CALIFORNIA
Breast
Cancer
Research
PROGRAM

Cycle VIII 2002 Awards Compendium

Table of Contents

Introduction

The California Breast Cancer Research Program (CBCRP) is pleased to announce the funding of 67 new research grants that will advance our knowledge about the causes, prevention, biology, detection, and treatment of breast cancer. With these new awards, the State is investing nearly $15 million to impact the lives of California women. These research projects are being performed at 22 institutions across the state, including universities both public (e.g., University of California campuses) and private (e.g., Stanford University); national laboratories (e.g., Lawrence Berkeley National Laboratory); research institutes (e.g., The Burnham Institute); and medical centers (e.g., California Pacific Medical Center).

The CBCRP supports breast cancer research only in California from funds obtained through:

1) A portion of a 2 cents per pack State cigarette tax
2) Contributions from individuals using the State's income tax check-off option
3) Other generous contributions from concerned community members dedicated to defeating breast cancer

This is our eighth year (or cycle) of grant funding, and through 2002 we have distributed or encumbered approximately $131 million to fund 518 research projects. The CBCRP is administered by the University of California, Office of the President-Division of Health Affairs, in Oakland. The overall objectives, strategies, and priorities of the CBCRP are set by a volunteer advisory Council, which actively participates in overseeing the program and making final recommendations on the grant applications to be funded. The Council consists of 16 members: five are representatives of breast cancer survivor/advocacy groups; five are scientists/clinicians; two are members from non-profit health organizations, one is a practicing breast cancer medical specialist, two are members from private industry, and one is an ex-officio member from the DHS Breast Cancer Early Detection Program.

The Challenge:

With a budget only about 0.1% that of the NIH, the challenge the CBCRP faces is to make the most impact on breast cancer and address the specific concerns of our California stakeholders. Our stated mission is:

> *"…to reduce the impact of breast cancer in California by supporting research on breast cancer and facilitating the dissemination of research findings and their translation into public health practice."*

We realize that both the task to accomplish this mission and the opportunities for success are enormous. Working alongside our advisory Council, we designated nine specific topics, which we call Priority Issues, for invited research in 2002. In addition, we offer a variety of award types that are tailored to the needs of both researchers and the CBCRP's mission. The reason we detail our funding interests so carefully is to: (1) encourage multi-disciplinary collaborative and community-oriented participatory research, (2) allow researchers to explore innovative, "high reward" opportunities, (3) bring new researchers into breast cancer at all levels, and (4) focus on underserved communities and special topics not well covered by other funding agencies. We have seen that our interests and goals have attracted the highest-quality California researchers and institutions to apply. There are two primary reasons for this. First, we maintain the focus of California researchers towards breast cancer by hosting a statewide, biennial CBCRP Research Symposium. This meeting brings the general public, Program stakeholders, and our funded researchers together and serves to motivate and generate a common purpose. We encourage breast cancer activists to express their concerns, so that the research community comes face-to-face with the human issues of the disease. Second, we offer an objective, competitive grant application

evaluation and funding process. In summary, we keep the challenge of defeating breast cancer squarely in the path of researchers in California, and we become active partners in their efforts.

How do we see our mission being accomplished? Our thinking is that the successful enterprise to impact breast cancer will emerge from a combination of: (1) individual creativity, (2) the coalescence of talent from different fields, (3) integrating the social and political components of the disease, (4) involving communities as equal partners in research aims, and (5) an overall vision of purpose. To the extent that encouraging research and funding grants can accomplish these ends, the CBCRP is taking up the challenge.

The CBCRP Funding Process:

In January–February 2002 we received 198 grant applications in response to our "Call" for new research on breast cancer. This was a more than 20% increase in applications compared to 2001. They were evaluated for scientific excellence in a "study section", or peer review process. Our review committee membership and a description of this process are found at the end of this booklet. What we feel makes our system special is the input of our advisory Council in a well-defined "programmatic review", which complements the scientific review to ensure that funded grants match the goals of the CBCRP. The Council members consider several aspects of the responsiveness of the applications to programmatic criteria independently before seeing the scientific peer review merit scores. Thus programmatic interest is rated as a separate item. Finally, the advisory Council and Program staff combine the scientific merit and programmatic interest elements to arrive at a funding decision for each application. The end result is that the successful applicant has responded both in terms of presenting a high quality research project **and** by meeting the interests of the CBCRP stakeholders.

The Outcome:

In the remainder of this introduction and the detailed sections to follow, we present a summary and listing of funded CBCRP grants for 2002 including:

1. Statistics related to funding CBCRP Priority Issue topics and Award Types
2. Highlights of 2002 funding
3. Portfolio summary and detailed list of funded grants for each of our Priority Issue groups
4. List of funded institutions
5. Detailed description of the review and funding process and review committee membership

We have organized our nine research topic Priority Issues into four groups that have a common theme. We feel that this best integrates the pieces of the puzzle that each grant represents in the breast cancer research landscape. The full abstracts of these newly funded grants, as well as those from previous CBCRP funding cycles, can be found on our Web site: http://cbcrp.ucop.edu/. We welcome your thoughts and feedback either via our Web site link "CBCRP Listens" or by e-mail: cbcrp@ucop.edu.

