Director, Division of Cancer Control and  
Population Sciences  
National Cancer Institute*

OVERVIEW

Cancer Research Network Sites & Participating Delivery Systems



- |  |  |  |
|--|--|--|
| <p><b>1 Fallon Community Health Plan,</b><br/>Meyers Primary Care Institute (<b>MPCI</b>)</p> <p><b>2 Geisinger Health System,</b><br/>Geisinger Center for Health Research (<b>GHS</b>)</p> <p><b>3 Group Health Cooperative,</b><br/>Group Health Research Institute (<b>GHC</b>)</p> <p><b>4 Harvard Pilgrim Health Care Institute and Harvard Medical School,</b><br/>Department of Population Medicine (<b>HPHC</b>)</p> <p><b>5 HealthPartners,</b><br/>HealthPartners Research Foundation (<b>HPRF</b>)</p> | <p><b>6 Henry Ford Hospital and Health System/Health Alliance Plan,</b><br/>Department of Biostatistics and Research Epidemiology and Center for Health Services Research (<b>HFHS</b>)</p> <p><b>7 Kaiser Permanente Colorado,</b><br/>Institute for Health Research (<b>KPCO</b>)</p> <p><b>8 Kaiser Permanente Georgia,</b><br/>The Center for Health Research-Southeast (<b>KPG</b>)</p> <p><b>9 Kaiser Permanente Hawaii,</b><br/>The Center for Health Research-Hawaii (<b>KPH</b>)</p> <p><b>10 Kaiser Permanente Northern California,</b><br/>Division of Research (<b>KPNC</b>)</p> | <p><b>11 Kaiser Permanente Northwest,</b><br/>The Center for Health Research-Northwest (<b>KPNW</b>)</p> <p><b>12 Kaiser Permanente Southern California,</b><br/>Department of Research and Evaluation (<b>KPSC</b>)</p> <p><b>13 Lovelace Health System,</b><br/>Lovelace Clinic Foundation Research (<b>LCF</b>)</p> <p><b>14 Marshfield Clinic/ Security Health Plan,</b><br/>Marshfield Clinic Research Foundation (<b>MCRF</b>)</p> |
|--|--|--|

**The Cancer Research Network (CRN) is a consortium of 14 non-profit research centers based in large, integrated health care delivery organizations. Collectively, these organizations provide care to nearly 11 million individuals.**

To achieve its scientific goals, the CRN fosters collaborations among CRN investigators and with investigators and research institutions outside of the CRN member organizations.

The CRN is funded through a National Cancer Institute (NCI) cooperative agreement grant that ensures substantial NCI involvement in attaining research goals and catalyzing new collaborations. The Agency for Healthcare Research and Quality (AHRQ) also supports the CRN, especially in the area of protecting research data for the purposes under which they were originally collected.

CRN research focuses on examining the characteristics of patients, families, clinicians, communities, and healthcare systems that lead to the best possible outcomes in cancer prevention, treatment, survivorship, and end-of-life care. The CRN also develops and uses standardized

approaches to data collection, data management, and analyses across health systems. By starting from the foundation of integrated health care delivery systems with defined populations and comprehensive health informatics systems, the CRN is able to measure complete episodes of all types of care, including prevention, screening, diagnosis, treatments (neoadjuvant, primary, adjuvant), surveillance for metastases and recurrence, secondary preventive care, and end-of-life care.

### Beginnings

In 1997, the National Cancer Institute (NCI) issued a Request for Applications (RFA) entitled “Cancer Research Network Across Health Care Systems.” In doing so, it acknowledged the need for data from representative populations with lengthy follow-up periods and a comprehensive range of patient information to examine important questions about prevention, diagnosis, treatment, long-term outcomes, costs, and other issues important to cancer care delivery, cancer patients, and overall health. By virtue of their organized care structures, defined populations, and extensive data systems, health maintenance organizations (HMOs) were seen as promising venues and as a strategic resource to address unmet research needs. Previously, comprehensive health care utilization and cost information related to cancer prevention and care was largely limited to the NCI-supported Surveillance

Epidemiology and End Results (SEER)–Medicare linked data for non-HMO cancer patients aged 65 and older. However, NCI envisioned a research network that would include population-based data for people younger than 65 and those at risk for cancer, including children. The CRN’s response to the RFA grew out of discussions among leaders of the established HMO Research Network (HMORN) and now includes 14 of the 16 HMORN members, all of which have an established program in cancer research and are based in integrated healthcare delivery systems.

### CRN1: 1999–2003

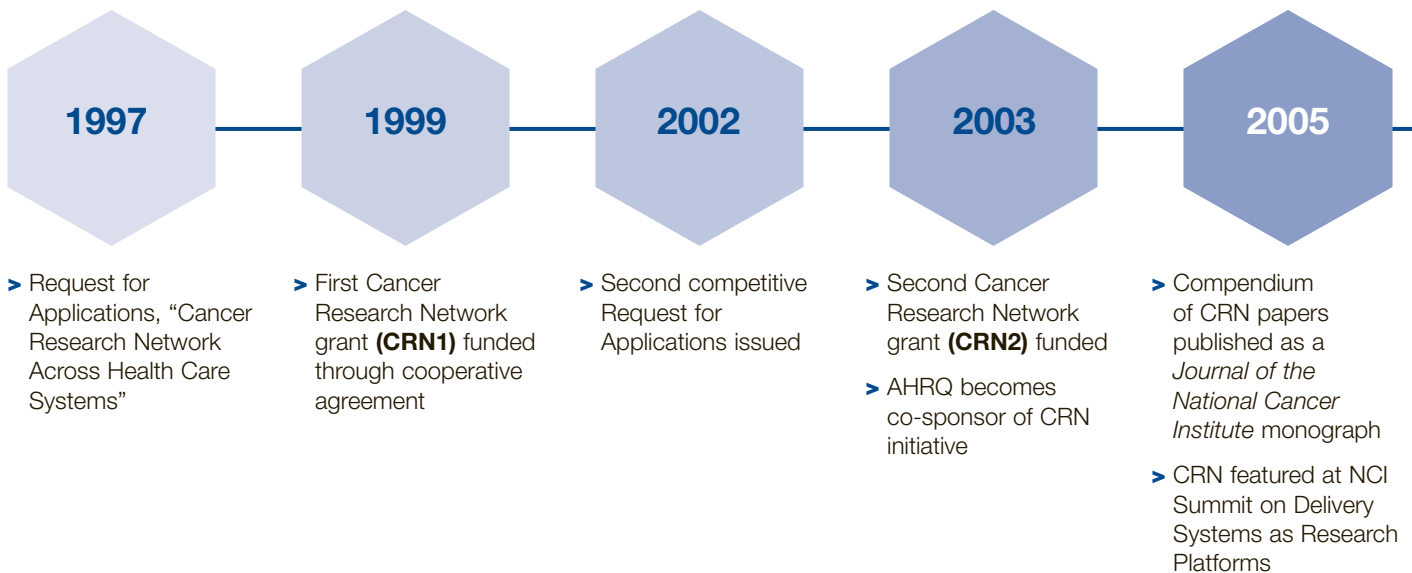
The first CRN grant cycle (CRN1) included 10 funded sites and one affiliate site. CRN1 aimed to improve the effectiveness of cancer prevention and care through research that identified system, provider, and patient factors affecting outcomes. The CRN’s initial core research projects focused on three areas paramount to cancer control: effectiveness of breast and cervical cancer screening in community practice; extent of adherence to tobacco control guidelines at the system, provider, and patient levels; and efficacy of prophylactic mastectomy and early screening among women at increased risk for breast cancer. Several administrative supplements, R01 grants, and other funded projects added to the CRN’s initial research portfolio.

## CRN2: 2003–2007

The second CRN grant cycle (CRN2) included 11 funded sites and two affiliate sites. Core research projects included in CRN2 broadened the scope of the original investigations to include randomized trials examining the use of electronic medical records (EMRs) to improve adherence to tobacco control guidelines, and the effectiveness of an individually tailored, Web-based program to promote daily fruit and vegetable consumption. A third project studied the clinical and pathologic predictors of recurrence among women with ductal carcinoma in situ (DCIS). As with the previous

grant, several supplements, R01 grants, and pilot funds augmented the core research, including a multi-center study of pancreatic cancer etiology and several information technology studies aimed at improving the research capacity of the CRN’s data and informatics resources. The Virtual Data Warehouse (VDW), a pivotal tool to facilitate multi-site cancer research through development of standardized, interoperable data files across multiple CRN sites, was a key product of CRN2. In addition, the DCIS and pancreatic cancer

projects expanded CRN’s scientific agenda to include linking of biomarker examinations with population-based studies. CRN2 was also marked by formal collaborations with cancer centers and increased efforts to support the professional development of junior investigators through mentorship and availability of pilot funds for small studies.



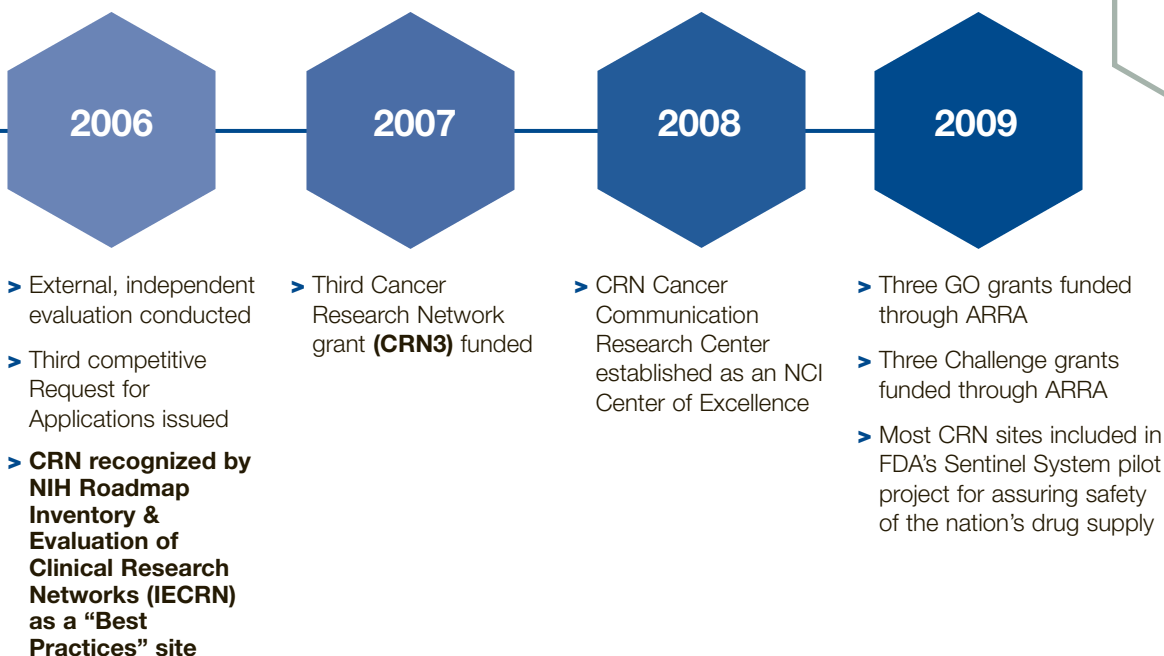


## CRN3: 2007–2012

The third CRN grant cycle (CRN3) includes 14 funded sites. Activities in CRN3 involve increasing collaboration with external researchers, research institutions, and networks outside the CRN member organizations; further development of standardized data resources, particularly informatics; increasing support and focus on career development for junior investigators through a formalized CRN Scholars Program; and the initiation of a pilot grant program with more funding opportunities than during CRN2. In addition, core research projects are investigating the economic burden of cancer, developing and testing measures of oral health literacy, and examining the potential for applying metrics to

assess the quality of preventive care for cancer. With its emphasis on data infrastructure and collaborative capacity, CRN3 also provides an ideal research platform for addressing the newly emerging area of Comparative Effectiveness Research (CER). In 2009, CRN investigators and collaborators successfully competed for multiple CER grants, including three NCI Grand Opportunity (GO) grants to support initial development of Centers for CER in the areas of screening, treatment, and genomic medicine and three NCI Challenge grants in the areas of data

development using natural language processing, effectiveness of hormonal therapy for localized prostate cancer, and improving surgical quality for breast cancer. The success of the CRN has inspired other NIH Institutes to adopt and replicate this model for their own research needs.





## RESEARCH THEMES

In 2008, scientists from the National Institutes of Health (NIH) and the CRN, advisors, non-CRN cancer researchers, and patient advocates participated in a concept mapping process to identify scientific priorities for the CRN. The following eight CRN priority research themes that emerged from this exercise, although not exclusive, include most of the CRN's current work, as well as areas of particular interest for future research.

### **Health Care Delivery, Quality, Costs, and Outcomes**

Examining the influence of alternate health care delivery processes on quality, cost, and outcomes is a key foundation of CRN research centers. Studies in this area address the nature and quality of services for cancer prevention, screening, treatment, supportive care, and survivorship care, and their impacts on health outcomes and costs. The relatively large number of clinical sites and the size and diversity of CRN patient populations facilitate studies of practice variation and disparities in care and outcomes, as well as intervention studies.

### **Health Insurance Benefit Design and Patterns of Care Utilization**

Innovations in benefit structure that improve care can be advanced with research that examines the relationships among patients' benefit design, in the form of cost sharing or out-of-pocket costs for medical services (e.g., copayments, coinsurance, deductible rates); patient use of cancer prevention, screening, and treatment services; and outcomes.

### **Cancer Epidemiology, Prevention, and Health Promotion**

The CRN consists of large and diverse populations for conducting cross-sectional, case-control, cohort, and randomized controlled intervention studies to examine numerous cancer-related conditions, including rare outcomes. Studies of health promotion strategies, lifestyle changes, and risk factor assessment and identification all benefit from being conducted in the HMO setting. This setting enhances the ability to define populations to facilitate recruitment and follow-up, work with the health care system to improve retention of study participants, and provide detailed information on medical care and comorbid conditions that may impact patient outcomes of interest.

### **Enhancing Cancer Communication and Decision-Making**

With its extensive data on patients, providers, health care delivery, and patient outcomes, a key CRN strength is the capacity to examine and optimize the quality of patient communication and decision-making about cancer screening, diagnosis, treatment, and survivorship in diverse populations. CRN studies in this area examine a wide range of issues—from shared clinical decision-making to Web-based consumer information.

### **Dissemination and Implementation Research in Cancer Prevention, Screening, and Treatment**

The CRN's population size, diversity, and data resources provide rich opportunities to study cancer prevention and care in different care settings, patient populations, and regions of the country over time. Of particular interest are studies of the introduction of new diagnostic and treatment modalities and their diffusion into practice, as well as the conduct of pharmacoepidemiologic and pharmacogenomic studies of the effectiveness of cancer drugs and related prognostic markers as delivered in community practice.

### **Psychosocial Factors and Burden of Cancer**

Factors such as education, financial assets, literacy, psychosocial distress, and costs of treatment have an impact on cancer care, patient outcomes (such as quality of life), and patient care experiences. Studies that characterize these effects are the basis for identifying and developing interventions to ameliorate them. Examining disparities in cancer access, outcomes, and treatment, as well as in the effectiveness of psychosocial interventions for cancer patients, are priority research areas.

### **Data Resources and Infrastructure**

CRN member organizations have electronic medical records (EMRs), patient Web sites with secured communication access to providers, and rich arrays of current and historical electronic data on enrollee populations. A major priority is the continued improvement of the CRN standardized data infrastructure and the development and testing of research, surveillance, and medical practice innovations built upon EMRs, patient Web portals, computer-based physician order entry systems, and automated records of complete health service utilization.

### **Building Capacity to Support Emerging Areas of Cancer Control Research**

CRN investigators and health care organizations have tremendous potential to advance research activities to develop, enhance, and test health informatics, database, and biospecimen tools and resources to support research in areas such as cancer risk assessment and modeling; studies of behavioral, environmental, and genetic factors; and personalized health care approaches to preventive care, screening, diagnosis/prognosis, and treatment. In addition, the CRN aims to develop activities to increase the timeliness, efficiency, and effectiveness of recruitment to phase 2 and phase 3 prevention and treatment trials.



## COMPARATIVE EFFECTIVENESS RESEARCH (CER)

Recently, comparative effectiveness research (CER) has emerged as a national priority. Much of the previous and emerging CRN research has been focused in this area, and it remains a high priority within the Network.

### What is CER?

CER is the conduct and synthesis of research comparing the benefits and harms of interventions and strategies to prevent, diagnose, treat, and monitor health conditions in “real world” settings. The purpose of this research is to improve health outcomes by developing and disseminating evidence-based information to patients, clinicians, and other decision-makers, responding to their expressed needs about which interventions (e.g., medications, procedures, medical and assistive devices and technologies, diagnostic testing, behavioral change, delivery system strategies) are most effective for which patients under specific circumstances.

CER is generally conducted using:

- Randomized controlled clinical trials
- Observational studies of retrospective and prospective cohorts, including secondary data analysis of registries and linked databases
- Simulation modeling

As part of the 2009 American Recovery and Reinvestment Act (ARRA), the Department of Health and Human Services received \$400 million to invest in CER. CRN sites and their collaborators successfully competed for ARRA funds, resulting in almost \$10 million in additional awards. Most of these additional dollars will be used to conduct CER studies. The CRN continues to respond to federal funding announcements to work on CER-related studies.