1. Statistical Summary:

A. New CBCRP Funding in 2002:

- Total applications reviewed =198
- Success rate = 33.8%
- Total new grants awarded = 67
- Amount awarded for new grants = $14,809,103

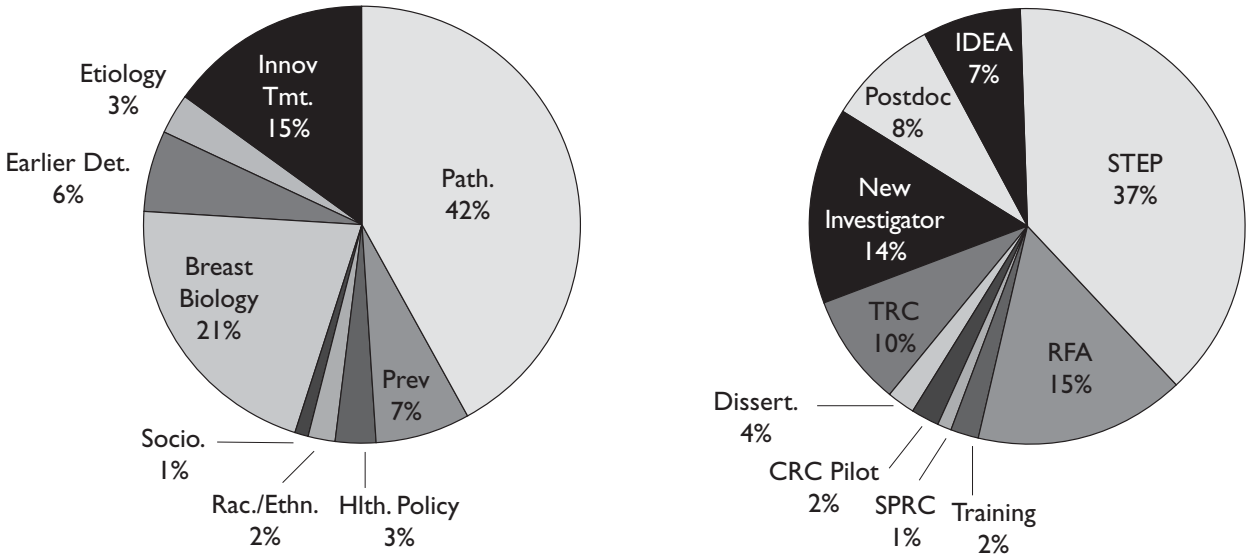
Diversity supplements to previous CBCRP grants:

- Number of supplements = 6
- Amount awarded = $199,990

Total of new grants and supplements awarded in 2002 = $15,009,003

B. Applications and Awards by CBCRP Priority Issues:

Priority Issue	# Applications	# Grants Awarded	Awarded Amount
Health Policy & Health Services	3	2	$432,055
Sociocultural	9	2	$205,028
Racial & Ethnic Differences	3	2	$289,563
Etiology	6	3	$389,696
Prevention	18	4	$1,087,573
Earlier Detection	10	3	$955,959
Innovative Treatments	38	10	$2,293,421
Biology of the Normal Breast	28	11	$3,076,254
Pathogenesis	83	30	$6,079,554



Pie charts showing relative distribution of 2002 CBCRP grants by Priority Issues (left) and Award Types (right). Data is for dollar amount.

C. Applications and Awards by CBCRP Award Types:

Award Type	# Applications	# Grants Awarded	Award Amount
Collaboration awards:			
Community (CRC)	6	2	$266,889
Translational (TRC)	8	4	$1,512,755
Sci. Perspectives (SPRC)	4	1	$100,000
Investigator-initiated Awards:			
RFA	11	3	$2,282,399
STEP	64	19	$5,618,764
IDEA	32	8	$1,085,670
Career Development Awards:			
Dissertation	15	11	$551,729
Postdoctoral	40	13	$1,092,544
New Investigator	16	5	$2,028,655
Training Program	2	1	$269,698

2. Funding Highlights:

2002 CBCRP funding featured:

- Eleven grants to expand our knowledge of normal breast development, function, aging, and separating abnormal breast structures from normal ones. These projects lay the groundwork for explaining the source of breast cancer and how **normal breast biology** might be influenced to prevent breast cancer.
- Seven awards that focus on **prevention/risk reduction and etiology**, including state-of-the-art genetic analysis, exploring ethnic differences, and continuing a training program to focus on these issues
- Two projects to **improve health services** by investigating bone density and access and delivery issues for African American women
- Three projects investigate the underlying reasons behind **racial and ethnic disparities** associated with breast cancer
- Two awards deal with **sociocultural/psychological issues** related to weight loss and the physiological effects of breast cancer diagnosis
- Ten grants will further our understanding of **how the disease progresses** at the basic science level
- Thirteen grants to explore novel methods to **detect breast cancer and explore novel approaches to treatments**. Many of these projects involve cross-disciplinary collaboration teams.
- Twenty-seven projects for **innovative, exploratory, and high-risk/high reward research** projects to push boundaries, challenge existing paradigms, and initiate new research programs
- Thirty awards provide opportunities in **career development** at the levels of graduate training, postdoctoral fellowships, and newly independent investigators. These researchers bring fresh thinking to their respective disciplines.

- Three grants in **special-topic RFAs**, which we have identified as under-funded and allow the CBCRP to maximize its overall impact in breast cancer research
- Seven projects involve **collaborative teams** that include community groups and cross-disciplinary efforts of traditional researchers
- Three awards and the 6 diversity supplements to previously-funded CBCRP grants are of special interest, because they are funded, in part, by revenue from the California **State Income Tax Check-off**. These projects are great examples of our research commitment.

The Community Impact of Breast Cancer:
The Social Context

A woman determined to be "at high risk", diagnosed with, or surviving breast cancer is changed forever. The CBCRP supports research and formulation of public policy alternatives that would contribute to breast cancer prevention and improve outcome. The CBCRP recognizes the need for reducing inequities in access to prevention, detection, treatment, and survivorship services for underserved populations. Finally, we encourage sociocultural, psychological, and behavioral research to reduce the impact of breast cancer on each woman.

Three of CBCRP's Priority Issues are represented in this section:

- Health Policy and Health Services: Better Serving Women's Needs
- Sociocultural, Behavioral & Psychological Issues Relevant to Breast Cancer: The Human Side
- Racial/Ethnic Differences in Breast Cancer: Eliminating Disparity

Funding Data:

		Proportion of CBCRP's Total
Community Impact grants awarded in 2002:	6	9%
Funded amount:	$926,646	6%

Community Impact Portfolio Summary:

Concerned women and scientists alike have long been puzzled by differences in breast cancer incidence and mortality outcomes among racial/ethnic populations. For example, while African American women have a lower incidence of breast cancer, they have a higher mortality rate. Three grants in the community impact section of this year's research portfolio are looking at both health care system and biological factors that may shed light on this issue.

Priscilla Banks with the African American Advisory Committee and Carol Somkin with the Kaiser Foundation Research Institute will carry out a qualitative study to investigate what it is about the health care settings and interactions with providers and staff that promotes and inhibits the delivery of care for African American women. They will explore issues of cultural sensitivity in patient-provider/staff communications and the physical and social environment of the health care settings in which the communications take place. They intend to develop testable hypotheses not only about each of these areas separately but also about their interrelationships.

Barbara Cohn of the Public Health Institute is following up her very recent, exciting findings (that certain placental factors during pregnancy seem to be protective factors for breast cancer later in life) for the first time among African American, Asian, and Hispanic women. **Sally Glaser of the Northern California Cancer Center**, in view of the fact that known risk factors do not explain the majority of the racial/ethnic variation in occurrence, is looking at a novel factor, human leukocyte antigen (HLA), as a new possible genetic factor underlying incidence differences between African American, Hispanic, and white women.

Until the disease is prevented, quality of life issues will continue to be important, especially as new treatment options lengthen survival. Three grants are looking at this issue: two considering various physiological and hormonal aspects of quality of life and one looking at the psychological dimensions. **Carolyn Crandall, a clinician practicing at the University of California, Los Angeles**, will use a new investigator award to help her in transition to a clinical research career by looking at the quality-of-life impact of treatment on bone density and osteoporosis in breast cancer survivors. **Rowan Chlebowski at the Harbor-UCLA Research and Education Institute** will test the feasibility of an intervention to achieve weight loss sufficient to show a reduction in fasting insulin levels in a racially and ethnically diverse population of breast cancer patients in a public hospital setting. He is hoping to eventually be able to show not only an increase in quality of life, but also perhaps a reduction in rates of recurrence.

Finally, **Jill Mitchell, a doctoral student at the University of California, Los Angeles**, will look at what can be learned from the meaning women give to their breast cancer experience, the processes through which they achieve meaning, and what the differences are among women who achieve positive meaning and those who do not. She will also look at how different themes of meaning correspond to cortisol profiles, which is a physiological measure of stress and a potential indicator of disease progression.

Community Impact Grants Funded in 2002:

African American Women and Breast Cancer: What Works?
Banks, Priscilla
African American Advisory Committee
Somkin, Carol
Kaiser Foundation Research Institute
Community Research Collaboration, Pilot Award
1.5 years, $132,055

Weight Loss in Public Hospital Breast Cancer Patients
Chlebowski, Rowan
Harbor-UCLA Research & Education Institute
IDEA Award
1.5 years, $140,941

Can Placenta Factors Explain Race Patterns of Breast Cancer?
Cohn, Barbara
Public Health Institute
IDEA Award
1 year, $86,175

Impact of Breast Cancer and its Therapy on Bone Density
Crandall, Carolyn
University of California, Los Angeles
New Investigator Award
3 years, $300,000

Immune-Function Genes and Race Differences in Breast Cancer
Glaser, Sally
Northern California Cancer Center
STEP Award
2 years, $203,388

Constructed Meaning and Stress in Breast Cancer Experience
Mitchell, Jill
University of California, Los Angeles
Dissertation Award
2 years, $64,087

Prevention and Risk Reduction:
The Environment of the Disease

Despite the identification of breast cancer genes and other risk factors, the disease strikes women seemingly at random. There are causes of the disease that cannot be explained by studying tumors in the laboratory setting. What are environmental and biological factors that interact to increase a woman's risk of developing breast cancer? How do these factors increase the risk and impact different communities of women in California? Knowing what causes breast cancer will allow us to take steps to prevent it.

Two of CBCRP's Priority Issues are represented in this section:

- Etiology: Finding the Causes
- Prevention and Risk Reduction: Ending the Danger of Breast Cancer

Funding Data:

		Proportion of CBCRP's Total
Prevention & Risk Reduction grants awarded in 2002:	7	10%
Funded amount:	$1,477,269	10%

Prevention & Risk Reduction Portfolio Summary:

Catherine Blake, a doctoral student at the University of California, Irvine, was funded to develop a computer program to help scientists rapidly identify new risk factors associated with breast cancer. She intends to semi-automate both the extraction of data from the breast cancer medical literature and the meta-analysis by which conclusions are drawn from multiple studies on the same topic. If scientists are able to explore secondary information in the literature faster and more comprehensively, then they may also be able to reduce publication bias by including articles that were not specifically studying a given risk factor.

Two grants will examine the role of the androgen receptor (AR) in breast cancer. The AR is a steroid hormone receptor that mediates the affects of the steroid hormones testosterone and 5α-dihydrotestosterone. There are contradictory studies in cell line, animal, and human studies about the role of androgen in affecting breast cancer risk. **Elizabeth Lillie, a doctoral student at the University of Southern California**, proposes to test the hypothesis that there is an association between AR activity, as measured by genotyping variations in the AR gene (AR polymorphism), and percent mammographic density, which is a known risk factor for breast cancer, and to determine whether the AR polymorphism is associated with more advanced forms of breast cancer. **Wei Wang, also a doctoral student at the University of Southern California**, will undertake a human population study that will incorporate genetic markers to study differences among individuals in one specific androgen pathway (the PSA pathway) in order to try to determine how androgens act to influence breast cancer risk. The molecular epidemiologic approach he will use is a powerful method that may overcome some of the deficiencies in the previous human studies on this topic.

Bradley Ekstrand, a postdoctoral fellow at Stanford University, will investigate a novel approach to the prediction and prevention of breast cancer. Cells from women with and without breast cancer will be exposed to X-rays and the genetic response to the X-rays will be measured using a microarray. The resulting data from women without breast cancer

will be compared to those with breast cancer. A computer-based statistical method will be used to identify the genes whose responses to X-rays predict the patients with breast cancer. If successful, this strategy would allow breast cancer risk assessments to be based on genetic factors specific to each woman.