### CER in the CRN

Much of the work that the CRN has conducted in CER to date has been through observational studies, particularly secondary data analyses or primary data collection enhanced with secondary data. In moving forward, however, the CRN is committed to developing infrastructure to conduct prospective, pragmatic clinical trials in CER, which will likely emerge as critical tools for evidence-based decision-making. The CRN is ideally poised to develop such an infrastructure in the integrated health care delivery setting that will allow investigators to rapidly and efficiently mount trials that address real-world questions in population laboratory models.

*The HMO Research Network, a consortium of large health maintenance organizations... may serve as a model for its capacity to implement studies and capture data within the context of usual care.*

Sean R. Tunis; Daniel B. Stryer; Carolyn M. Clancy. Practical Clinical Trials: Increasing the Value of Clinical Research for Decision Making in Clinical and Health Policy. *JAMA*. 2003;290(12):1624–1632.

## ARRA Funding for CER Projects

The following two-year projects pertaining to CER were proposed by CRN investigators and funded by NIH using 2009 ARRA funds:

### Research on the Effectiveness of Advanced Cancer Treatments (REACT)

Principal Investigators: Jane C. Weeks (Dana-Farber Cancer Institute) and Debra Ritzwoller (KPCO); CRN Sites: KPCO, KPG, KPNC, KPNW, GHC; Non-CRN Site: Dana-Farber Cancer Institute

This project will use the CRN VDW and other large databases to evaluate alternative therapeutic approaches for patients with advanced cancer, and to build capacity within the CRN to conduct large, efficient prospective CER trials.

### Comparative Effectiveness in Genomic and Personalized Medicine for Colon Cancer

Principal Investigators: Katrina Goddard (KPNW), Evelyn Whitlock (KPNC), and Lawrence Kushi (KPNC); CRN Sites: KPNW, HFHS, HPRF, KPCO, KPH, KPNC, MCRF, KPH, KPG; Non-CRN Sites: Georgetown University, Oregon Health & Sciences University

This project will use primary and secondary data to investigate the comparative effectiveness of two tests related to colorectal cancer, the KRAS test and the Lynch syndrome prediction test, and will evaluate the utilization of these tests.

### SEARCH: Cancer Screening Effectiveness and Research in Community-based Healthcare

Principal Investigators: Diana Buist (GHC) and Chyke Doubeni (MPCI); CRN Sites: GHC, GHS, HPRF, KPH, KPNC, KPNW, GHS, MCRF, MPCI; Non-CRN Sites: University of Massachusetts, University of Washington

This project will study effective cancer screening delivery approaches to enhance colorectal and cervical cancer detection, diminish morbidity and other adverse effects, and reduce mortality; develop a stronger CRN collaboration with the NCI-sponsored Cancer Intervention and Surveillance Modeling Network (CISNET); and, develop methodological capacity for future large-scale, population-based CER studies in the area of cancer screening to address important evidence gaps.

### Natural Language Processing for Cancer Research Network Surveillance

Principal Investigator: David Carrell (GHC); CRN Sites: GHC, HFHS; Non-CRN Sites: University of Pittsburgh Medical Center, Vanderbilt University, Mayo Clinic

This project will develop new measurement technologies for extracting disease and treatment information from text data available in EMRs to advance epidemiologic and clinical breast cancer research and will develop an algorithm to identify recurrent breast cancer diagnoses.

### Improving Breast Cancer Surgery Quality through a Collaborative Surgery Database

Principal Investigator: Laurence McCahill (Van Andel Research Institute); CRN Sites: GHC, KPCO, MCRF; Non-CRN Sites: Van Andel Research Institute, University of Vermont

This project will develop a breast cancer surgery outcomes database enabling CER studies to be conducted, particularly as related to current controversies in the management of breast cancer, such as an appropriate pathologic margin of clearance in partial mastectomies, which can be used to improve outcomes and reduce health care costs.

### Cost-Effectiveness of Hormonal Therapy for Clinically Localized Prostate Cancer

Principal Investigators: Stephen K. Van Den Eeden (KPNC), Marianne Ulcickas Yood (HFHS), and Arnold Potosky (Georgetown University); CRN Sites: KPNC, HFHS; Non-CRN Site: Georgetown University

This project will provide information on the risks and potential benefits of immediate androgen deprivation therapy in men diagnosed with localized prostate cancer, and will help to estimate costs, calculate the cost-effectiveness, and determine the cost-utility of this treatment.





## COLLABORATING WITH THE CRN

Visit the CRN Web site (<http://crn.cancer.gov>) to learn about CRN data resources and research priorities, and to see how well they fit your research interests and data needs.

If you are interested in collaborating with the CRN, you will need to complete the Web inquiry form found on the CRN Web site. This form is used to describe:

- Any current or previous involvement with the CRN
- A statement of your main research questions and hypotheses
- The nature of the data needed from the CRN to address your research questions
- A description of your project team or potential collaborators
- An estimated timeline for proposal development and submission
- The type of proposal you are planning to submit (e.g., an NIH R01), and whether it is in response to a particular Request for Applications (RFA) or Program Announcement (PA)

The Principal Investigator's office will connect you with appropriate partners at one or more CRN sites or affiliates to determine whether your interests and/or data needs align with the CRN.

Promising collaborations generally lead either directly to the development of a research proposal, or to participation by external collaborators in a CRN Scientific Interest Group (SIG). The CRN has developed guiding principles for initiating and participating in CRN SIGs, which are forums that enable investigators interested in a particular topic to discuss research interests and ideas.

For collaborations leading to proposals, the following resources assure effective communication and increase the likelihood of a successful proposal.

- The CRN New Proposals Committee has outlined policies and procedures for reviewing and submitting new collaborative proposals. The Committee assesses feasibility, potential for overlap with existing projects, and appropriateness of the CRN as the setting to answer your research questions.

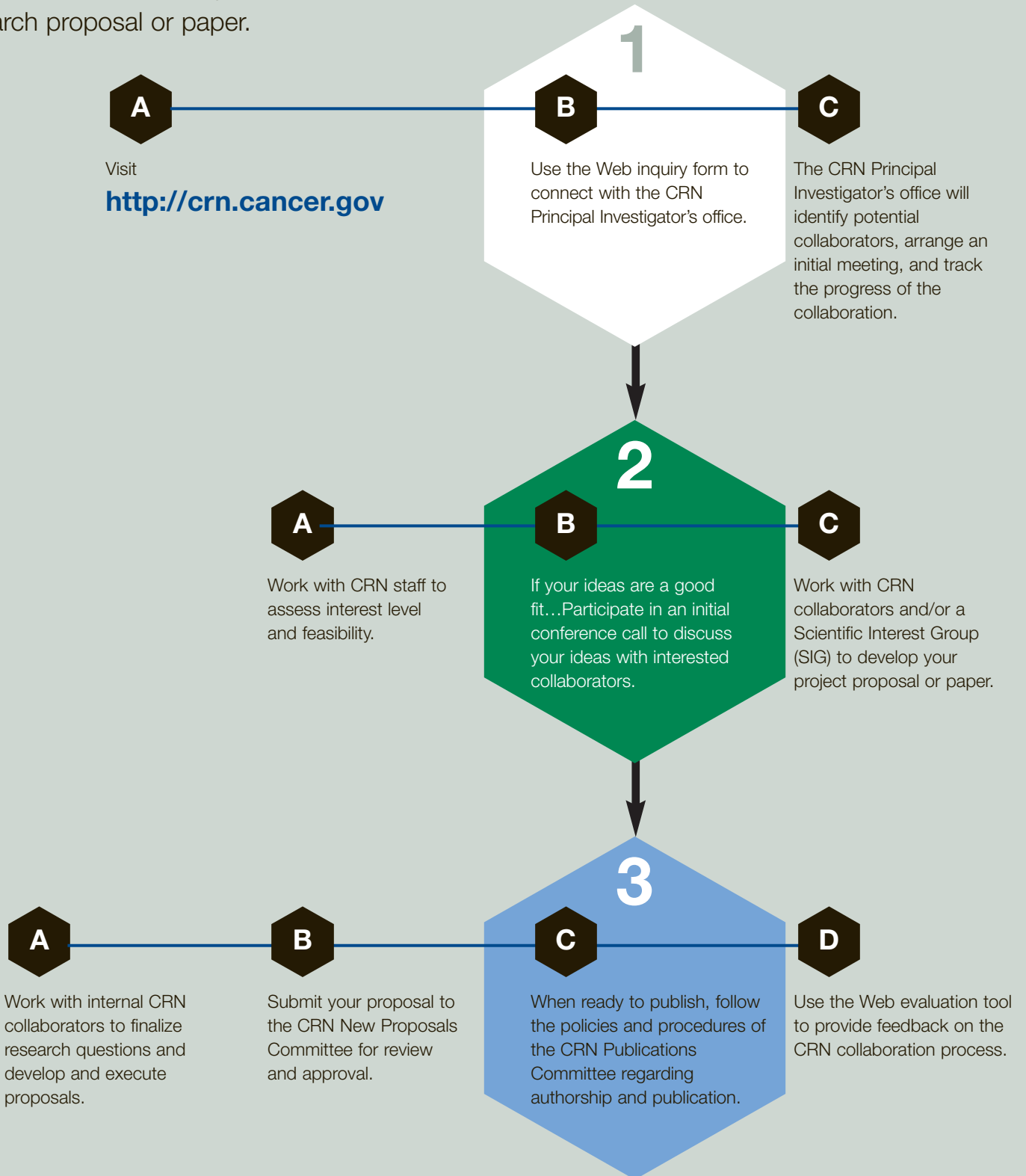
- Experienced CRN investigators are available for direct involvement in all aspects of the research, including research design, conduct, analysis, and dissemination.
- CRN sites contributing data to your project will review and comment on your research proposal.
- The CRN Publications Committee has outlined policies and procedures for authorship and publication of CRN-related research.

*This has been an outstanding opportunity to broaden our collaborations with researchers beyond the University and to connect our faculty to populations for the study of cancer. From the Cancer Center's perspective, our clinicians (in particular) will have new opportunities to study various aspects of cancer prevention, early detection, treatment, and survivorship questions.*

DeAnn Lazovich, Ph.D., Associate Professor, Division of Epidemiology and Community Health, University of Minnesota

## Collaboration at a Glance

A successful collaboration involves sharing ideas, aligning with CRN priority areas of research, and developing an innovative research proposal or paper.





## EXAMPLES OF CRN COLLABORATIONS

**T**he CRN recognizes the critical importance of growth through collaboration with both internal and external research partners and has made this a high priority since its inception.

Collaboration with external partners, such as affiliated cancer centers, other academic institutions, research consortia and networks, and NCI researchers has enabled the CRN to initiate studies that might not have otherwise been possible. Fruitful collaborations among large, established entities require thoughtful negotiation and recognition of the interpersonal, technical, and financial considerations of all parties. The CRN has developed a large knowledge base on how to successfully collaborate with other groups, as evidenced by the myriad partnerships in which they are engaged.

### Collaboration with Cancer Centers

The NCI-designated Cancer Centers are a major source of discovery regarding the nature of cancer and the development of more effective approaches to cancer prevention, diagnosis, and therapy. They also deliver medical advances to patients and their families, educate health care professionals and the public, and reach out to underserved populations. The CRN's growing

collaborations with NCI-designated Comprehensive Cancer Centers provide vehicles for facilitating and triaging research inquiries and also provide access to critical scientific expertise. In particular, external biomedical and clinical collaborators (e.g., oncology researchers, pathologists) have played critical scientific roles in CRN research projects. Eight CRN sites currently have active collaborations with Cancer Centers.

Harvard Pilgrim Health Care Institute in Boston was the first group to initiate an affiliation agreement on behalf of the CRN with the Dana-Farber Cancer Institute/Harvard Cancer Center (DF/HCC). The agreement was signed in 2005 and has since served as a model for other CRN-Cancer Center partnerships with the following universities: Oregon Health Sciences, Hawaii, Emory, California–San Francisco, Wisconsin, Minnesota, and New Mexico.

**Example:** Through a partnership between the CRN and DF/HCC, investigators funded through a CER grant are developing a resource to support high quality cancer CER that addresses two key knowledge gaps: (1) treatment of advanced disease and (2) patterns and outcomes of cancer care for patients not represented in the SEER-Medicare database (e.g., patients younger than 65, patients receiving their care through an HMO). This project will generate new and improved methods to help advance

the field of cancer CER, and it will provide insights into the nature and causes of variation in important patterns of cancer care.

### Collaboration with Academic Institutions

The reach and visibility of the CRN has extended into the academic research community, which has increased access to superb investigators and biologic laboratories. Collaborations are facilitated by the Academic Liaison Committee, which was designed to advise the CRN on overall objectives, provide guidance on directions for new research, and identify potential collaborators outside of CRN sites. Many new collaborations and ties have developed as a result of this Committee's involvement.

**Example:** Researchers from the CRN have teamed up with investigators at Van Andel Research Institute and the University of Vermont to expand the University of Vermont's electronic breast cancer surgical outcomes database to three CRN sites. Researchers will use this database to develop and assess measures of surgical quality by examining variation in outcomes of initial breast cancer surgery at the patient, surgeon, hospital, and geographic levels. They will explore how this system can be implemented in other CRN sites, with a long-term goal of facilitating comparative effectiveness research throughout the network, especially in the area of breast cancer management.



*The National Cancer Institute (NCI) has created the potential for rapid breakthroughs in clinical science through computerized databases, data sharing, and networked research communities. The NCI supports the Cancer Research Network (CRN), with the HMO Research Network, an alliance of... large research health maintenance organizations (HMOs) that have ten [now eleven] million enrollees, with compatible electronic health record (EHR) systems and research programs.... The NCI-funded CRN is already a model for collaborative cancer networks...*

Lynn M. Etheredge. Medicare's Future: Cancer Care. *Health Affairs* 2009;28:148–159.

**Example:** Researchers from seven CRN sites are collaborating with investigators from the University of California–San Francisco to investigate patterns and variability of medical imaging over time and patterns of radiation exposure associated with medical imaging. These data will provide critical information that will allow researchers to estimate the increased risk of radiation-sensitive cancers associated with medical radiation exposure as a result of imaging.

### Collaboration with Federally Funded Research Consortia and Networks

The CRN provides a platform for rapidly conducting population-based studies, which has been leveraged by federally funded research consortia and scientists within the government.

The Clinical and Translational Science Awards (CTSA) program, which is funded by the NIH National Center for Research Resources, uses a consortium model to create academic homes for clinical and translational science across the country by developing teams of researchers to bring laboratory science into the clinic. The CRN is well positioned to collaborate with this national consortium because it provides a population-based health care environment in which to conduct further research. Eight CRN sites currently are members or have partnerships with members of the CTSA consortium.

**Example:** The Oregon Clinical and Translational Research Institute (OCTRI) is one example of a CRN-CTSA collaboration. Oregon Health Sciences University and Kaiser Permanente Northwest have teamed up to accelerate the translation of research from bench to bedside to populations and develop feedback loops from clinical trials and population science back to basic scientists. By bringing together a strong biomedical research university and an innovative practice-based research center associated with a large patient population, OCTRI is attempting to remove barriers to the pace and growth of research and improve patient care.

**Example:** Nine CRN research programs participate in an AHRQ-funded Center for Education and Research in Therapeutics (CERT). For the past few years, CRN and CERT leadership have met regularly to discuss the development of the VDW to ensure that it can meet the needs of both networks. The proposed program to study the diffusion, cost, and outcomes of new cancer therapy innovations takes advantage of the pharmacoepidemiologic experience and skills of our CERT colleagues.

**Example:** The CRN is also involved with other NCI research consortia and cooperative groups. CRN work includes actively enrolling patients to cancer treatment clinical trials through cooperative groups such as the: National Surgical Adjuvant Breast and Bowel Project (NSABP),

Southwest Oncology Group (SWOG), Radiation Therapy Oncology Group (RTOG), American College of Surgeons Oncology Group (ACOSOG), Eastern Cooperative Oncology Group (ECOG), and Cancer Trials Support Unit (CTSU).

Investigators affiliated with the CRN also have helped to recruit patients into prevention and screening trials such as the Prostate, Lung, Colorectal and Ovarian (PLCO) Cancer Screening Trial, the National Lung Screening Trial (NLST), and the Selenium and Vitamin E Cancer Prevention Trial (SELECT). The CRN is a participating research site of the NCI Cancer Care Outcomes Research and Surveillance Consortium (CanCORS).

**Example:** CRN investigators have also formed collaborations with intramural researchers at NCI. Researchers from both organizations are teaming up to investigate the association between chronic immune stimulation and risk of lymphomas and related precursor conditions. Conducting this study within the CRN framework will improve on previous studies because the results will be more generalizable to the U.S. population and researchers will be better able to capture exposures through use of both inpatient and outpatient data. Incorporation of laboratory, medication, and survival data will also provide a more comprehensive picture of the issues surrounding lymphomagenesis.

## CAPACITY

With 14 research centers based in large, integrated health care delivery organizations nationwide, the CRN is heavily influenced by its proximity to and familiarity with the day-to-day provision of cancer prevention, diagnosis, and care.

All CRN sites are longstanding organizations with a stable presence

in their communities. They also offer research centers and highly skilled investigators who understand their enrollee populations, the organization and delivery of care, and the associated data systems.

### Population Coverage

CRN member organizations have a combined population of nearly 11 million enrollees. The age and sex distributions of enrollees collectively reflect those of the general U.S. population, although individual plans vary widely. The CRN includes population centers with a high percentage of African Americans (Henry Ford Hospital and Health System/Health Alliance

Plan, Harvard Pilgrim Health Care Institute, and Kaiser Permanente Georgia); Asian Americans (Kaiser Permanente Hawaii, Kaiser Permanente Northern California, and Kaiser Permanente Southern California); Hispanics (Lovelace Health System, Kaiser Permanente Southern California, Kaiser Permanente Northern California, and Kaiser Permanente Colorado); and rural and under-served rural populations (Geisinger Health System and Marshfield Clinic). Racial, ethnic, and socioeconomic diversity is an important strength of the CRN, which permits studies emphasizing effectiveness research focused on these subpopulations.

## QUICK FACTS

- > Between 1999 and 2009, CRN researchers have published more than 175 peer-reviewed journal articles on CRN-related projects.
- > Across the CRN sites, there are over 200 scientific and program staff conducting and supporting cancer research.
- > Most of the CRN sites actively enroll patients to cancer treatment clinical trials through cooperative groups, such as the NSABP, SWOG, RTOG, ACOSOG, ECOG, and CTSU. Investigators affiliated with the CRN also have helped to recruit patients into prevention and screening trials such as the PLCO Cancer Screening Trial, the NLST, and the SELECT.
- > CRN partnerships and affiliations include the HMO Research Network, many NCI-designated Cancer Centers, and several federal agencies, including NCI, NHLBI, NHGRI, CDC, and AHRQ.
- > The CRN has significantly leveraged its core funding since the original grant to develop and receive many infrastructure or core research grants; administrative or minority supplements; pilot studies; challenge grants; and GO grants.
- > Investigators from the CRN have participated in other funded work, including R21, R01, U01, P50, and training grants as well as career awards.

## Characteristics of the CRN Research Centers

|  | <b>GHC</b> | <b>GHS</b> | <b>HFHS</b> | <b>HPHC</b> | <b>HPRF</b>    | <b>KPCO</b> | <b>KPG</b> | <b>KPH</b> | <b>KPNC</b> | <b>KPNW</b>  | <b>KPSC</b> | <b>LCF</b> | <b>MCRF</b>  | <b>MPCI</b> |
|--|------------|------------|-------------|-------------|----------------|-------------|------------|------------|-------------|--------------|-------------|------------|--------------|-------------|
| <b>Year Established</b>                        | 1983       | 2003       | 1948        | 1969        | 1989           | 1991        | 1998       | 1991       | 1961        | 1964         | 1975        | 1990       | 1959         | 1996        |
| <b>2009 Funding, Millions</b>                  | 36         | 8.9        | 60.9        | 30          | 10.5<br>(2008) | 14.4        | 2.3        | 4          | 73          | 35<br>(2008) | 25.9        | 4.9        | 27<br>(2008) | 2.9         |
| <b>% Extramural</b>                            | 92         | 90         | 81          | 84          | 69.6           | 54          | 75         | 90         | 80          | 90           | 72          | 100        | 40           | 80          |
| <b># Full-time M.D./Ph.D.<br/>-level staff</b> | 36         | 18         | 80          | 38          | 19             | 30          | 3          | 4          | 46          | 54           | 20          | 6          | 26           | 10          |
| <b># Programmers</b>                           | 42         | 2          | 23          | 8           | 15             | 23          | 3.5        | 4          | 88          | 24           | 31          | 3          | 15           | 4           |
| <b>Total Staff</b>                             | 297        | 120        | 484         | 140         | 88             | 111         | 12         | 34         | 509         | 250          | 186         | 31         | 190          | 24          |
| <b>Research Facilities</b>                     |            |            |             |             |                |             |            |            |             |              |             |            |              |             |
| <b>Survey Research</b>                         | •          | •          | •           | •           | •              | •           |            | •          | •           | •            |             | •          | •            | •           |
| <b>Clinical Center</b>                         | •          | •          | •           | •           | •              |             | •          | •          | •           | •            |             |            | •            | •           |
| <b>Chart Abstraction</b>                       | •          | •          | •           | •           | •              | •           | •          | •          | •           | •            | •           | •          | •            | •           |

**Key** (table column heads, pages 17–18):

**GHC** = Group Health Cooperative (Group Health Research Institute)

**GHS** = Geisinger Health System (Geisinger Center for Health Research)

**HFHS** = Henry Ford Hospital and Health System/Health Alliance Plan (Department of Biostatistics and Research Epidemiology and Center for Health Services Research)

**HPHC** = Harvard Pilgrim Health Care Institute and Harvard Medical School (Department of Population Medicine)

**HPRF** = HealthPartners (HealthPartners Research Foundation)

**KPCO** = Kaiser Permanente Colorado (Institute for Health Research)

**KPG** = Kaiser Permanente Georgia (Center for Health Research-Southeast)

**KPH** = Kaiser Permanente Hawaii (Center for Health Research-Hawaii)

**KPNC** = Kaiser Permanente Northern California (Division of Research)

**KPNW** = Kaiser Permanente Northwest (Center for Health Research-Northwest)

**KPSC** = Kaiser Permanente Southern California (Department of Research and Evaluation)

**LCF** = Lovelace Health System (Lovelace Clinic Foundation Research)

**MCRF** = Marshfield Clinic/Security Health Plan (Marshfield Clinic Research Foundation)

**MPCI** = Fallon Community Health Plan (Meyers Primary Care Institute)

## Characteristics of the Health Plans

|  | <b>GHC</b>     | <b>GHS</b> | <b>HFHS</b> | <b>HPHC</b>     | <b>HPRF</b> | <b>KPCO</b> | <b>KPG</b> | <b>KPH</b> | <b>KPNC</b> | <b>KPNW</b>     | <b>KPSC</b> | <b>LCF</b>      | <b>MCRF</b> | <b>MPCI</b>     |
|--|----------------|------------|-------------|-----------------|-------------|-------------|------------|------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| <b>Year Established</b>                      | 1947           | 1915       | 1976        | 1969            | 1957        | 1969        | 1985       | 1958       | 1945        | 1942            | 1947        | 1973            | 1916        | 1977            |
| <b>Structure, %</b>                          |                |            |             |                 |             |             |            |            |             |                 |             |                 |             |                 |
| Staff/Group                                  | 80             | 90         | 100         | 20              | 15          | 100         | 90         | 100        | 100         | 100             | 100         | 52              | 70          | 53              |
| Independent Phys. Assn.                      | 20             | 10         | 0           | 80              | 0           | 0           | 10         | 0          | 0           | 0               | 0           | 48              | 30          | 46              |
| Preferred Provider                           | 0              | 0          | 0           | 0               | 85          | 0           | 0          | 0          | 0           | 0               | 0           | 0               | 0           | 1               |
| <b>Clinic Sites</b>                          | 33             | 60         | 27          | 14 <sup>a</sup> | 45          | 18          | 10         | 17         | 159         | 28 <sup>b</sup> | 150         | 20 <sup>c</sup> | 48          | 20              |
| <b>Total enrollment, x 1,000<sup>d</sup></b> |                |            |             |                 |             |             |            |            |             |                 |             |                 |             |                 |
|  | 617            | 229        | 208         | 762             | 717         | 451         | 271        | 216        | 3,130       | 471             | 3,324       | 194             | 160         | 220             |
| 1-year retention                             | 84             | 82         | 99.5        | 78              | 73          | 83          | 87         | 85         | 87          | 82              | 87          | 78              | 92          | 95 <sup>e</sup> |
| 3-year retention                             | 66             | 54         | 86.4        | 47              | 46          | 66          | 67         | 72         | 75          | 66              | 70          | 66              | 78          | 92              |
| 5-year retention                             | 55             | 41         | 62.6        | 35              | 38          | 56          | 54         | 63         | 66          | 57              | 59          | 57              | 68          | 92              |
| <b>Age, Years, %</b>                         |                |            |             |                 |             |             |            |            |             |                 |             |                 |             |                 |
| 0-17   | 20             | 19         | 18          | 24              | 25          | 22          | 24         | 22         | 22          | 23              | 25          | 39              | 24          | 19              |
| 18-44  | 33             | 29         | 29          | 39              | 38          | 34          | 39         | 35         | 35          | 34              | 36          | 25              | 33          | 33              |
| 45-64  | 33             | 28         | 35          | 33              | 30          | 30          | 31         | 30         | 29          | 31              | 28          | 20              | 26          | 29              |
| 65+  | 13             | 24         | 18          | 4               | 8           | 14          | 7          | 13         | 13          | 13              | 11          | 15              | 17          | 19              |
| <b>Female, %</b>                             |                |            |             |                 |             |             |            |            |             |                 |             |                 |             |                 |
|  | 53             | 52         | 55          | 52              | 51          | 53          | 53         | 50         | 52          | 52              | 52          | 55              | 52          | 52              |
| <b>Race, %</b>                               |                |            |             |                 |             |             |            |            |             |                 |             |                 |             |                 |
| White  | 82             | 96         | 54          | 75              | 81          | 74          | 63         | 25         | 51          | 84              | 38          | 55              | 97          | 87              |
| African American                             | 3              | <1         | 33          | 16              | 9           | 5           | 33         | <1         | 8           | 3               | 8           | 1               | <1          | 2               |
| Asian American                               | 6              | 0          | 3           | 5               | 5           | 3           | <1         | 63         | 17          | 5               | 10          | 1               | <1          | 3               |
| American Indian                              | 1              | <1         | <1          | <1              | 1           | 1           | <1         | <1         | <1          | 1               | <1          | 2               | <1          | <1              |
| Hispanic                                     | 4              | 1.4        | 1           | 4               | 2           | 15          | <1         | 3          | 19          | 6               | 41          | 38              | <1          | 8               |
| Other  | 3 <sup>f</sup> | <1         | 8           | 0               | 2           | 2           | 4          | 17         | 5           | 1               | <1          | 0               | <1          | 0               |

<sup>a</sup> HVMA (Harvard Vanguard Medical Associates)

<sup>b</sup> Does not include KPNW's 16 dental offices

<sup>c</sup> ABQ Health Partners

<sup>d</sup> Total enrollment, all sites combined: 10,872,000 members

<sup>e</sup> Retention among cancer survivors only

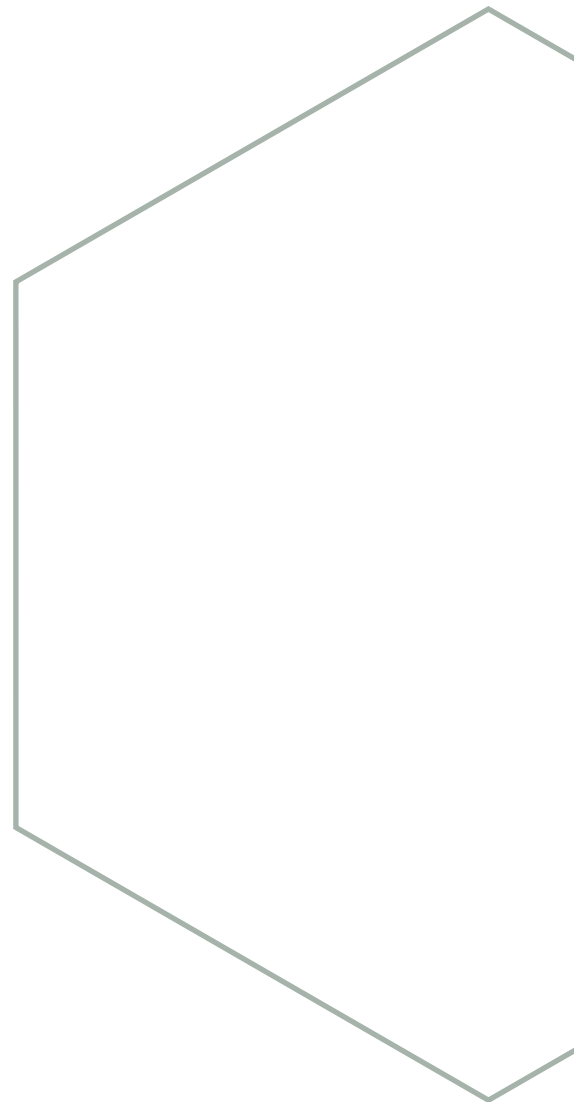
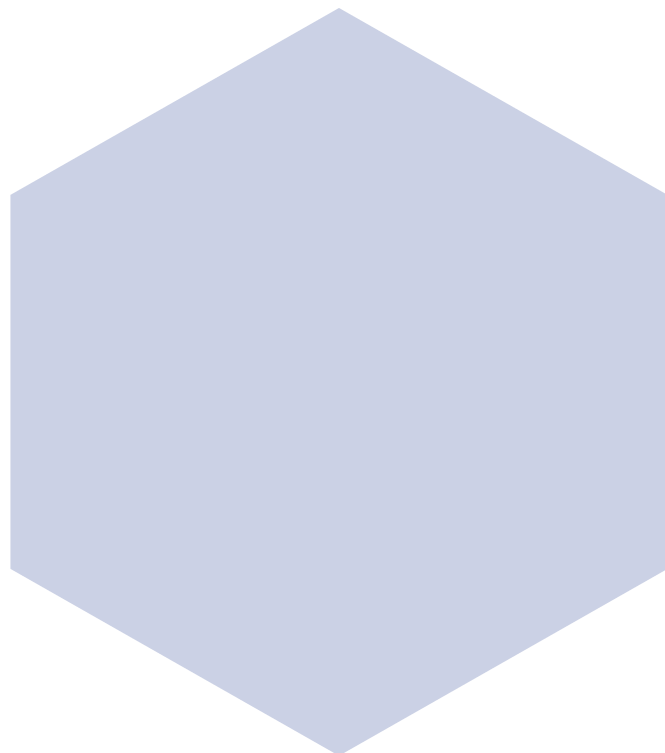
<sup>f</sup> Includes persons reporting more than one race

## Administrative Data Resources

CRN sites have a rich array of legacy data systems that date back many years. These data systems include information about:

- HMO enrollment
- Outside claims and referrals
- Patient scheduling and registration
- Births and deaths
- Cost of services
- Outpatient visits
- Hospitalizations
- Emergency room visits
- Prescriptions
- Laboratory tests
- Long-term care

The year of initiation for collecting these data varies by CRN site. These data systems have been used for research for decades for both single-site and multisite studies. The number of collaborating sites and the complexity of CRN research questions required the CRN to create a more efficient and standardized approach to data aggregation. The CRN chose to create a VDW, consisting of databases with a common set of standardized variables in each CRN site. The variability of the legacy data systems has made developing the VDW the CRN's most formidable challenge.





## INFORMATICS AND RESEARCH TOOLS

**The HMOs affiliated with the CRN have an ethical and legal obligation to safeguard the confidentiality of medical information of their individual members.**

Thus, it is natural that CRN scientists and their home organizations have long been concerned about the sensitivity of health system data, especially medical information about

individuals as well as data related to quality or delivery of care and prices paid for medical care. HMO leaders have legitimate concerns that without careful stewardship, such data could be compromised or misrepresented. Because of these concerns, the CRN Steering Committee rejected the notion of establishing a centralized repository of generic data on the enrollees of each HMO for use in current and future studies. However, the CRN proposed developing standardized data resources to increase the quality and efficiency of research using automated data: the VDW,

cancer counters, EMRs, and natural language processing (NLP). Research information containing patient or provider identification is protected from third-party discovery by federal statute.

### The Virtual Data Warehouse (VDW)

The VDW is a distributed data warehouse, a federated database that is made up of standardized datasets stored behind separate security firewalls at each participating CRN site. The datasets include variables with identical names, formats, and specifications (including definitions,

### Emerging Partnerships in Informatics

The CRN is coordinating its informatics development efforts with NCI's Cancer Biomedical Informatics Grid (caBIG<sup>®</sup>) to facilitate collaboration. The aim of the caBIG<sup>®</sup> collaboration is to use caBIG<sup>®</sup> tools to improve the VDW's compatibility and interoperability with national standards. The CRN also is an active contributor to the caBIG<sup>®</sup> Population Sciences Special Interest Group and the cross-cutting Data Sharing and Intellectual Capital Workspace, both of which are working on strategies to facilitate multisite collaboration, data collection, and stewardship.

The CRN has also partnered with the SEER Program to pilot a project in Hawaii in which VDW data is electronically transmitted to the geographically co-existing central cancer registry. This unique partnership will enable investigators to conduct analyses relating to comorbidities, such as examination of the association between the number and severity of comorbidities present during the year prior to diagnosis and treatment modalities, survival, and other patient outcomes. It will also allow investigators to determine whether CRN records are able to enhance SEER registry data, and vice versa. If the pilot proves useful to CRN and SEER investigators, periodic transmission of data from the CRN to SEER registries at multiple sites may be considered.