There is a large and compelling body of evidence implicating estrogen in human breast cancer. Diet is also thought important, although its role is less clear; however, dietary fiber may play an important role in estrogen metabolism and may therefore be an important determinant of circulating estrogen levels in the body, and thus affect breast cancer risk. **Malcolm Pike at the University of Southern California** will conduct a study into this issue, which is innovative in that it: (1) utilizes an ideal population where the traditional diet is rich in dietary fiber, (2) comprises two generations of Mexican-origin women where differences in breast cancer rates provide powerful evidence on the extent to which the causes are due to changes in environmental factors, and (3) utilizes two methods of quantifying fiber intake—that of a food frequency questionnaire as well as a biochemical marker.

A full term pregnancy (FTP) before age 20 reduces breast cancer risk in women. It does the same in rats and mice exposed to potent chemical carcinogens, perhaps by permanently reducing secretion (in parous animals who have given birth) of some hormones associated with breast cancer. **Satyabrata Nandi at the University of California, Berkeley**, intends to optimize and analyze the physiological and molecular bases of a short-term (7–21 days) protective hormone treatment (PHT) that he has developed using pregnancy levels of estrogen. In rats who have never given birth, this treatment reduced mammary cancer incidence by over 80% and multiplicity of tumors by over 90%. The eventual goal is for this PHT to serve as a paradigm for safe and efficient human breast cancer prevention.

Part of CBCRP's goal is to continually bring fresh ideas and new approaches into breast cancer research. One way of doing this is to support the training of highly qualified students. **Ronald Ross at the University of Southern California** will continue with the third cycle of CBCRP support for a training program emphasizing multidisciplinary interests, which include pathology, molecular biology, cell biology, and cancer control. Trainees are matched to an appropriate faculty mentor with an active breast cancer research program.

Prevention & Risk Reduction Grants Funded in 2002:

Using Scientific Text to Identify Breast Cancer Risk-Factors
Blake, Catherine
University of California, Irvine
Dissertation Award
1 year, $29,136

Using Microarrays to Estimate Breast Cancer Risk
Ekstrand, Bradley
Stanford University
Postdoctoral Fellowship
2 years, $86,400

The Androgen Receptor and Mammographic Density
Lillie, Elizabeth
University of Southern California
Dissertation Award
2 years, $59,998

Breast Cancer Prevention with Estrogen
Nandi, Satyabrata
University of California, Berkeley
Prevention RFA Award
3 years, $812,340

Fiber, Estrogen and Breast Cancer in Mexican American Women
Pike, Malcolm
University of Southern California
STEP award
2 years, $159,697

Tax Check-off

USC/NCCC Breast Cancer Research Training Program
Ross, Ronald
University of Southern California
Training Program
3 years, $269,698

Androgen Receptor Gene and PSA Gene in Breast Cancer Risk
Wang, Wei
University of Southern California
Dissertation Award
2 years, $60,000

Diagnosis and Treatment:

Delivering Clinical Solutions

Early detection does not guarantee a cure. And the limitations of mammography require women to undergo unnecessary biopsies and emotional strain. Ultimately patients and physicians have too few options for treatment. New breast cancer specific and individualized therapies require investigation. Lab researchers and clinicians are encouraged to engage in more cross-disciplinary research projects to link discovery efforts with the clinical issues important to breast cancer.

Two of CBCRP's Priority Issues are represented in this section:

- Earlier Detection: Improving the Chances for a Cure
- Innovative Treatment Modalities: Search for a Cure

Funding Data:

		Proportion of CBCRP's Total
Diagnosis & Treatment grants awarded in 2002:	13	19%
Funded amount:	$3,249,380	21%

Diagnosis & Treatment Portfolio Summary:

We are pleased that several of the newly funded grants in the Diagnosis & Treatment topics are collaborative efforts between scientists from different fields. Starting with the earliest development of the disease, **Thea Tlsty at University of California, San Francisco, and Stefanie Jeffrey at Sanford University** are funded for a Translational Research Collaboration award to examine the role of the connective tissues and stromal cells of the breast. Their research will examine the underlying genetic profile of tissue and cells immediately adjacent to breast tumors and pre-neoplastic lesions to see whether there are changes relative to normal stromal tissue. Detection of cancer, thus, might occur indirectly via biomarkers in the breast stroma, and this research could lead to new thinking on how breast tumors might be arrested by inhibiting the ability of non-cancerous cells to become permissive and support the tumor.

Steven Cummings, Karla Kerlikowske, and John Shepherd at the University of California, San Francisco, are funded for a Scientific Perspectives Research Collaboration exploratory award to employ novel X-ray approaches to study breast density. This project brings new technology to bear on breast cancer. This approach, if successful, also has the potential to be used as an adjunct to mammography to screen high-risk women and monitor preventive treatments. **Kai Vetter and Christine Hartmann Siantar at Lawrence Livermore National Laboratory** are collaborating with **Gerald DeNardo at the University of California, Davis**, in a TRC pilot award to develop a fundamental improvement in visualizing tumors that are "tagged" with radioactive isotopes. If successful, this approach will reduce the radiation needed and improve image quality to bring this method of diagnosis a step closer to the clinic.

Lucy Berlin with her community group, Young Moms with Breast Cancer, and **Hope Rugo at the University of California, San Francisco**, are sharing a Community Research Collaboration pilot award with **Lynn Westphal at Stanford University**. They are funded to develop a new approach to spare younger women diagnosed with breast cancer possible ovarian damage and infertility that often results from chemotherapy treatment. This grant is aimed at

developing the information needed to advance this concept to a clinical trial. Taken together, the four collaboration awards described above allow researchers to combine critical, cross-disciplinary expertise on innovative, "high risk/high reward" projects.