Finally, the CRN has partnered with Harvard University to test a system developed by Harvard that locates and retrieves tissue specimens and pertinent clinical and outcome data on an as-needed (just-in-time) basis. Testing of this system is being conducted within the CRN to determine how well it functions in a large HMO setting and whether it can reliably remove all personal health data identifiers while maintaining usable data extracted from medical records. This system has the potential to substantially enhance the capability of the CRN to conduct multisite cancer control research projects involving pathological specimens and associated clinical/outcome data.



labels, and coding). This structure is a vital element of the VDW because it allows the same SAS program, written at one site, to be run against all participating sites' databases. Person-level data at each CRN site remains under local control at that site. The VDW is supported by a set of informatics tools—hardware and software—that facilitate storage, retrieval, processing, and managing of VDW datasets; a set of access policies and procedures governing use of VDW resources; and documentation of all elements of the VDW. The VDW is a cornerstone of today's "rapid-cycle" research environment, because it allows for responsiveness and efficiency while maintaining data privacy and security, as well as local autonomy over the data at each site.

The VDW files cover the following areas of information:

- Demographics and vital signs
- Enrollment into the health care plan
- Utilization, including inpatient and outpatient visits, emergency department visits, long-term care admissions and home health visits, and communications with health professionals via phone
- Diagnoses, procedures, and lab tests/results
- Incident cancer
- Pharmacy data
- Provider information
- Census data
- Birth and death data

The VDW files are linked together using a unique person identifier. Researchers working with the CRN can receive more detailed and specific information about the content of the VDW once an official collaboration has been established.

### Cancer Counters

To facilitate efficient study planning, CRN staff developed virtual data marts or "counters." The Cancer Counter includes summarized, de-identified data that can produce counts of patients with cancer aggregated by tumor site, morphology, stage, health plan, vital status, race, gender, and Hispanic ethnicity, and that allows users to select one- and two-way frequencies of these variables. The Cancer Counter has proven to be invaluable for estimating study population sizes for new cancer research proposals.

### Electronic Medical Records (EMRs)

EMRs allow researchers to manipulate and standardize free-text clinical data such as clinical assessment findings, image interpretations, surgical operative reports, pathology evaluations, hospital discharge summaries, and consultant evaluations. In addition to the standard physician user-interface, many of the EMRs also have a patient interface, where patients can view items in their medical record (such as visit summaries and laboratory test results), send secure messages to

their physicians, and enter information into a health risk assessment survey or other survey instrument. This provides the CRN with opportunities for innovative interventions. Several EMR systems are employed across CRN member organizations, although EpicCare is the most commonly used. Beacon Oncology Information System, also an Epic software product, will be used by at least eight of the CRN sites to document patient consult and chemotherapy infusion visits, and manage patient treatment plans.

### Natural Language Processing (NLP)

NLP helps investigators convert a variety of sentences, clauses, words, symbols, and abbreviations that represent synonyms into measurable concepts of research interest. CRN informaticists developed an NLP tool called MediClass<sup>®</sup> to collect standardized information about tobacco control counseling in "Using Electronic Medical Records to Measure and Improve Adherence to Tobacco Treatment Guidelines in Primary Care." In 2009, the CRN was awarded ARRA stimulus funds to integrate the Clinical Text Analysis and Knowledge Extraction System (cTAKES), a powerful and expandable NLP system, into the infrastructure of the CRN coordinating site and test a complex NLP algorithm for identifying recurrent breast cancer diagnoses in clinical text.



## ORGANIZATIONAL STRUCTURE

The CRN is overseen by Academic Liaison, Executive, and Steering Committees. As a cooperative agreement grant, the CRN Principal Investigator's Office and NCI program staff collaborate actively. The CRN's administrative structure is made up of four cores, a Clinical Applications and Translation Program, and research projects including a pilot studies program.

The four cores include Administrative Committees, an Evaluation Core, a Scientific and Data Resources Core, and the CRN Scholars Program. The Clinical Applications and Translation Program emphasizes work in two major areas: improving enrollment in cancer clinical trials and studying diffusion of innovations in cancer prevention and care. Scientific Interest Groups (SIGs) are initiated and led by investigators with shared interests in emerging areas of high-priority research.

The Pharmacogenomics SIG is organized through the larger HMORN and led by CRN scientists. Many other CRN researchers are active participants. This SIG brings interested researchers together to learn about existing pharmacogenomics projects within the HMORN as well as upcoming research opportunities. The SIG also facilitates collaboration between the HMORN and external investigators on pharmacogenomics topics.

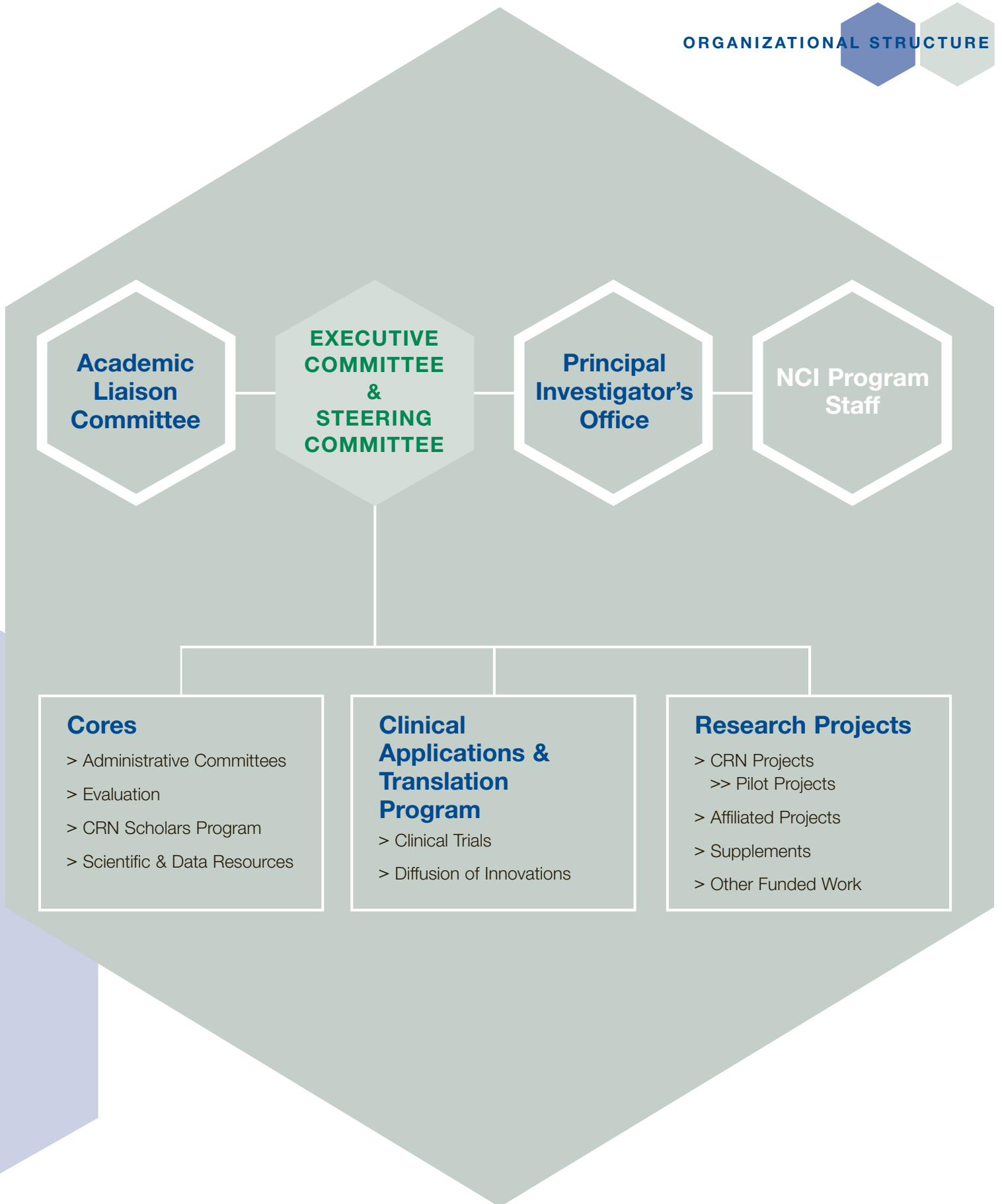
The Pharmacogenomics SIG laid the foundation for a GO grant funded by NCI in 2009 entitled **Comparative Effectiveness Research in Genomic and Personalized Medicine of Colorectal Cancer** and led by principal investigators Dr. Katrina Goddard (KPNW), Dr. Evelyn Whitlock (KPNW), and Dr. Lawrence Kushi (KPNC). The grant will use the CRN health systems as platforms to explore the comparative effectiveness of genomic and molecular tests, including those for KRAS and Lynch Syndrome, related to colorectal cancers. Researchers will also measure psychosocial issues related to testing to help inform understanding of genetic test results in decision making. This research will build the experience, data systems, and methods that can be applied to other cancer-related genetic or molecular tests in the future.



### CRN SCIENTIFIC INTEREST GROUPS (SIGs)

- > Obesity
- > Family History
- > Cancer Survivorship
- > Pharmacogenomics
- > Patient-Centered Communication in Cancer Care
- > Racial Disparities
- > Others





**Academic  
Liaison  
Committee**

**EXECUTIVE  
COMMITTEE  
&  
STEERING  
COMMITTEE**

**Principal  
Investigator's  
Office**

**NCI Program  
Staff**

**Cores**

- > Administrative Committees
- > Evaluation
- > CRN Scholars Program
- > Scientific & Data Resources

**Clinical  
Applications &  
Translation  
Program**

- > Clinical Trials
- > Diffusion of Innovations

**Research Projects**

- > CRN Projects
  - >> Pilot Projects
- > Affiliated Projects
- > Supplements
- > Other Funded Work

# SITE PRINCIPAL INVESTIGATORS

## Group Health Cooperative, Group Health Research Institute (GHC)



**Edward H. Wagner, M.D., M.P.H.**  
*CRN Principal Investigator*

Senior Investigator,  
Group Health Research Institute  
Director, MacColl Institute

Research Interests: studies of interventions to reduce disability in seniors and to enhance the care of persons with cancer and other chronic illnesses; cluster randomized trials

[wagner.e@ghc.org](mailto:wagner.e@ghc.org)

## Kaiser Permanente Northern California, Division of Research (KPNC)



**Lawrence H. Kushi, Sc.D.**  
*CRN Co-Principal Investigator*

Associate Director for Etiology and Prevention Research,  
Kaiser Permanente Northern California

Research Interests: role of diet and nutrition in the etiology of breast and other cancers; epidemiologic studies of cancer prognosis

[larry.kushi@kp.org](mailto:larry.kushi@kp.org)

## Kaiser Permanente Northwest, Center for Health Research-Northwest (KPNW)



**Mark C. Hornbrook, Ph.D.**  
*CRN Co-Principal Investigator*

Senior Investigator and Chief Scientist,  
Kaiser Permanente Northwest Center for Health Research

Research Interests: health care cost and utilization analysis; economic evaluation methods; patient classification methods; health status measurement; predictive modeling; health-based payment systems

[mark.c.hornbrook@kpchr.org](mailto:mark.c.hornbrook@kpchr.org)

## Fallon Community Health Plan, Meyers Primary Care Institute (MPCI)



**Terry S. Field, D.Sc.**

Associate Director,  
Meyers Primary Care Institute

Associate Professor of Medicine, University of Massachusetts Medical School

Research Interests: providing safe and effective health care for adults who are disabled, chronically ill, or elderly; racial disparities

[tfield@meyersprimary.org](mailto:tfield@meyersprimary.org)

## Geisinger Health System, Geisinger Center for Health Research (GHS)



**Azadeh Stark, Ph.D., M.Sc.**

Senior Staff Scientist, Henry Hood Center for Health Research, Geisinger Health System

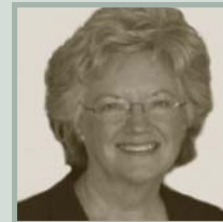
Adjunct Associate Professor, Center for Clinical Epidemiology and Biostatistics, School of Medicine, University of Pennsylvania

Adjunct Associate Professor, Department of Internal Medicine, Wayne State School of Medicine

Research Interests: cancer control and early detection; prevention of obesity; breast cancer prevention; screening mammography improvement; use of biomarkers for early detection and recurrence; prevention of chronic health problems secondary to cancer treatment; long-term cancer care communication

[astark1@geisinger.edu](mailto:astark1@geisinger.edu)

## Harvard Pilgrim Health Care Institute and Harvard Medical School, Department of Population Medicine (HPHC)



**Suzanne W. Fletcher, M.D., M.Sc.**

Professor Emerita of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care Institute

Research Interests: prevention, especially related to breast cancer screening; DCIS; quality of life issues

[suzanne\\_fletcher@hms.harvard.edu](mailto:suzanne_fletcher@hms.harvard.edu)

**HealthPartners,  
HealthPartners Research  
Foundation (HPRF)**



**Thom Flottemesch, Ph.D.**

Investigator, HealthPartners Research Foundation

Research Interests: health services; health disparities; economics and risk adjustment; biostatistics

[thomas.j.flottemesch@HealthPartners.com](mailto:thomas.j.flottemesch@HealthPartners.com)

**Kaiser Permanente Georgia,  
Center for Health Research-  
Southeast (KPG)**



**Douglas W. Roblin, Ph.D.**

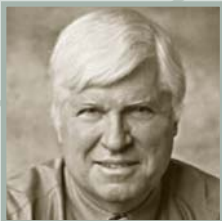
Senior Investigator, Kaiser Permanente Southeast Center for Health Research

Adjunct Assistant Professor of Health Policy and Management, Rollins School of Public Health at Emory University

Research Interests: organizational and financial characteristics of health care systems affecting patient outcomes, such as medical services use and cost; visit satisfaction; quality of chronic disease care

[douglas.roblin@kp.org](mailto:douglas.roblin@kp.org)

**Lovelace Health System,  
Lovelace Clinic Foundation  
Research (LCF)**



**Herbert (Bert) T. Davis, Ph.D.**

Senior Research Scientist, Lovelace Clinic Foundation Research

Research Interests: comparative effectiveness for cancer therapies; ethnic disparities in cancer treatment, alcohol abuse, and diabetes

[bert.davis@lcfresearch.org](mailto:bert.davis@lcfresearch.org)

**Henry Ford Hospital and Health  
System/Health Alliance Plan,  
Department of Biostatistics and  
Research Epidemiology and  
Center for Health Services Research  
(HFHS)**



**Christine Cole Johnson, Ph.D., M.P.H.**

Senior Staff Scientist, Henry Ford Health System

Chair, Department of Biostatistics and Research Epidemiology; Director, Henry Ford Hospital and Health System, Epidemiology, Prevention, and Control Program, Josephine Ford Cancer Center, Henry Ford Health System; Director, Center for Allergy, Asthma, and Immunology Research, Henry Ford Health System

Research Interests: cancer epidemiology and prevention; pharmacoepidemiology; etiologies of allergy and asthma

[cjohnso1@hfhs.org](mailto:cjohnso1@hfhs.org)

**Kaiser Permanente Hawaii, Center  
for Health Research-Hawaii (KPH)**



**Andrew E. Williams, Ph.D.**

Investigator, Kaiser Permanente Center for Health Research

Adjunct Assistant Professor, Department of Public Health Sciences, University of Hawaii at Manoa

Research Interests: medical judgment and decision making; health services

[andrew.e.williams@kp.org](mailto:andrew.e.williams@kp.org)

**Marshfield Clinic/Security Health Plan,  
Marshfield Clinic Research  
Foundation (MCRF)**



**Robert T. Greenlee, Ph.D., M.P.H.**

Marshfield Epidemiologic Study Area Lead Scientist, Marshfield Clinic Research Foundation

Research Interests: cancer surveillance and control; sociodemographic disparities in prevention, early detection, and treatment; clinical epidemiology of cardiovascular disease, particularly arrhythmias and conduction disorders

[greenlee.robert@mcrf.mfldclin.edu](mailto:greenlee.robert@mcrf.mfldclin.edu)

**SITE PRINCIPAL INVESTIGATORS**

**Kaiser Permanente Colorado,  
Institute for Health Research (KPCO)**



**Debra P. Ritzwoller, Ph.D.**

Investigator, Health Care Economist, Institute for Health Research, Kaiser Permanente Colorado

Research Interests: costs and cost-effectiveness of behavioral interventions; the uninsured; disease management interventions; vaccine effectiveness; public health surveillance systems; physician compensation; comorbidities; cost estimation; cost-effectiveness

[debra.ritzwoller@kp.org](mailto:debra.ritzwoller@kp.org)

**Kaiser Permanente Southern  
California,  
Department of Research and  
Evaluation (KPSC)**



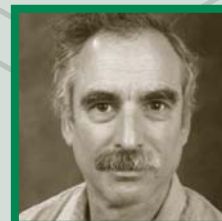
**Virginia P. Quinn, Ph.D.**

Research Scientist, Department of Research and Evaluation, Kaiser Permanente Southern California

Research Interests: lifestyle and health behavior change; prevention, screening, and adherence; adolescents and depression; quality of cancer-related care

[virginia.p.quinn@kp.org](mailto:virginia.p.quinn@kp.org)

**National Cancer Institute**



**Martin L. Brown, Ph.D.**

CRN Program Director

Chief, Health Services and Economics Branch, Applied Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute

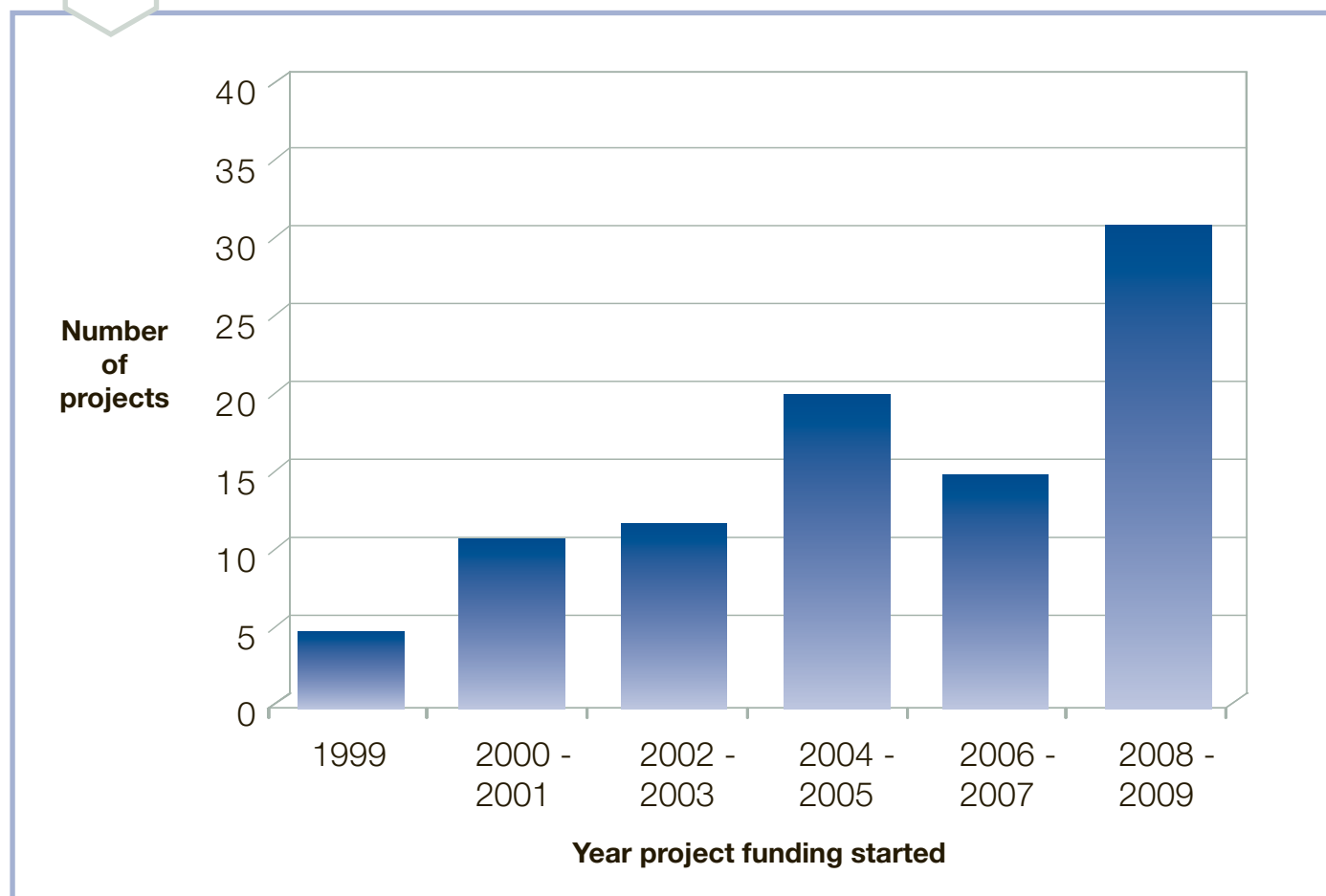
Research interests: health services; economics of cancer; cost effectiveness of cancer control

[mbrown@mail.nih.gov](mailto:mbrown@mail.nih.gov)

## RESEARCH PROJECTS BY CRN RESEARCH THEME AND YEAR

Since its inception, the number of funded CRN research projects has increased dramatically, from three core research projects funded as part of the original grant in 1999 to more than 25 active projects in 2008–2009. This increase in research projects reflects the many successful collaborations and ongoing efforts to address important cancer control questions in the CRN population laboratory. Research projects are listed according to themes described on pages 8 and 9, and selected studies are highlighted in each section.

GROWTH IN FUNDED CRN RESEARCH PROJECTS, 1999-2009





## Health Care Delivery, Quality, Costs, and Outcomes

CRN studies in this area address the nature and quality of cancer prevention services, screening, treatment, supportive care, and survivorship care, and their impacts on health outcomes, resource use, and costs. The relatively large number of clinical sites and the size and diversity of CRN patient populations facilitate studies of practice variation, disparities in care and outcomes, and intervention studies.

| PROJECT TITLE   | FUNDING SOURCE                           | YEAR FUNDED |
|---|--|-------------|
| Outcomes of Prostate Cancer Androgen Deprivation Therapy  | NCI R01 Grant                            | 2010        |
| Cost-Effectiveness of Hormonal Therapy for Clinically Localized Prostate Cancer   | NCI Challenge Grant                      | 2009        |
| Improving Breast Cancer Surgery Effectiveness through Establishment of an Electronic Cancer Surgery Database                    | NCI Challenge Grant                      | 2009        |
| Preventing Errors in the Home Care of Children with Cancer  | NCI CRN Pilot Project                    | 2009        |
| <b>Long-Term Survivorship in Older Women with Early Stage Breast Cancer (BOW II)</b>  | <b>NCI R01 Grant</b>                     | <b>2008</b> |
| Opportunistic Colorectal Cancer Screening: Providing FIT with Annual Flu Shots  | NCI CRN Pilot Project                    | 2008        |
| Systems Failures Contributing to Chemotherapy Error:<br>A Project of the HMORN Center of Education in Research & Therapeutics   | AHRQ Contract                            | 2006        |
| 4CQuality: Quality of Patient-Centered Cancer Care, Communication, and Coordination   | NCI Contract                             | 2005        |
| Do Acute and Chronic Illness Trump Preventive Care?<br>A Case Study of Breast and Colon Cancer Screening                        | NCI CRN Pilot Project                    | 2004        |
| Research Supplement for Underrepresented Minorities Program:<br>Patterns of Preventive Services Utilization of Cancer Survivors | NCI CRN Administrative Supplement        | 2003        |
| Evaluation of Hospice Referral and Palliative Care for Ovarian Cancer in the Managed Care Environment                           | CDC Task Order                           | 2002        |
| <b>Breast Cancer Treatment Effectiveness in Older Women (BOW I)</b>   | <b>NCI R01 Grant</b>                     | <b>2002</b> |
| Lung/Colon Cancer Outcomes: Cancer Care Outcomes Research and Surveillance Consortium (CanCORS)                                 | NCI Cooperative Agreement                | 2001        |
| <b>A Pilot Study of Disenrollment among HMO Patients with Cancer</b>  | <b>NCI CRN Administrative Supplement</b> | <b>2001</b> |
| Design, Implementation & Analysis of a Clinician Survey (DETECT supplement)   | NCI CRN Administrative Supplement        | 2000        |
| HMOs Investigating Tobacco (HIT)  | NCI CRN Core Research Project            | 1999        |
| <b>Toward Reducing Cervical and Late-Stage Breast Cancer: Detecting Early Tumors Enables Cancer Therapy (DETECT)</b>            | <b>NCI CRN Core Research Project</b>     | <b>1999</b> |

*Selected research projects are highlighted below.*

### **Breast Cancer Treatment Effectiveness in Older Women (BOW I) and Long-Term Survivorship in Older Women with Early Stage Breast Cancer (BOW II)**

Dr. Rebecca Silliman (Boston University), a member of the CRN Academic Liaison Committee, led this large-scale cohort study of the care and outcomes of 1,859 older women with breast cancer at six CRN sites. By reviewing medical records and using administrative data,

information was collected on initial surgery, adjuvant treatments, long-term surveillance, and recurrence and mortality outcomes. The team compared the effectiveness of different treatment and surveillance patterns, and identified the characteristics of providers, tumors, and patients associated with various treatment choices. The study found that less-than-standard treatment is associated with increased rates of recurrence and breast cancer-specific mortality, while mammography

surveillance during the first five years after diagnosis is associated with a reduced rate of breast cancer mortality.

Following successful completion of BOW I, study investigators received a renewal to collect additional information about this cohort of breast cancer survivors through 15 years after diagnosis. This new study will evaluate the effectiveness of mammography surveillance for recurrence and second primaries beyond five years; the cost





### Health Care Delivery, Quality, Costs, and Outcomes (cont.)

implications associated with short-term and long-term survivorship care; and the risk of late treatment effects.

#### A Pilot Study of Disenrollment among HMO Patients with Cancer

This study assessed turnover among enrollees with cancer diagnoses in five HMOs and how turnover may affect longitudinal cancer outcomes research. The Principal Investigator, Dr. Terry Field (MPCI), and colleagues studied the retention rates among cancer survivors over a six-year period. Enrollees were followed from diagnosis through death, disenrollment, or end of follow-up. The

retention rates among survivors for all cancers combined at one and five years after diagnosis were 96.0 percent and 83.9 percent, respectively. The proportion of enrollees who remained enrolled and available for evaluation suggests that the CRN is well suited for studies of cancer quality of care, survivorship, and long-term outcomes. This led to a follow-up study that assessed racial disparities in cancer care and survival in more than 130,000 cancer patients.

#### Toward Reducing Cervical and Late-Stage Breast Cancer: Detecting Early Tumors Eases Cancer Therapy (DETECT)

This eight-HMO project, led by Dr. Stephen Taplin (NCI; formerly

of GHC), identified women with invasive cervical cancer or late-stage breast cancer. The project estimated the proportion of each group attributable to potential problems in care delivery—absence of screening and detection and/or deficiencies in follow-up. The project team created a model for considering quality issues in cancer care. They also profiled the screening practices and policies in the HMOs and surveyed clinician attitudes about screening policies and practices. The absence of screening accounted for most of the late-stage breast and cervical cancers.

### Health Insurance Benefit Design and Patterns of Care Utilization

CRN studies examine the relationship between patients’ benefit design and use of cancer screening and treatment services.

| PROJECT TITLE  | FUNDING SOURCE                             | YEAR FUNDED |
|--|--|-------------|
| Medical Care Burden of Cancer: System and Data Issues Supplement               | NCI R01 Grant<br>Administrative Supplement | 2009        |
| High Deductible Health Plans and Receipt of Cancer Prevention Services         | ACS Research Scholar Grant                 | 2008        |
| <b>Chemotherapy and Coinsurance: The Effect of Cost Sharing on Cancer Care</b> | <b>NCI CRN Pilot Project</b>               | <b>2008</b> |
| Economic Burden Pilot Study  | NCI CRN Core Research Project              | 2007        |
| <b>Medical Care Burden of Cancer: System and Data Issues</b>                   | <b>NCI R01 Grant</b>                       | <b>2007</b> |

*Selected research projects are highlighted below.*

#### Chemotherapy and Coinsurance: The Effect of Cost Sharing on Cancer Care

Dr. Debra Ritzwoller (KPCO) is leading this multiyear, multisite CRN pilot study to assess the impact of coinsurance on receipt of cancer chemotherapy services among breast, colorectal, and lung cancer patients. This observational study will compare the rates of chemotherapy regimen use for a cohort of HMO cancer patients, before and after the implementation

of 20% coinsurance on all infused chemotherapy services, at one of the sites. This study will leverage the ongoing efforts of the CRN VDW chemotherapy working group, and it is an unparalleled opportunity for the CRN to help inform policymakers of the potential impact of cost-sharing changes on cancer care. Given the potentially large economic and clinical consequences of new cancer therapies and greater patient cost-sharing requirements, this study will inform our

understanding of how these changes may impact cancer treatment, compliance, outcomes, and costs.

#### Medical Care Burden of Cancer: System and Data Issues

Most cancer cost estimates are from NCI's SEER cancer registries linked to Medicare claims (SEER-Medicare). These data only represent the experience of the more than 80% of aged Medicare beneficiaries enrolled in the fee-for-service (FFS) indemnity option; no information is available about the remaining



seniors enrolled in Medicare HMOs. In addition to differences in patient benefits, HMO providers face different incentives, and because beneficiaries select their coverage, the populations may differ in their health status and preferences in ways that are difficult to measure. These factors may cause selection and omission biases in cancer cost estimates based on either group alone.

This project, led by Dr. Mark Hornbrook (KPNW), will extend

and complement the SEER-Medicare link by (1) estimating the incremental medical care cost of all cancers by cancer site, stage at diagnosis, patient demographics, and source of health insurance (FFS vs. HMO); (2) estimating costs of non-Medicare covered services; and (3) modeling the determinants of cancer costs across HMO and FFS systems, correcting for selection and omissions biases. The study team received an NCI supplement to estimate the costs of

cancer care in the non-elderly population. Additionally, Dr. Hornbrook is leading the study team with a pilot study to estimate the cancer-related pharmacy costs among aged Medicare HMO beneficiaries that are not covered in FFS Medicare. A byproduct of this body of research will be the development of a reusable infrastructure that will enhance the CRN VDW for other uses, including efforts focused on the dissemination of pharmacotherapy among cancer patients over time.

## Cancer Epidemiology, Prevention, and Health Promotion

CRN populations are the basis for conducting cross-sectional, case-control, cohort, and intervention studies to examine numerous cancer-related conditions, including rare outcomes. Studies of health promotion strategies, lifestyle change, and risk factor assessment and identification benefit from the HMO setting, and particularly from the detailed information on medical care and comorbid conditions that may impact patient outcomes.

| PROJECT TITLE  | FUNDING SOURCE                       | YEAR FUNDED |
|--|--------------------------------------|-------------|
| Establish a Prospective Cohort to Investigate Obesity, Diabetes and the Metabolic Syndrome as Risk Factors in Young Adult Cancer       | NCI CRN Pilot Project                | 2010        |
| Lymph Node Examination in Colorectal Cancer: Predictors of Adequate Staging and Its Influence on Cancer Survival in Community Practice | NCI CRN Pilot Project                | 2010        |
| Non-Melanoma Skin Cancer Ascertainment in the HMO Setting  | NCI CRN Pilot Project                | 2010        |
| Statins and Lymphoid Malignancy Risk in a Large Multi-Site Population-Based Cohort   | NCI R01 Grant                        | 2010        |
| Medical Radiation Induced Cancers  | NCI CRN Pilot Project                | 2009        |
| Development of a Model for Predicting Prostate Cancer  | NCI CRN Pilot Project                | 2009        |
| <b>Is Stroke a Late Effect of Chemotherapy?</b>  | <b>NCI R01 Grant</b>                 | <b>2006</b> |
| Residential Segregation, Housing Status, and Prostate Cancer in African American and White Men   | Department of Defense Training Grant | 2006        |
| New Markers: Clinical & Pathologic Predictors of Ductal Carcinoma <i>in Situ</i>   | NCI CRN Administrative Supplement    | 2005        |
| Medications and Colorectal Cancer Risk   | NCI R03                              | 2004        |
| Statins and Risk of Site-Specific Cancers  | NCI R03                              | 2004        |
| Investigation of Age-Specific Differences and Cancer of the Cecal Colon  | NCI CRN Pilot Project                | 2004        |
| African American Disparities in Lung Cancer Outcomes   | NCI CRN Pilot Project                | 2004        |
| Multicenter Study of Pancreatic Cancer Etiology  | NCI R01 Grant                        | 2004        |
| <b>Making Effective Nutritional Choices (MENU)</b>   | <b>NCI CRN Core Research Project</b> | <b>2003</b> |
| <b>Clinical and Pathologic Predictors of Ductal Carcinoma <i>in Situ</i></b>   | <b>NCI CRN Core Research Project</b> | <b>2003</b> |
| Optimizing Breast Cancer Outcomes: BMI, Tumor Markers, and Quality of Care   | ACS Career Development Grant         | 2003        |
| Medication Use and Risk of Esophageal Adenocarcinoma and Barrett's Esophagus   | NCI Contract                         | 2002        |
| Colon Cancer Survivors—Medications and Risk of Recurrence  | NCI R01 Grant                        | 2001        |
| The Impact of Endocrine Therapy on Survival in Men with Local or Regional Prostate Cancer—Feasibility Study                            | NCI CRN Administrative Supplement    | 2001        |
| <b>Program Testing Early Cancer Treatment and Screening (PROTECTS)</b>   | <b>NCI CRN Core Research Project</b> | <b>1999</b> |

*Selected research projects are highlighted on the following page.*

## Cancer Epidemiology, Prevention, and Health Promotion (cont.)

### Is Stroke a Late Effect of Chemotherapy?

This grant, led by Dr. Ann Geiger (Wake Forest University; formerly of KPSC), explores the hypothesis that chemotherapy may increase stroke risk for years afterward. The study team will estimate the relative risks of stroke as a result of chemotherapy among ethnically diverse patients with bladder, female breast, colorectal, Hodgkin's lymphoma, adult leukemia, multiple myeloma, non-Hodgkin's lymphoma, and ovarian cancers, adjusting for numerous demographic and clinical characteristics.