Other grants funded by the CBCRP in 2002 are focused on issues related to immune therapy, new drug targets and tumor-selective agents, chemotherapy and drug resistance, and the application of novel methodologies to address treatment issues. **John Reed, Xiao-Kun Zhang, and Marcia Dawson at The Burnham Institute** and **Francisco Piedrafita at the Sidney Kimmel Cancer Center** are funded for separate innovative STEP grants to study key issues in programmed cell death (apoptosis). Breast cancer cell cells survive drug treatments, and one aspect of drug resistance is the alterations in cellular pathways that might otherwise respond to DNA damage and immune attack. **Jennifer Murray at the Beckman Research Institute of the City of Hope** is funded for a dissertation award to study a gene involved in expression of the key multi-drug resistance protein that often foils treatments with chemotherapy. Another dissertation award to **Christine Case Lo at the University of California, San Francisco**, involves the new discipline of pharmacogenomics to examine the individual response of patients to chemotherapy drugs, so that the tumor exposure and response might be optimized. **Jack Youngren at the University of California, San Francisco**, received funding to explore the insulin-like growth factor and small molecule inhibitors as possible anti-breast cancer agents.

Finally, two new grants focus on cell movement and angiogenesis. Clinical development of MMP (matrix metalloproteinase) inhibitors has lagged, because these enzymes are widespread in the body and have several related forms. Thus, MMP inhibitors usually have too severe side-effects that preclude clinical development. **Vito Quaranta at the Scripps Research Institute** will be using new CBCRP funding in collaboration with a recent Nobel Prize laureate to employ a novel chemistry method to use a specific breast cancer MMP itself to "instruct" the synthesis of a selective inhibitor. **Michael Samoszuk at University of California, Irvine**, is funded for to see if a normal blood clotting mechanism can be activated in the tumor blood supply to starve breast cancer.

Diagnosis & Treatment Grants Funded in 2002:

Chemotherapy-Induced Ovarian Damage: Prevention & Impact
Berlin, Lucy
Young Moms with Breast Cancer, Sunnyvale
Rugo, Hope
University of California, San Francisco
Lynn Westphal
Stanford University
Community Research Collaboration, Pilot Award
1.5 years, $82,479 (UCSF) and $52,355 (Stanford/YMBC)

Drug Dose Tailoring Based on Patient-Specific Factors
Case Lo, Christine
University of California, San Francisco
Dissertation Award
2 years, $50,572

Compositional Breast Density as a Risk Factor
Cummings, Steven; Kerlikowske, Karla; and Shepherd, John
University of California, San Francisco
Scientific Perspectives Research Collaboration, Exploratory Award
1.5 years, $100,000

Novel Retinoids with Enhanced Anti-Breast Tumor Efficacy
Dawson, Marcia
The Burnham Institute
STEP Award
2 years, $384,000

Regulation of SXR and Drug Resistance in Breast Cancer
Murray, Jennifer
Beckman Research Institute of the City of Hope
Dissertation Award
2 years, $42,784

Retinoids in Combination Therapies Against Breast Cancer
Piedrafita, Francisco
Sidney Kimmel Cancer Center
STEP Award
2 years, $396,800

MMP-Directed Synthesis of Invasive Breast Cancer Blockers
Quaranta, Vito
Scripps Research Institute
IDEA Award
1 year, $136,224

PPARγ Modulators as Apoptosis Sensitizers for Breast Cancer
Reed, John
The Burnham Institute
STEP Award
2 years, $465,373

Clotting Breast Cancer
Samoszuk, Michael
University of California, Irvine
IDEA Award
1 year, $98,986

Breast Stromal Genes Act as Early Markers of Malignancy
Tax Check-off
Tlsty, Thea & Jeffrey, Stefanie
University of California, San Francisco and Stanford University
Translational Research Collaboration, Full Award
3 years, $249,999 (UCSF) and $392,498 (Stanford)

New Imager to Improve Specificity in Breast Cancer Detection
Vetter, Kai; Hartmann Siantar, Christine; and DeNardo, Gerald
Lawrence Livermore National Laboratory and University of California, Davis
Translational Research Collaboration, Pilot Award
1.5 years, $213,462

Potential New Drug Therapy for Breast Cancer
Youngren, Jack
University of California, San Francisco
STEP Award
2 years, $199,848

TR3-based Peptides for Apoptosis in Breast Cancer
Zhang, Xiao-Kun
The Burnham Institute
STEP Award
2 years, $384,000

Biology of the Breast Cell:
The Basic Science of the Disease

We need to move beyond the static picture of breast cancer in current tumor cell lines and animal models. We need new research to understand the pre-neoplastic, causative events of the disease at the tissue, cell, and genetic levels. Disease progression and the heterogeneity seen in the clinic need clarification at the basic science level. We must better understand the genetic and molecular signatures of the disease to treat it effectively.

Two of CBCRP's Priority Issues are represented, and the funding data, portfolio summaries, and funded grants are presented in separate sections:

- Biology of the Normal Breast: The Starting Point
- Pathogenesis: Understanding the Disease

Biology of the Normal Breast: The Starting Point

Biology of the Normal Breast Funding Data:

		Proportion of CBCRP's Total
Grants awarded in 2002:	11	16%
Funded amount:	$3,076,254	21%

Biology of the Normal Breast Portfolio Summary:

The biology of the normal breast is a greatly understudied area. That is why the CBCRP has continued to support this priority issue. The breast is a complex structure composed of several cell types that function to generate milk or to support the cells that generate milk. We know that the milk-forming cells are the ones that are most likely to give rise to tumors, but there are many questions yet to be answered. How do the different types of cells interact in the breast under normal conditions? What normal changes are necessary for the breast to function properly? Without knowing the answers to these questions, it requires a leap of faith to be able to identify the abnormal changes associated with cancer.

What we do know about the breast is that it is an organ in constant flux. Researchers are finding that how the breast remodels itself under the influence of internal and external factors dictates how it functions. The production of milk depends on the maturity (differentiation) of the breast cells, which in turn is controlled by hormones and growth factors and the immediate environment of the cells, as well as the internal and external physical structure of the cells.