### Making Effective Nutritional Choices for Cancer Prevention (MENU)

Dr. Christine Cole Johnson (HFHS) led the development and evaluation of an individually tailored, Web-based program to promote daily fruit and vegetable (F&V) consumption. Its efficacy was tested in a randomized trial of five HMOs. The online intervention was shown to be effective in the diverse sample of healthy adults who enrolled. All three intervention arms (untailored and tailored Web program and tailored Web program plus email support) showed early and sustained increases of more than two F&V servings per day. The untailored

Web program arm was least effective. Those participating online at a higher rate had more gain in F&V servings, the retention rate was high, and reported satisfaction with the online program overall was high. Analyses exploring the effects of additional variables on dietary behaviors are ongoing.

### Clinical and Pathologic Predictors for Recurrence after Ductal Carcinoma *in Situ* (DCIS)

In this project, led by Dr. Laurel Habel (KPNC), investigators at three CRN sites are studying clinical and pathologic factors that could be used to identify DCIS patients at high and low recurrence risk. From medical records, investigators have identified DCIS patients treated with breast-conserving surgery (BCS) and followed for recurrence. Recurrence rates after BCS for DCIS have declined as treatment with adjuvant radiotherapy and tamoxifen have increased; adjuvant treatment use does not appear to differ markedly across racial/ethnic groups; and surveillance mammography after BCS for DCIS declines over time and becomes inadequate. This large,

comprehensive study on prognostic factors will improve understanding of the natural history of DCIS and help in developing individually tailored DCIS treatment strategies. It also serves as a model of a CRN project that benefits from the unique electronic and biologic specimens available in the CRN health plans.

### Effectiveness of Early Screening and Prophylactic Mastectomy in Women at Increased Risk for Breast Cancer: Program Testing Early Cancer Treatment and Screening (PROTECTS)

This project, led by Dr. Suzanne Fletcher (HPHC), evaluated the efficacy of bilateral prophylactic mastectomy (BPM) and contralateral prophylactic mastectomy (CPM) among women with unilateral breast cancer in





reducing subsequent breast cancer incidence and mortality, compared to women who had not undergone these surgeries. The women who underwent BPM had a significant reduction in breast cancer risk, but approximately two-thirds experienced significant adverse effects. Compared with breast cancer patients without CPM, the risk of contralateral breast cancer in these women was also reduced significantly. The project also

evaluated the efficacy of mammography and clinical breast exam in real-world settings and contributed methodologic innovations and analyses.

**Multicenter Study of Pancreatic Cancer Etiology**

The Pancreatic Cancer Investigation: Finding Causes (PACIFIC) study is a large, comprehensive case-control study with recruitment from two HMOs

that have infrastructure to support ultra-rapid case identification during diagnostic evaluation. Led by Dr. Margaret Mandelson (GHC), Dr. John Potter (Fred Hutchinson Cancer Research Center), and Dr. Stephen Van Den Eeden (KPNC), this study’s methods allow enrollment of patients who represent the full spectrum of disease, including those typically omitted from prior epidemiologic research because of death shortly following diagnosis.

**Enhancing Cancer Communication and Decision-Making**

Increasingly, CRN projects are leveraging the extensive data on patients, providers, health care delivery, and outcomes to examine and optimize the quality of communication with and among patients; patient decision-making about cancer screening, diagnosis, treatment, and survivorship in diverse populations; and the communication and coordination that characterize the best health care teams in support of their patients. CRN studies in this area examine a wide range of issues, from shared clinical decision-making to outreach strategies, high-risk members, and Web-based consumer information.

**PROJECT TITLE**

Studying Communication over the Cancer Continuum: A Feasibility Study

Development of an Online Dissemination Planning Tool

**CRN Cancer Communication Research Center**

Effective Communication for Preventing and Responding to Oncology Adverse Events

Improving Physician-Parent Communication to Reduce Home Medication Errors and Improve Adherence in Children with Cancer

Oral Health Communication and Latinos in a Managed Care Organization: Does Understanding Vary by Knowledge Level of Colorectal Cancer and Acculturation?

**Health Literacy and Cancer Prevention: Do People Understand What They Hear?**

Use of an Interactive Voice Response System, with Physician Feedback, to Reduce Cancer Symptoms: A Pilot Study

Michigan Center for Health Communications Research

*Selected research projects are highlighted on the following page.*

**FUNDING SOURCE**

NCI CRN Pilot Project

CCRC Administrative Supplement

**NCI P20**

CCRC RO1 Project

CCRC Developmental Project

CCRC Developmental Project

**NCI CRN Core Research Project**

NCI CRN Pilot Project

NCI P50 Grant

**YEAR FUNDED**

2010

2009

**2008**

2008

2008

2008

**2007**

2005

2003

## Enhancing Cancer Communication and Decision-Making (cont.)

### CRN Cancer Communication Research Center

The CRN Cancer Communication Research Center (CCRC) was funded by NCI in 2008 as a program project (P20) to advance research about cancer communication in clinical settings. Led by Dr. James Dearing (KPCO), this is the first communication research center founded within the CRN. The Center identifies, tests, and applies optimal communication and coordination processes that facilitate patient-centered cancer care. Two initial core R01 projects are *Testing an Optimal Model of Patient-Centered Cancer Care* and *Effective Communication for Preventing and Responding to Oncology Adverse Events*. Eighteen investigators at eight CRN sites participate in the Center. The CCRC also ties the CRN into the Center of

Excellence in Cancer Communication Research (CECCR) network of cancer communication research centers at Washington University, the University of Pennsylvania, the University of Michigan, and the University of Wisconsin. Through its shared resource cores that study and explore new practice-based approaches to cancer communication across the CRN as well as how to most effectively disseminate effective cancer communication interventions across clinical settings, the Center is heavily involved in translational research from the processes of innovation to the processes of replication and diffusion. Communication and care coordination processes are assessed across the cancer care continuum from prevention to early detection, diagnosis, treatment, survivorship, and end of life as well as across types, including breast, cervical, colorectal, lung, and prostate cancers.

### Health Literacy and Cancer Prevention: Do People Understand What They Hear?

This study, led by Dr. Kathy Mazor of the Meyers Primary Care Institute at the University of Massachusetts, is developing a test of comprehension of oral (i.e., spoken) messages about cancer prevention and screening. Current measures of health literacy involve comprehension of written material, which is not how most key health information is transmitted. The team will examine the relationship between health literacy and cancer prevention using both quantitative and qualitative methods. Findings will lay the foundation for future research into the prevalence of inadequate oral health literacy, identification of groups and individuals with inadequate comprehension skills, and identification of risk factors and causes of limited comprehension. The project will develop recommendations for modifying oral messages so that they are easily comprehensible, and will test the impact of specific enhancements in a randomized experiment.

*Managed care research networks have several potential advantages for studying questions about cancer care in older women. First, access to care is removed from the equation in survival outcomes. Second, they include large proportions of the population from almost all regions of the United States, providing an alternative universe for population-based studies. Third, the availability of computerized administrative databases linked to laboratory and pathology data and often electronic medical records allows careful delineation of disease and interventions and comprehensive, cost-efficient long-term follow-up. Thus, this network provides high-quality data for observational research and can fill critical gaps in our knowledge, especially in situations where large-scale clinical trials are not likely to be mounted.*

Mandelblatt J. To Screen or Not to Screen Older Women for Breast Cancer: A New Twist on an Old Question or Will We Ever Invest in Getting the Answers? *J Clin Oncol* 2007;25(21):2991–2992.



## Dissemination and Implementation Research in Cancer Prevention, Screening, and Treatment

CRN studies of the introduction and diffusion of new diagnostic and treatment modalities into practice, and the conduct of pharmacoepidemiologic and pharmacogenomic studies of the effectiveness of cancer drugs as delivered in community practice are priority research areas.

| PROJECT TITLE  | FUNDING SOURCE                           | YEAR FUNDED |
|--|--|-------------|
| Media Coverage and Direct-to-Consumer Advertising of Genetic Tests | NCI CRN Pilot Project                    | 2008        |
| Ovarian Cancer Treatment Diffusion Study                           | NCI CRN Administrative Supplement        | 2006        |
| <b>Anti-Estrogen Therapies for Breast Cancer</b>                   | <b>NCI CRN Infrastructure Project</b>    | <b>2005</b> |
| Diffusion of Breast MRI Technology in Community Clinical Settings  | NCI CRN Administrative Supplement        | 2005        |
| <b>HRT Initiation and Cessation after WHI Results</b>              | <b>NCI CRN Administrative Supplement</b> | <b>2002</b> |

*Selected research projects are highlighted below.*

### Anti-Estrogen Therapies for Breast Cancer

As early as 2001, several randomized trials demonstrated that adjuvant aromatase inhibitor treatment is superior to tamoxifen for decreasing breast cancer recurrence among women with estrogen receptor positive breast cancer. CRN investigators used automated pharmacy data from seven CRN sites to assess the use of aromatase inhibitors and tamoxifen between 1996 and 2003. This study, co-lead by Dr. Edward Wagner (GHC) and Ms. Erin Aiello Bowles (GHC), also included an oncologist survey to assess whether and how CRN organizations and oncology groups made policy decisions about cancer interventions. Aromatase inhibitor use rose dramatically after 2001, while tamoxifen use decreased. Regardless of whether their site had formal treatment guidelines, almost all oncologists reported prescribing aromatase inhibitors under various

circumstances: metastatic breast cancer, after completion of tamoxifen, or in lieu of tamoxifen.

### HRT Initiation and Cessation after WHI Results

On May 31, 2002, the Women’s Health Initiative (WHI) randomized trial of hormone therapy (HT) was stopped early because the risks of HT were found to outweigh the benefits. Women randomized to estrogen plus progestin therapy (EPT) experienced an excess risk of invasive breast cancer, coronary heart disease, stroke, venous thromboembolism, and pulmonary embolism compared to women randomized to placebo. To ascertain the effect of this pivotal announcement in community-based delivery settings, the CRN received an NCI administrative supplement to conduct an observational cohort study using automated pharmacy dispensing data. This study, led by Dr. Diana Buist (GHC), provided important information on the rapid

translation of the WHI results into clinical practice, use of HT in relation to current clinical recommendations, and patterns of re-initiation after cessation. The prevalence of EPT and estrogen alone declined 46% and 28%, respectively, after the WHI announcement. These findings demonstrate the CRN’s ability to rapidly examine changes in therapies over time. A follow-up study being conducted by NCI investigators in collaboration with two CRN sites is examining these data at the individual patient level to determine the association between patterns of HT usage and subsequent breast cancer occurrence. The results of this study will be utilized to improve the specification of breast cancer natural history used in the prevention component of breast cancer simulation models (Cancer Intervention and Surveillance Modeling Network [CISNET]).

## Psychosocial Factors and Burden of Cancer

CRN studies that characterize patient education, financial assets, literacy, psychosocial distress, and outcomes such as care experiences and quality of life are the basis for identifying and developing interventions to improve care. Examining disparities in access, treatment, and outcomes are priority research areas.

| PROJECT TITLE  | FUNDING SOURCE          | YEAR FUNDED |
|--|-------------------------|-------------|
| Race, Treatment and Cardiovascular Health: A Study of Men with Prostate Cancer     | Department of Defense   | 2009        |
| Childhood, Adolescent and Young Adult Cancer Survivors—CRN Feasibility Pilot       | NCI CRN Pilot Project   | 2009        |
| Socioeconomic Diversity in Integrated Healthcare Delivery Systems                  | NCI CRN Pilot Project   | 2008        |
| <b>Testing an Optimal Model of Patient-Centered Care</b>                           | <b>CCRC R01 Project</b> | <b>2008</b> |
| <b>Intestinal Ostomies and Informal Caregiving for Colorectal Cancer Survivors</b> | <b>NCI R21 Grant</b>    | <b>2008</b> |
| Understanding Racial and Ethnic Differences in Survival from Colorectal Cancer     | NCI K01 Grant           | 2007        |
| Informing an R01 Application: Interviewing Long-Term Colorectal Cancer Survivors   | NCI CRN Pilot Project   | 2005        |
| <b>Patient-Oriented Outcomes of Prophylactic Mastectomy</b>                        | <b>NCI R01 Grant</b>    | <b>2001</b> |
| Evaluation of End-of-Life Care for Prostate Cancer in the Managed Care Environment | CDC Task Order          | 2000        |

*Selected research projects are highlighted below.*

### Testing an Optimal Model of Patient-Centered Cancer Care

The goal of this study is to develop an Oncology Nurse Care Management program for newly diagnosed breast, colorectal, and lung cancer patients that will address patient questions, symptoms, and psychosocial needs, and facilitates timely, coordinated care. Led by Dr. Edward Wagner (GHC), the study team will develop an early notification system of cancer diagnosis using automated data; develop and implement the case management system; and test its effectiveness in improving patient quality of care, psychosocial distress, and depression. This innovative care management program to enhance patient-centered care will help to fill an important gap in efforts to improve quality of cancer care surrounding diagnosis and treatment decision making.

### Intestinal Ostomies and Informal Caregiving for Colorectal Cancer Survivors

Many colorectal cancer survivors are living with intestinal ostomies, which can lead to bowel incontinence, unless managed daily with special equipment, diet, and behavior. Losing the ability to manage one's ostomy independently can transform an ostomy from a manageable impairment to a source of profound disempowerment, stigma, and disability. This study, led by Dr. Carmit McMullen (KPNW), uses a social model of disability framework to better understand the interrelationships among disability and caregiving in this population, and identifies strategies that ostomates and their caregivers employ to cope with caregiving challenges. This study builds on a longstanding research program on the quality of life of long-term colorectal cancer survivors.

### Patient-Oriented Outcomes of Prophylactic Mastectomy

This study, led by Dr. Ann Geiger (Wake Forest University; formerly of KPSC), used the prophylactic mastectomy efficacy study cohort of nearly 800 women who had undergone contralateral prophylactic mastectomy, bilateral prophylactic mastectomy, or neither of these surgeries (comparison group) at six CRN sites. A survey ascertained willingness to recommend prophylactic mastectomy, decision satisfaction, breast cancer risk-related stress, body image, and sexual activity. Most women undergoing prophylactic mastectomy were satisfied with their decision and reported quality of life comparable to similarly at-risk women in the comparison group. Investigators also examined decision-making research questions and contributed methods papers pertaining to medical records data validity and the impact of IRB reviews on study operations and response rates.



## Data Resources and Infrastructure

In addition to maintaining existing electronic medical record systems and patient Web sites, projects in the CRN are continuing to standardize data infrastructure and develop and test research, surveillance, and medical practice innovations built upon these systems; patient Web portals; and computer-based physician order entry systems.

| PROJECT TITLE   | FUNDING SOURCE  | YEAR FUNDED |
|---|---|-------------|
| Natural Language Processing for Cancer Research Network: Surveillance Studies   | NCI Challenge Grant                                       | 2009        |
| Socioeconomic Diversity in Integrated Healthcare Delivery Systems   | NCI CRN Pilot Project                                     | 2008        |
| Cancer Biomedical Informatics Grid (caBIG®) Data Sharing and Intellectual Capital Workspace                                     | NCI caBIG® Participant Contract                           | 2008        |
| <b>Development of a Versatile Geospatial Database within the CRN</b>  | <b>NCI CRN Pilot Project</b>                              | <b>2008</b> |
| HMO Cancer Research Network: Infrastructure   | NCI CRN Infrastructure Grant                              | 2007        |
| caBIG® Population Sciences Special Interest Group   | NCI caBIG® Participant Contract                           | 2006        |
| Development of a Shareable Analytic Dataset for Studies of Racial Disparities   | NCI CRN Administrative Supplement                         | 2005        |
| Comparing Pancreatic Cancer Identification Using Health Plan Automated Data and SEER Cancer Registry                            | NCI CRN Administrative Supplement                         | 2005        |
| Virtual Data Warehouse (VDW) Enhancement  | NCI CRN Administrative Supplement                         | 2005        |
| Increasing Technology to Maximize Use of the Virtual Data Warehouse (VDW)   | NCI CRN Administrative Supplement                         | 2005        |
| Accuracy of Automated Data on Colorectal Cancer Screening   | NCI CRN Pilot Project                                     | 2004        |
| <b>Using Electronic Medical Records to Measure and Improve Adherence to Tobacco Treatment Guidelines in Primary Care (HIT2)</b> | <b>NCI CRN Core Project and Administrative Supplement</b> | <b>2003</b> |
| HMO Cancer Research Network: Infrastructure   | NCI CRN Infrastructure Grant                              | 2003        |
| Investigating Medical Patient Records and Administrative Data in Case Identification and Treatment (IMPACT)                     | NCI R01 Grant   | 2001        |
| HMO Cancer Research Network: Infrastructure   | NCI CRN Infrastructure Grant                              | 1999        |

*Selected research projects are highlighted below.*

### Development of a Versatile Geospatial Database within the CRN

Geographic information associated with health records and facilities has a broad range of applications, including calculation of geographic access to health services, examination of service areas for health care systems, and measurement of geographically-based exposures. This project, led by Dr. Andrea Cook (GHC) and Dr. Tracy Onega (Dartmouth Medical School), will expand existing geocoding infrastructure to create a versatile geospatial database that will

include individual, demographic, and facility-level geographic variables. The geocoded facility and member data will be used to examine the influences of travel time to facility, facility availability, and socioeconomic indicators on receipt of surveillance mammography.

### Using Electronic Medical Records to Measure and Improve Adherence to Tobacco Treatment Guidelines in Primary Care (HIT2)

EMRs offer an attractive method for evaluating guideline implementation and improving quality of care. This study, led by Dr. Victor Stevens

(KPNW), developed a method for coding tobacco-cessation activities (the “Five A’s”) in four HMOs using EMRs. Data were obtained from coded fields, and information entered in free-text fields (e.g., progress notes) was coded using MediClass, a natural language processing program. The team evaluated the accuracy of MediClass in assessing whether clinicians adhered to the national tobacco treatment guidelines (the “Five A’s”) with patients. MediClass performed as well as the human abstractors and was found to be practical for assessing primary care adherence to the tobacco treatment guidelines.



## Building Capacity to Support Emerging Areas of Cancer Control Research

CRN investigators and health care organizations have tremendous potential to advance research activities to develop, enhance, and test health informatics, database, and biospecimen tools. Moreover, they have the resources to support research in areas such as cancer risk assessment and modeling; studies of behavioral, environmental, and genetic factors; and personalized health care approaches to preventive care, screening, diagnosis/prognosis, and treatment in relation to patient outcomes. Currently, the CRN is developing activities to increase the timeliness, efficiency, and effectiveness of recruitment to phase 2 and phase 3 prevention and treatment trials.

| PROJECT TITLE  | FUNDING SOURCE                                | YEAR FUNDED |
|--|---|-------------|
| SEARCH: Screening Effectiveness and Research in Community-Based Healthcare   | NCI GO Grant                                  | 2009        |
| Comparative Effectiveness Research in Genomic and Personalized Medicine of Colorectal Cancer   | NCI GO Grant                                  | 2009        |
| Building CER Capacity: Aligning CRN, CMS and State Resources to Map Cancer Care  | NCI GO Grant                                  | 2009        |
| <b>Building a Population Laboratory for Pharmacoepidemiologic and Pharmacogenomic Studies in Cancer: Cardiotoxicity following Systemic Therapy for Breast Cancer</b> | <b>NCI CRN Administrative Supplement</b>      | <b>2008</b> |
| <b>Cancer Prevention Index: Using Electronic Records to Improve Cancer Prevention</b>  | <b>NCI CRN Core Research Project</b>          | <b>2008</b> |
| DEcIDE Distributed-Data Network: Comparative Effectiveness and Safety of Second-Line Anti-Hypertensive Agents  | AHRQ Contract                                 | 2007        |
| Effect of HIPAA Privacy Rule on Health Research  | IOM Contract                                  | 2007        |
| <b>Increasing Patient Participation in Clinical Trials</b>   | <b>NCI R01 Grant</b>                          | <b>2007</b> |
| <b>Multiplex Genetic Susceptibility Testing: An Interdisciplinary Collaboration</b>  | <b>NHGRI Administrative Supplement to CRN</b> | <b>2006</b> |
| Outcomes of Genetic Counseling for Heritable Breast/Ovarian Cancer: Feasibility of Identifying Cohort Through EMR  | NCI CRN Administrative Supplement             | 2005        |
| Development of a Method to Assess Obesity and Treatment via EMR  | NCI CRN Administrative Supplement             | 2005        |
| Enrolling Vietnamese and Chinese Women in Breast Cancer Treatment and Prevention Trials  | NCI CRN Administrative Supplement             | 2001        |
| <b>Pilot Study to Identify Organizational Barriers to HMO Participation in Clinical Trials</b>   | <b>NCI CRN Administrative Supplement</b>      | <b>2000</b> |

*Selected research projects are highlighted on the following page.*



### **Building a Population Laboratory for Pharmacoepidemiologic and Pharmacogenomic Studies in Cancer: Cardiotoxicity following Systemic Therapy for Breast Cancer**

This CRN proposal represents the collaborative efforts of four multicenter efforts involving members of the HMO Research Network (HMORN)—the AHRQ-funded HMORN Center for Education and Research in Therapeutics (CERTs), the NHLBI-funded Cardiovascular Research Network (CVRN), the Pharmacogenomics Scientific Interest Group of the HMORN, and the CRN. These networks contribute to and use a common data infrastructure. This project, led by Dr. Edward Wagner (GHC), is creating a population research laboratory to conduct pharmacoepidemiologic and pharmacogenomic studies, and will use this laboratory to examine important questions about the cardiotoxicity of systemic agents used to treat invasive breast cancer. Capacity development will assess the validity of electronic data on chemotherapy infusion; adapt and test alternative strategies for identifying cardiotoxicity using VDW data or other electronic data; explore the feasibility of strategies for assembling biological specimens and collecting DNA samples on study subjects; and add analytic variables for chemotherapy dose, route, and type and cardiotoxicity outcomes data to improve the VDW among the eight participating HMORN sites.

### **Cancer Prevention Index: Using Electronic Records to Improve Cancer Prevention**

This two-year pilot study, led by Dr. Thomas Vogt (KPH), will use the Prevention Index methodology and the CRN VDW to develop and apply a set of Cancer Prevention Index (CPI) metrics to assess the quality of primary and secondary preventive care for cancer. The study will identify the variation in CPI scores across clinics and practices, determine the association of these variations with selected event rates several years later, and evaluate the association of clinician adherence to guidelines with subsequent events among their patients. The study will assess the CPI for secondary prevention (i.e., screening for breast, cervical, colorectal, and prostate cancers) and relate this index to stage at diagnosis, survival, and medical care utilization with 5- and 10-year follow-up for all persons by practice-level performance. A complementary CPI study that incorporates preventive practices relevant to cardiovascular disease was recently funded as part of the CVRN, sponsored by NHLBI.

### **Increasing Patient Participation in Clinical Trials and Pilot Study to Identify Organizational Barriers to HMO Participation in Clinical Trials**

Clinical trials are the primary mechanism by which new approaches to cancer treatment can be evaluated, yet only a very small proportion of eligible cancer patients are offered the

opportunity to participate in clinical trials, and fewer actually enroll.

Dr. Carol Somkin (KPNC) investigated attitudinal and organizational barriers to clinical trial participation at multiple CRN sites in a pilot study. The study revealed enthusiasm for clinical trials, but also a critical need for infrastructure to support trials, better intra-organizational communication, and consideration of a trial design's impact on health plan resources. The study team next received a larger grant to increase patient participation in clinical trials, known as CHOICES: Understanding Clinical Trials as a Treatment Option. This study will use a cluster randomized trial to evaluate the effectiveness of a telephone counseling intervention to increase enrollment, knowledge, and satisfaction with treatment decision. The intervention will be tailored to patient language (English and Spanish), ethnic and cultural background, knowledge, attitudes, and beliefs about clinical trials.

### **Multiplex Genetic Susceptibility Testing: An Interdisciplinary Collaboration**

The Multiplex Initiative, led by Dr. Colleen McBride (NHGRI), is a collaborative effort between NHGRI, NCI, HFHS, and GHC that was funded through a CRN supplement from NHGRI. The objectives are to explore individual response to being offered the Multiplex Genetic Test for complex common diseases and receiving test results, and to develop an infrastructure through which future research participants can be offered the Multiplex Genetic Test protocol.



## ENHANCING CRN RESEARCH CAPACITY AND COLLABORATIONS

CRN priorities in the near term emphasize further development of the CRN research infrastructure and capacity.

This will be accomplished through:

- > Enhancement of the CRN VDW, including continual incorporation of data elements from the EMR systems of the CRN member integrated health care systems.
- > Development, evaluation and implementation of informatics tools to enhance the research utility of CRN data and research materials, including: NLP tools for extracting and standardizing EMR data elements, the use of administrative and EMR data to rapidly and efficiently identify subjects for observational studies and accrual into prospective trials, and the evaluation of informatics tools for inventory control and retrieval of biospecimen material.
- > Increasing CRN human scientific resources by supporting career development of junior investigators through the CRN Scholars Program and increased support for pilot projects, with a special emphasis on collaborations between CRN junior investigators and outside investigators.

In addition, CRN-related grants and other research projects are utilizing the multisite collaborative approach pioneered by the CRN to extend research into new areas. Examples include: CRN-affiliated Challenge and GO grants in CER, the CRN CCRC, and the CVRN. Increasingly, HMO-based cohorts are being developed to study cancer-related outcomes, such as those related to human papillomavirus (HPV) vaccination and the influence of lifestyle factors and molecular markers on breast cancer recurrence and survival.

*It has been an absolute pleasure collaborating with CRN investigators. They have been generous with their expertise as well as their data. The research that we are conducting could not be done in any other setting. Our pilot project has focused on understanding the utilization of diagnostic imaging, and in particular CT, and its associated radiation exposure. As part of this work we have been able to improve the standardization of the data regarding imaging contained within the virtual data warehouse (VDW), and we and other investigators are already submitting broader grant projects that will utilize these newly improved data.*

Rebecca Smith-Bindman, M.D.

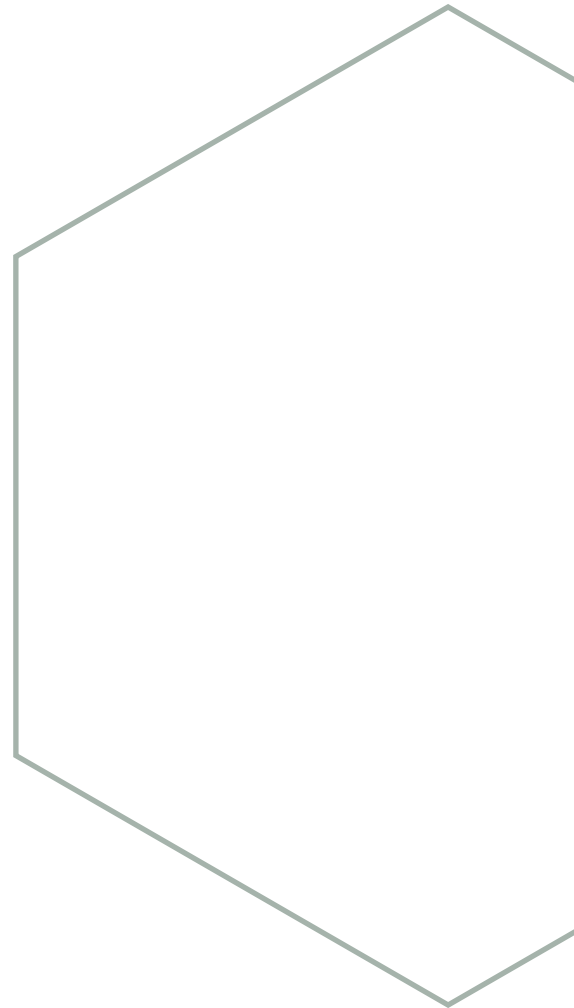
Professor in Residence, Radiology and Biomedical Imaging and Epidemiology & Biostatistics, Obstetrics, Gynecology, and Reproductive Medicine, UCSF Helen Diller Family Comprehensive Cancer Center





## CRN Developmental Pilot Funds

NCI awarded the CRN a developmental fund for pilot activities that are consistent with the CRN’s scientific priorities and leverage unique features of the CRN. The expectation is that the funded pilots will lead to larger fundable grants. Pilot activities involve at least one CRN site and have the potential to lead to research projects that involve multiple CRN sites. All investigators from within the 14 CRN sites are eligible to submit proposals. The CRN also welcomes new collaborators, including investigators external to the CRN. Projects that have already been funded using CRN developmental pilot funds are listed below by year.



- > Establish a Prospective Cohort to Investigate Obesity, Diabetes and the Metabolic Syndrome as Risk Factors in Young Adult Cancer

- > Lymph Node Examination in Colorectal Cancer: Predictors of Adequate Staging and Its Influence on Cancer Survival in Community Practice
- > Non-Melanoma Skin Cancer Ascertainment in the HMO Setting
- > Studying Communication over the Cancer Continuum: A Feasibility Study



- > Childhood, Adolescent and Young Adult Cancer Survivors: CRN Feasibility Pilot
- > Development of a Model for Predicting Prostate Cancer

- > Medical Radiation Induced Cancers
- > Preventing Errors in the Home Care of Children with Cancer



- > Chemotherapy and Coinsurance: The Effect of Cost Sharing on Cancer Care
- > Development of a Versatile Geospatial Database within the CRN

- > Media Coverage and Direct-to-Consumer Advertising of Genetic Tests
- > Opportunistic Colorectal Cancer Screening: Providing FIT with Annual Flu Shots
- > Socioeconomic Diversity in Integrated Healthcare Delivery Systems



- > Informing an R01 Application: Interviewing Long-term Colorectal Cancer Survivors
- > Use of an Interactive Voice Response System, with Physician Feedback, to Reduce Cancer Symptoms: A Pilot Study



- > Accuracy of Automated Data on Colorectal Cancer Screening
- > African American Disparities in Lung Cancer Outcomes

- > Do Acute and Chronic Illness Trump Preventive Care? A Case Study of Breast and Colon Cancer Screening
- > Investigation of Age-Specific Differences and Cancer of the Cecal Colon

## CRN Scholars Program

The CRN Scholars Program was designed to nurture and develop new talent. Designed as a 20-month training activity, the program helps junior investigators develop research independence by serving as a principal investigator on a successful investigator-initiated grant and authoring peer-reviewed, published articles that report original research. The program has two components, including a one-on-one mentoring of 28 CRN Scholars (two groups of 14) over the five years of the grant cycle, and group sessions, including biweekly conference calls and in-person meetings at annual meetings of the CRN. The faculty leaders of the CRN Scholars Program are Drs. Suzanne and Robert Fletcher (HPHC). Both are active in the CRN, Dr. Suzanne Fletcher as Site Principal Investigator of HPHC and Project Leader of the PROTECTS project, and Dr. Robert Fletcher as Co-Principal Investigator of the CRN component of the CanCORS project. Drs. Suzanne and Robert Fletcher have extensive experience in investigator development. Other senior CRN investigators participate in the program to expose participants to leaders in cancer research beyond those at their home institutions, and to increase the breadth and depth of expertise available to them.

### Highlighting CRN Scholar

#### **Chyke Doubeni, M.D., F.R.C.S., M.P.H.**



Dr. Chyke Doubeni is a physician researcher and epidemiologist who has built strong collaborative ties with the CRN throughout his career. He was a member of the 2009 class of CRN scholars and is currently an Assistant Professor in Family Medicine and Community Health and Associate Vice Provost for Diversity at the University of Massachusetts Medical School. In 2004, Dr. Doubeni received a CRN research supplement for underrepresented minorities to conduct a multicenter study evaluating patterns of cancer early detection services in women following diagnosis of breast or cervical cancer, and examining cancer disparities in

these patients. Following completion of the CRN research supplement, Dr. Doubeni received a career development award (*Understanding Racial and Ethnic Disparities in Survival from Colorectal Cancer*) from NCI in 2007. The research component of the career development program utilizes the integrated health care delivery systems of the CRN to assess colorectal cancer care in vulnerable populations. Dr. Doubeni led a recently awarded CRN pilot grant, *Socioeconomic Diversity in Integrated Healthcare Delivery Systems*, to assess the area-level socioeconomic status and race structure of enrollees in integrated health delivery systems of the CRN. Building on this body of research and his CRN collaborations, Dr. Doubeni is currently the Co-Principal Investigator for a CER GO grant: *SEARCH: Cancer Screening Effectiveness and Research in Community Based Healthcare*.

### Highlighting CRN Scholar

#### **Reina Haque, Ph.D., M.P.H.**



Dr. Reina Haque is an epidemiologist and member of the 2009 class of CRN scholars. She is a Research Scientist in the Department of Research and Evaluation, KPSC, and a Scientific Advisor to the KPSC Cancer Registry. In 2005, Dr. Haque led a CRN pilot study, *Comparing Pancreatic Cancer Case Identification Using Health Plan Automated Data and SEER Cancer Registry*, to develop methods for rapid case ascertainment. She has served as a co-investigator and Site PI for several CRN studies, including *Clinical and Pathologic Predictors for Recurrence after Ductal Carcinoma in Situ*, *Molecular Epidemiology of Fatal Prostate Cancer*,

*and Outcomes of Prostate Cancer Androgen Deprivation Therapy*. She has also received pilot funding from the University of California Breast Cancer Research Program to examine adverse effects of combined tamoxifen and antidepressants on breast cancer recurrence. Dr. Haque will build on this body of research and her CRN collaborations to lead a recently awarded multisite R01 grant, *ABC: Antidepressants and Breast Cancer Pharmacoeconomics*, which will assess interactions between tamoxifen and antidepressant use in a large cohort of nearly 25,000 women.