The eleven newly funded grants in the Biology of the Normal Breast priority area investigate various pathways that contribute to breast cell growth, maturation, and death. These include the:

- Influence of **breast structure** on growth and **maturation**
- **Influence of DNA structure on growth and cell growth and maturation**
- **Role of non-milk producing cells** in the breast
- Mechanisms of **action of hormones** and internal factors in breast cells
- Discrimination of normal **early changes in the breast** from abnormal ones

Several grants are examining how the non milk-producing cells and the environment that surround the milk-producing cells affect their behavior during growth, development, and aging. The role of cells such as those lining the blood vessels could affect breast cell growth potential. **Longchuan Chen of the La Jolla Institute for Molecular Medicine** received a one-year IDEA Award to determine whether blood vessel precursor cells can affect mammary cell growth. The extracellular matrix that surrounds the breast cells can also be a major factor in breast development. **Jamie Bascom at the Lawrence Berkeley National Laboratory** will use a one-year dissertation award to determine how an extracellular protein, called epimorphin, interacts with progesterone to influence breast development, while **Aylin Rizki from the Lawrence Berkeley National Laboratory** will use a two-year postdoctoral fellowship to determine the role of the extracellular matrix in protecting the milk-producing cells from DNA damage. **Ana Krtolica, also at the Lawrence Berkeley National Laboratory**, has a three-year new investigator award in which she will determine whether the age of fibroblasts—a type of breast cell that provides support for the milk-producing cells—effects the biological processes of the milk-producing cells. **Steven Artandi of Stanford University** is also going to study the affects of aging in the breast using a three-year RFA, but he will focus on the role of telomerase and telomere shortening in this process.

Several investigators will explore the role of hormones and growth factors on breast cell growth and breast development. Estrogen, progesterone, and prolactin have all been shown to regulate breast cell growth, but their process for doing so is still unclear. Three investigators will look at the effect of putative intermediate players in hormone growth regulation on breast growth by removing them from cells or adding excess amounts to cells. **Shi Huang of The Burnham Institute** will use a two-year STEP award to investigate the role of an estrogen-receptor related protein, called RIZ1, in mammary gland development; **Richard Price, Jr. from the University of California, San Francisco**, will use a two-year postdoctoral fellowship to investigate the effect of varying levels of estrogen receptor on mouse milk-producing cells; and **Hee Kwang Choi at The Burnham Institute** will use a two-year postdoctoral fellowship to investigate the effect of Rac/STAT5—a putative master switch for estrogen and prolactin action—on mammary growth. **Cindy Wilson of the University of California, Los Angeles**, will use a two-year STEP award to explore a slightly different aspect of normal mammary growth control. She will determine the effect of differing levels of the growth factor receptor called HER-2 on mammary growth inhibition.

An additional reason for studying normal breast biology is to devise ways to sort out normal changes in the breast from pre-cancerous changes. Two studies using different methods to advance this goal have been funded. **James Ford and Sylvia Plevritis at Stanford University** have been funded to perform a one-year Translational Research Collaboration pilot project, which will use MRI screening to detect changes in the breast and then genetic analysis to determine whether the normal structures can be differentiated from abnormal ones. **Saira Mian of the Lawrence Berkeley National Laboratory** will use a three-year RFA to develop statistical techniques to sort out which genetic changes in the breast are significant.

Biology of the Normal Breast Grants Funded in 2002:

Understanding Telomere Dynamics in the Breast
Artandi, Steven
Stanford University
Request for Applications (RFA) Award
3 years, $675,691

Role of Epimorphin and Progesterone in Breast Development
Bascom, Jamie
Lawrence Berkeley National Laboratory
Dissertation Award
1 year, $23,825

Defining a Role for Endothelial Precursor Cells in Breast
Chen, Longchuan
La Jolla Institute for Molecular medicine
IDEA Award
1 year, $199,174

Rac/STAT5 Signaling
Choi, Hee Kwang
The Burnham Institute
Postdoctoral Fellowship
2 years, $86,400

Genetic Alterations in MRI Screen-Detected Breast Lesions
Ford, James & Plevritis, Sylvia
Stanford University
Translational Research Collaboration, Pilot Award
1.5 years, $157,000

Steroid Receptor Coactivators in Mammary Gland Development
Huang, Shi
The Burnham Institute
STEP award
2 years, $394,020

Understanding Aging Effects in the Breast
Krtolica, Ana
Lawrence Berkeley National Laboratory
New Investigator
3 years, $448,884

Statistical Techniques for Breast Biology & Cancer Research
Mian, Saira
Lawrence Berkeley National Laboratory
Request for Applications Award
3 years, $794,368

Targeting Estrogen Receptors to Mouse Mammary Epithelium
Price, Jr., Richard
University of California, San Francisco
Postdoctoral Fellowship
2 years, $80,000

Effect of Breast Cell Environment on Repair of DNA Damage
Rizki, Aylin
Lawrence Berkeley National Laboratory
Postdoctoral Fellowship
2 years, $80,672

The Importance of Growth Inhibitory Signals in Normal Breast
Wilson, Cindy
University of California, Los Angeles
STEP Award
2 years, $150,000

Pathogenesis: Understanding the Disease

Pathogenesis Funding Data:

		Proportion of CBCRP's Total
Grants awarded in 2002	30	45%
Funded amount:	$6,079,554	42%

Pathogenesis Portfolio Summary:

The underlying cellular, genetic, and biological processes of breast cancer continue to be major topics of research interest and CBCRP funding for 2002. Some key questions that are being addressed in our funded research include:

- Why do cancer cells have the ability to divide beyond the point where normal breast cells become stable?
- What is the underlying biology that explains why many breast cancer cells do not respond well to drug treatment, or develop drug resistance?
- What are the genetic differences between various forms of breast cancer?
- Can a more detailed understanding of heterogeneity in breast cancer lead to better disease biomarkers and targeted, individualized therapies?
- What are the key genetic and protein biomarkers of disease status and risk for progression?

Because of the large number of Pathogenesis grants funded in 2002, we will provide highlights only for selected projects. **Gerry Boss and Anne Wallace at the University of California, San Diego**, are funded for a three-year Translational Research Collaboration to study whether a newly patented test for a key signaling protein, called Ras, might provide prognostic information on biopsy samples. Ras inhibitors are in clinical development, but there is not a validated assay to match patients with these drugs. **Jan Schnitzer from the Sidney Kimmel Cancer Center** is funded for an innovative STEP grant to discover new proteins on the blood vessel lining cells (endothelial cells) that are specific to breast cancer and might be the target of new therapeutics. This research would open new opportunities to target the tumor's blood supply. **Jonathan Pollack from Stanford University** is funded as a new investigator to use powerful DNA array technology to pinpoint DNA amplifications or deletions in clinical samples. Herceptin become most clinically useful when a test became available to determine those women having Her-2 gene amplifications. Dr. Pollack would greatly expand on this approach and simultaneously associate gene expression information and gene copy number.