CRN Scholars

2007–2009 COHORT

**Fallon Community Health Plan**

(Meyers Primary Care Institute)  
*Chyke A. Doubeni, M.D., F.R.C.S., M.P.H.*

**Geisinger Health System**

(Geisinger Center for Health Research)  
*James B. Jones, M.B.A., Ph.D.*  
*Nirav Shah, M.D., M.P.H.*

**Harvard Pilgrim Health Care and Harvard Medical School**

(Department of Population Medicine)  
*Michael Klompas, M.D.*  
*Natasha K. Stout, Ph.D.*

**HealthPartners**

(HealthPartners Research Foundation)  
*Robin R. Whitebird, Ph.D., M.S.W.*

**Henry Ford Hospital and Health System/Health Alliance Plan**

(Department of Biostatistics and Research Epidemiology and Center for Health Services Research)  
*Andrea E. Cassidy-Bushrow, Ph.D., M.P.H.*

**Lovelace Health System**

(Lovelace Clinic Foundation Research)  
*Scott B. Robinson, M.A., M.P.H.*

**Kaiser Permanente Hawaii**

(The Center for Health Research–Hawaii)  
*Andrew E. Williams, Ph.D.*

**Kaiser Permanente Northern California**

(Division of Research)  
*Maryam M. Asgari, M.D., M.P.H.*

**Kaiser Permanente Northwest**

(The Center for Health Research–Northwest)  
*Carmit K. McMullen, Ph.D.*

**Kaiser Permanente Southern California**

(Department of Research and Evaluation)  
*Reina Haque, Ph.D., M.P.H.*

**Marshfield Clinic/Security Health Plan**

(Marshfield Clinic Research Foundation)  
*Laura A. Coleman, Ph.D., R.D.*  
*Robert T. Greenlee, Ph.D., M.P.H.*

2009–2011 COHORT

**Fallon Community Health Plan**

(Meyers Primary Care Institute)  
*Kathleen E. Walsh, M.D., M.S.C.*

**Geisinger Health System**

(Geisinger Center for Health Research)  
*Diane Smelser, Ph.D.*

**Group Health Cooperative**

(Group Health Research Institute)  
*Jessica Chubak, Ph.D.*

**Harvard Pilgrim Health Care and Harvard Medical School**

(Department of Population Medicine)  
*Lingling Li, Ph.D.*

**HealthPartners**

(HealthPartners Research Foundation)  
*Kenneth F. Adams, Ph.D.*

**Henry Ford Hospital and Health System/Health Alliance Plan**

(Department of Biostatistics and Research Epidemiology and Center for Health Services Research)  
*Melody Eide, M.D., M.P.H.*  
*Christine M. Neslund-Dudas, Ph.D.*

**Kaiser Permanente Colorado**

(Institute for Health Research)  
*Heather S. Feigelson, Ph.D., M.P.H.*  
*Borsika Rabin, Ph.D., Pharm.D., M.P.H.*

**Kaiser Permanente Georgia**

(The Center for Health Research–Southeast)  
*Pamela J. Mink, Ph.D. (Emory University)*

**Kaiser Permanente Hawaii**

(The Center for Health Research–Hawaii)  
*Katie M. Heinrich, Ph.D. (University of Hawaii at Manoa)*

**Kaiser Permanente Northwest**

(The Center for Health Research–Northwest)  
*Nangel Lindberg, Ph.D.*

**Kaiser Permanente Southern California**

(Department of Research and Evaluation)  
*Corinna Koebnick, Ph.D.*

**Marshfield Clinic/Security Health Plan**

(Marshfield Clinic Research Foundation)  
*Adedayo A. Onitilo, M.D.*

*To me, the CRN has provided unparalleled opportunities to test systems interventions on important cancer outcomes and cancer health disparities. I have had the opportunity to work and partner with investigators at various levels of experience, develop mentoring relationships with renowned investigators, and build collaborative relationships. The combination of data resources, systems to support the development of new investigators, and the academic partnerships has made it possible for me to train and grow as an investigator.*

Chyke Doubeni, M.D., F.R.C.S., M.P.H., University of Massachusetts Medical School, Fallon Community Health Plan, Meyers Primary Care Institute

### THE HMO-BASED CARDIOVASCULAR RESEARCH NETWORK (CVRN)

In December of 2006, the NHLBI issued an RFA for a CVRN, with the goal of increasing scientific knowledge of cardiovascular diseases, including their epidemiology, risk and risk factors, prevention, detection and diagnosis, treatment, and prognosis, in the context of community-based health care delivery, which is the environment in which most clinical and preventive care is delivered. The RFA further stated that the research should be designed to take advantage of existing integrated data systems and use complementary resources for collaborative activities relevant to the goal.

A cooperative agreement grant totaling \$7.5 million was awarded to an HMO-based CVRN led by Dr. Alan S. Go of KPNC. Research collaborators within the CVRN span all 14 of the CRN sites, as well as other external organizations.

Initial CVRN research projects include studies of:

- Hypertension recognition, treatment, and control.
- Quality of care and outcomes of the blood thinner, warfarin, for atrial fibrillation and blood clots.
- Use, outcomes, and costs of implantable cardiac defibrillators for primary prevention of sudden death in heart failure.

Most collaborating research organizations in the HMO Research Network are participating in both the CRN and the CVRN. Through these common links, the CRN and the CVRN will have many opportunities to coordinate research activities of mutual interest, share complementary research infrastructure and expertise, and create many synergies between the two networks.

The CVRN, like the CRN, was successful in competing for CER GO grants. The NHLBI awarded two CER GO grants to the CVRN, one to develop a cardiovascular surveillance system and one to study treatment and outcomes for atrial fibrillation.

### Development of HMO-Based Cohorts at CRN Sites

With its extensive data on patients, providers, health care delivery, and patient outcomes, the HMOs are ideally suited for the development of large prospective cohorts to study cancer-related outcomes. For example, the Vaccine Safety Datalink (VSD), funded by the CDC, is the primary mechanism for population-based evaluations of vaccine safety in the United States.

Eight of the CRN sites participate in the VSD to assess patterns of uptake of the human papillomavirus (HPV) vaccine, a significant new tool for the control of cervical cancer. The VSD is currently assessing capabilities for incorporating the procedure, pharmacy, cytology, and histology data necessary to measure vaccine impact in routine clinical care into their infrastructure. The project will also measure baseline cervical cancer precursor disease, genital warts, and type-specific HPV infection in the period prior to vaccine introduction (i.e., 2000–2005). After the cohort is established, the CDC will be able to monitor outcomes such as autoimmune reactions, type-specific HPV infection, age-specific immunization rates, and possible long-term adverse effects and the durability of the immune response.

Another HMO-based cohort is the Pathways Study. Led by Dr. Lawrence Kushi (KPNC), this study has identified over 2,900 newly

diagnosed breast cancer patients at KPNC who will be followed for multiple years. The multidisciplinary team of investigators from KPNC, the Roswell Park Cancer Institute, and the University of California–San Francisco will study the influence of lifestyle factors, such as diet and physical activity, the built environment, and molecular markers, including genetic factors and epigenetic modification of tumor DNAs on breast cancer recurrence and survival. Because disparities in prognosis by race may be influenced in part by these factors, the study is emphasizing enrollment of minority participants. Investigators will conduct studies in two areas that may provide insight into racial differences in prognosis, namely the role of inflammatory and immune factors, and vitamin D levels. With data from interviews and questionnaires, blood samples, saliva as a source of DNA, availability of tumor blocks, clinical data from KPNC resources and databases, and contextual-level data, the Pathways Study will be a major resource for the epidemiologic investigation of breast cancer prognosis.

CRN scientists and oncologists are very interested in assuring optimal safety of cancer patients, most of whom are exposed to therapies with complex risk profiles. Starting in 2009, most of the CRN sites were included in the Food and Drug

Administration's (FDA's) Sentinel System pilot project, which was established to monitor drug safety using electronic health data. Ultimately, the FDA plans to expand use of this active surveillance system to monitor all FDA-regulated products continuously and in real time through a larger linked system.

### Biospecimen Resources

Recognizing the growing importance of population-based normal tissue specimens as well as tumor specimens linked to rich demographic, risk factor, and medical history data, the CRN Genomics Working Group, which is part of the eight-site CRN Pharmacovigilance Administrative Supplement, has conducted an appraisal of current and potential CRN capacity in this area. Two sites (MCRF and KPNC) currently have large-scale repositories of banked blood or saliva specimens collected under protocols that allow broad access for future research. Multiple CRN sites have access to banked formalin-fixed paraffin-embedded tumor blocks, several of which date back multiple decades. Currently, one site (HFHS) stores fresh frozen tissue as a standard procedure. Infrastructure regarding access, use, and cost of these materials varies across sites and funding under which materials may have been collected. Three sites (GHC, HFHS,

MCRF) currently have the capacity to electronically identify specimens. The CRN Genomics Working Group identified 33 past or current studies at CRN sites that included specimen collection as part of protocols.

### CRN Cancer Communication Research Center (CCRC)

The CRN CCRC was established in 2008 at the Institute for Health Research of Kaiser Permanente Colorado and is a partnership among eight of the 14 CRN sites. Funded by NCI, this CECCR aims to identify and describe optimal communication structures and processes in organizations that facilitate patient-centered communication in cancer care. It also extends the CRN in new ways, including research on health care team-based approaches to communication about cancer, the reduction of patient uncertainty and anxiety, strategies for improving physician-patient communication about cancer, how organizational aspects of our health care systems affect communication quality, and the application of dissemination science to evidence-based practices. The strength of the CRN infrastructure, both interpersonally and technologically, was critical for obtaining this award.



## CRN Grand Opportunity (GO) Grants for Building CER Capacity

The NCI CER GO grant funding opportunity was issued with the specific intent of building capacity and accelerating scientific progress in cancer comparative effectiveness research. Its goal was to sponsor initial two-year efforts to build coherent teams of interdisciplinary researchers to leverage and integrate existing data and health system research resources through such activities as CER study prioritization; data and informatics development; development of CER trials resources and operating procedures; development of CER statistical, psychometric, econometric, and modeling methods; and conduct of proof of principle CER retrospective or prospective pilot studies.

Through the competitive funding process, the CRN received three of the 13 CER GO grants awarded by the NCI. These CER capacity development projects will complement the general capacity development efforts of CRN over the next two years in the areas of breast, cervical, and colorectal cancer screening; clinical and genomic tests for colorectal cancer risk and chemotherapy response; and treatment approaches for recurrent and progressive cancer.

The GO grants awarded to the CRN include:

## Research on the Effectiveness of Advanced Cancer Treatments (REACT)

Through a partnership between investigators in the CRN and Dana-Farber/Harvard Cancer Center, this study will support high-quality cancer CER by addressing two key knowledge gaps: (1) the treatment of advanced cancer; and (2) research on patterns and outcomes of cancer care for patients not represented in SEER-Medicare, the dominant data source in the field. Namely, these patients are less than 65 years of age, receive their health care through an HMO, and are ranked as ‘poor’ based on select criteria. This study will use cancer patient-level data and region-specific data to support studies of patterns of care and outcomes among patients with advanced cancer, and will also look at the capacity and limitations of these datasets. A comparative effectiveness study for patients with advanced cancer will be specified, and an evaluation trial will be designed. The output of this activity will be used to engage stakeholders in building CER capacity in cancer.

## Comparative Effectiveness in Genomic and Personalized Medicine for Colon Cancer

This study will investigate the comparative effectiveness of two tests related to colorectal cancer, the KRAS test and the Lynch Syndrome (LS) prediction test, and will have two main components: (1) data collection conducted through evidence synthesis and cost-effectiveness analysis and (2) primary data collection conducted through a proof-of principle study, which will evaluate the utilization of KRAS and LS genetic tests within several integrated health care delivery systems and measure the effectiveness of KRAS testing compared with a patient population that does not receive testing. Patient and physician interviews will be conducted to assess psychosocial and decision-making issues related to KRAS testing. This study will create a unique research network spanning several member sites of the CRN as well as academic partners.





### **SEARCH: Cancer Screening Effectiveness and Research in Community-based Healthcare**

This study will create a multidisciplinary, multisite center for CER focused on the delivery of cancer screening in a community-based setting. The SEARCH study will be used to conduct two proof-of-principle studies, one comparing liquid-based vs. conventional cytology for cervical cancer screening and one comparing screening colonoscopy vs. fecal-based tests and flexible sigmoidoscopy for colorectal cancer screening. This project will also develop methodological capacity for future large-scale, population-based CER studies, make comparisons of the performance and impact of available and emerging options for population-based cancer screening, and demonstrate the ability to conduct research that addresses important evidence gaps.

### **Other GO Grants with CRN Participation**

#### **Comparative Effectiveness of Breast Imaging Strategies in Community Practice**

CRN investigators are collaborating with investigators from other institutions, including the University of Vermont, the University of California–San Francisco, Georgetown University, and the University of North Carolina to conduct CER on breast cancer imaging modalities and gather evidence on how to optimize breast cancer screening in community practice. Using the NCI-funded Breast Cancer Surveillance Consortium (BCSC), rigorous comparative effectiveness studies on conventional and new breast imaging technologies will inform how screening strategies can be personalized based on patient demographic and risk factor information, and aid in optimizing the balance of screening benefits and harms. In addition, BCSC data will be used to compare the clinical effectiveness of mammography screening intervals, decipher health care utilization and costs of digital vs. film-screen mammography, discern the cost-effectiveness of various breast cancer screening strategies, capture clinically and scientifically relevant data on breast MRI, and develop epidemiologic and statistical methods focused on conducting CER in community settings.

#### **ADVancing Innovative Comparative Effectiveness Research—Cancer Diagnostics (ADVANCE)**

CRN investigators are collaborating with researchers from the University of Washington and the Fred Hutchinson Cancer Research Center to establish a unique research platform designed to perform CER on cancer diagnostics to fill the evidence gap for technologies used in the diagnosis and post-treatment monitoring of cancer. ADVANCE will establish a multidisciplinary and cross-institutional network of health delivery systems and researchers in western Washington State for evaluating the comparative effectiveness of cancer diagnostics in real-world settings. Proof-of-principle studies will be conducted to assess diagnostic tools used for establishing extent of disease among newly diagnosed Stage I–III breast cancer and examine priority topics around in vitro diagnostic and imaging modalities and their clinical applications. Over the long run, the study will use the Puget Sound ADVANCE network to conduct retrospective and prospective community-based CER with a focus on rapid turnaround and observational and randomized studies.



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## Key Resources

### Breast Cancer Surveillance Consortium (BCSC):

<http://breastscreening.cancer.gov>

### Cancer Care Outcomes Research and Surveillance (CanCORS) Consortium:

<http://outcomes.cancer.gov/cancors>

### Cardiovascular Research Network (CVRN):

<http://www.cvrn.org>

### Centers for Education & Research in Therapeutics (CERTs):

<http://www.certs.hhs.gov>

### CRN Cancer Communication Research Center:

<http://www.crn-ccrc.org>

### HMO Research Network (HMORN):

<http://hmoresearchnetwork.org>

### NCI Division of Cancer Control and Population Sciences (DCCPS):

<http://cancercontrol.cancer.gov>

### NCI Centers of Excellence in Cancer Communication Research:

<http://cancercontrol.cancer.gov/hcirb/ceccr>

## CRN Research Themes

- Health Care Delivery, Quality, Costs, and Outcomes
- Health Insurance Benefit Design and Patterns of Care Utilization
- Cancer Epidemiology, Prevention, and Health Promotion
- Enhancing Cancer Communication and Decision-Making
- Dissemination and Implementation Research in Cancer Prevention, Screening, and Treatment
- Psychosocial Factors and Burden of Cancer
- Data Resources and Infrastructure
- Building Capacity to Support Emerging Areas of Cancer Control Research

## CRN Sites

**GHC** = Group Health Cooperative (Group Health Research Institute)

**GHS** = Geisinger Health System (Geisinger Center for Health Research)

**HFHS** = Henry Ford Hospital and Health System/ Health Alliance Plan (Department of Biostatistics and Research Epidemiology and Center for Health Services Research)

**HPHC** = Harvard Pilgrim Health Care Institute and Harvard Medical School (Department of Population Medicine)

**HPRF** = HealthPartners (HealthPartners Research Foundation)

**KPCO** = Kaiser Permanente Colorado (Institute for Health Research)

**KPG** = Kaiser Permanente Georgia (Center for Health Research – Southeast)

**KPH** = Kaiser Permanente Hawaii (Center for Health Research – Hawaii)

**KPNC** = Kaiser Permanente Northern California (Division of Research)

**KPNW** = Kaiser Permanente Northwest (Center for Health Research – Northwest)

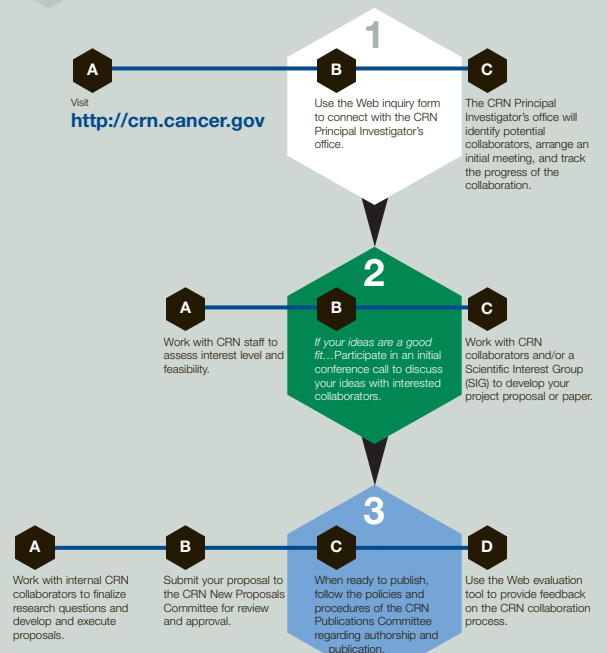
**KPSC** = Kaiser Permanente Southern California (Department of Research and Evaluation)

**LCF** = Lovelace Health System (Lovelace Clinic Foundation Research)

**MCRF** = Marshfield Clinic/Security Health Plan (Marshfield Clinic Research Foundation)

**MPCI** = Fallon Community Health Plan (Meyers Primary Care Institute)

## Collaborating with the CRN





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