Next, proteomics is an emerging discipline that complements genetic analysis by studying the protein content and abundance within cells and, in the case of breast cancer, determining how protein differences are associated with progression and key biological properties. **Benjamin Cravatt** and his postdoctoral fellow, **Arul Joseph at the Scripps Research Institute**, are funded in separate grants to apply a novel proteomics assay to analyze the invasive proteases of breast cancer cells. Their methods can catalog the active proteases and simultaneously point the way to inhibiting their activity.

The narrow focus in basic science's approach to breast cancer is illustrated best by the fact that the bulk of research is performed using less than ten model cell lines, and these model cells do not mirror key clinical aspects of the disease. **Shanaz Dairkee at the California Pacific Medical Center** is using CBCRP funding to think outside the box and develop a potential breakthrough technique to immortalize breast cancer cells directly from newly diagnosed patients. If successful, this method might bring individualized therapy a big step closer.

Finally, the CBCRP funds career development and allows researchers to bring approaches completely outside current breast cancer research to bear on our understanding the disease. **Patrick Lupardus at Stanford University** received a dissertation award to study a key DNA repair process using a frog model system. The inability of cancer cells to monitor their DNA properly is a key factor in allowing the massive genetic changes seen at diagnosis. A postdoctoral fellow, **Cheryl Van Buskirk at the California Institute of Technology**, is studying a nematode, called *C. elegans*, to see how the cellular processing of a key growth factor receptor (EGFR) is regulated. **Kelly Boatright at The Burnham Institute** received a dissertation award to enter breast cancer research by studying why chromosome separation is defective in breast cancer.

Pathogenesis Grants Funded in 2002:

The newly funded grants for CBCRP's Pathogenesis priority issue are organized into five sub-topics.

1. **Outbreak—How Cancer Spreads: Angiogenesis, Invasion, and Metastasis**
   Breast tumors become life-threatening by acquiring the ability to stimulate blood vessel growth, initiating cell movement and invasion, and ultimately spreading to distant organs. The CBCRP funded four new grants in 2002 under this sub-topic.

   HOX Transcriptional Regulation of Angiogenesis
   Charboneau, Aubri
   University of California, San Francisco
   Postdoctoral Fellowship
   2 years, $80,000

   The Role of Matrix Metalloproteinase 13 in Breast Cancer
   Egeblad, Mikala
   University of California, San Francisco
   Postdoctoral Fellowship
   2 years, $80,000

   Method to Profile Active Metalloproteases in Breast Cancer
   Joseph, Arul
   Scripps Research Institute
   Postdoctoral Fellowship
   2 years, $86,400

   Identifying Accessible Targets in Human Breast Tumors
   Schnitzer, Jan
   Sidney Kimmel Cancer Center
   STEP Award
   2 years, $496,000

2. **Too Much Cell Growth: Defective Messages and Internal Signaling**
   Cancer is defined as the growth of abnormal cells. Therefore, much current research effort is directed at underlying growth processes of intracellular signaling, cell division control checkpoints, growth receptor function (e.g., Her-2 and EGFR), and programmed cell death (apoptosis). This research will give insight into tumor formation and the ability of cells to survive drug treatment and the immune response. The CBCRP funded eight new grants in 2002 under this sub-topic.

   Cell Killing Effect of Orphan Receptor TR3 in Breast Cancer
   Bruey-Sedano, Nathalie
   The Burnham Institute
   Postdoctoral Fellowship
   2 years, $86,400

   Novel Ligands as Probes of Estrogen Receptor Signaling
   Clegg, Nicola
   University of California, San Francisco
   Dissertation Award
   2 years, $50,941

Cyclin E Affects Growth Arrest in Breast Cancer Cells
Dhillon, Navdeep
University of California, Davis
Dissertation Award
2 years, $50,386

A Novel Anti-estrogen Resistance Mechanism in Breast Cancer
Ely, Kathryn
The Burnham Institute
IDEA Award
1.5 years, $144,000

Structure and Function of the Bax Apoptosis Regulator
Marassi, Francesca
The Burnham Institute
STEP Award
2 years, $297,000

DNA Damage Response Pathways in Breast Cancer Cells
Maroto, Beatriz
Scripps Research Institute
Postdoctoral Fellowship
2 years, $86,400

Regulation of Estrogen Response by Corepressors
Privalsky, Martin
University of California, Davis
STEP Award
2 years, $149,942

Analysis of EGFR Transcript Splicing in *C. Elegans*
Van Buskirk, Cheryl
California Institute of Technology
Postdoctoral Fellowship
2 years, $86,400

3. Mistakes on the Master Blueprint: Molecular Genetics and Gene Regulation

Breast cancer is characterized by major chromosomal deletions, duplications, and rearrangements. These genetic mutations might someday form the basis of detection, treatment, and analysis of disease severity. Many of these genetic alterations are thought to accumulate as a result of defects in DNA monitoring functions and normal repair processes. The CBCRP funded four new grants in 2002 under this sub-topic.

Alterations in the Separase/Securin Balance in Breast Cancer
Boatright, Kelly
The Burnham Institute
Dissertation Award
2 years, $60,000

Identifying Sources of Genomic Instability in Breast Cancer
Cimprich, Karlene
Stanford University
IDEA Award
1.5 years, $118,432

The Detailed Structure of a Model Breast Cancer Genome
Collins, Colin
University of California, San Francisco
STEP Award
2 years, $194,840

Global Gene Regulation by SATB1 in Metastatic Breast Cancer
Kohwi-Shigematsu, Terumi
Lawrence Berkeley National Laboratory
IDEA Award
1 year, $161,513

4. **Searching the Unknown: Novel Breast Cancer Genes**

It has been estimated that up to 4,000 of the 30,000–35,000 human genes might represent causative agents for initiation and progression of various human diseases. The relevant number for breast cancer is thought to be 100–200, perhaps less. Each new suspected genetic piece of the puzzle needs to be validated as relevant to breast cancer and accurately placed with respect to the biology of the disease. The CBCRP funded four new grants in 2002 under this sub-topic.

Profiling Enzyme Activities in Models of Human Breast Cancer
Cravatt, Benjamin
Scripps Research Institute
STEP Award
2 years, $369,508

Regulation of the Rad1 Checkpoint Complex in Breast Cancer
Lupardus, Patrick
Stanford University
Dissertation Award
2 years, $60,000

Cloning of the X Chromosome's Putative Tumor Suppressor Gene
Malkhosyan, Sergei
The Burnham Institute
STEP Award
2 years, $297,000

Locating Novel Breast Cancer Genes using DNA Microarrays
Pollack, Jonathan
Stanford University
New Investigator Award
3 years, $470,796

5. **Unraveling the Path to Breast Cancer: Tumor Progression**

Breast cancer develops though many stages for a decade or more before detection. What happens during this progression period, and are there new opportunities to arrest the disease? This topic also incorporates work on the biology of the normal breast and enables new treatment concepts based on an understanding of clinical heterogeneity of breast cancer. The CBCRP funded ten new grants in 2002 under this sub-topic.

The Role of PTEN in Progression of Ductal Carcinoma *in Situ*
Bose, Shikha
Cedars-Sinai Medical Center
New Investigator
2 years, $306,000

Prognostic Value of Ras Activation in Breast Cancer
Boss, Gerry & Wallace, Anne
University of California, San Diego
Translational Research Collaboration, Full Award
3 years, $499,796

Infinite Expansion of Breast Tumor Samples in Culture
Dairkee, Shanaz
California Pacific Medical Center
STEP Award
2 years, $311,400

Does the BLM Gene Co-regulate BRCA1 in DNA Damage Response?
Davalos, Albert
Lawrence Berkeley National Laboratory
Postdoctoral Fellowship
2 years, $80,672

Molecular Pathogenesis of Metastatic Breast Cancer
Debs, Robert
California Pacific Medical Center
STEP Award
2 years, $311,400

Studies of Telomere Capping Dysfunction in Breast Cancer
Gilley, David
Lawrence Berkeley National Laboratory
New Investigator
3 years, $502,975

Fatty Acid Synthase and Breast Cancer
Knowles, Lynn
The Burnham Institute
Postdoctoral Fellowship
2 years, $86,400

Identification and Prognostic Value of ERβ in Breast Cancer
Leitman, Dale
University of California, San Francisco
STEP Award
2 years, $150,000

Three-Dimensional Modeling of Breast Cancer Progression
Ortiz de Solorzano, Carlos
Lawrence Berkeley National Laboratory
STEP Award
2 years, $336,328

BRCA1-dependent Ubiquitin Ligase Activity in Breast Cancer
Xia, Yan
Salk Institute for Biological Studies
Postdoctoral Fellowship
2 years, $86,400

Diversity Supplements

In 2002 the CBCRP began offering award supplements to allow individuals and community organizations that face barriers to overcome these barriers and participate in CBCRP-funded research. We have two grant supplement categories.

First, the regular Diversity Supplements provide funds to CBCRP-supported Principal Investigators so that they may mentor a promising student who may not otherwise have the opportunity to continue in breast cancer research. The aim is to support students who are:

- Interested in pursuing careers in breast cancer research
- Facing barriers that may prevent them from realizing a career in breast cancer research or pursuing research in areas that are under-represented in breast cancer research or with communities that are under-represented in breast cancer research

Second, we offer participatory research Community Research Collaboration (CRC) supplements (CRCAS) that focus in two distinct areas:

- Academic: To mentor students, research fellows, and early career (less than 3 years as an independent investigator) researchers.
- Community: To mentor new community groups to become part of an existing CBCRP-funded grant.

Note: The diversity supplements are supported by funds generated from Californians that donate to the CBCRP via the check-off line on the State income tax form.

Funding Data:

Diversity supplements awarded in 2002:	6
Funded amount:	$199,990

Diversity Supplements Funded in 2002:

The Impact of Structure on the Quality of Breast Cancer Care
Danielle Rose Ash
University of California, Los Angeles
PI and mentor: Katherine Kahn
2 years, $40,000

Pathway-Specific Gene Expression in Breast Cancer Cells
Melanie Funes-Duran
University of California, Davis
PI and mentor: Colleen Sweeney
2 years, $40,000

HER-2/neu Gene Variations and Breast Cancer Risk
Dorothy Hong
University of Southern California
PI and mentor: Michael Press
2 years, $40,000

Determinants of Receiving Breast Cancer Treatment in the Underserved
Yoshiko Umezawa
University of California, Los Angeles
PI and mentor: Rose Maly
2 years, $40,000

A Network-Based Intervention for Chamorros in Southern California
Tina Vacharkulksemsuk (CRCAS)
University of California, Irvine
Co-PIs and mentors: Sora Park Tanjasiri and Lola Sablan-Santos
1 year, $19,990

Does a Peer Navigator Improve Quality of Life at Diagnosis?
Familia Center, Santa Cruz (CRCAS)
Stanford University
PI and mentor: Caroline Bliss-Isberg
2 years, $20,000

2002 CBCRP Funding by Institution

The following 22 California research institutions were awarded new CBCRP grants in 2002. Some awards were split between institutions.

Institution	# Awards	Award Amount
Beckman Research Institute of the City of Hope, Duarte	1	$42,784
California Institute of Technology, Pasadena	1	$86,400
California Pacific Medical Center Research Institute, San Francisco	2	$622,800
Cedars-Sinai Medical Center, Los Angeles	1	$306,000
Harbor-UCLA Research & Education Institute, Torrance	1	$140,941
Kaiser Foundation Research Institute, Oakland	1	$132,055
La Jolla Institute for Molecular Medicine	1	$199,174
Lawrence Berkeley National Laboratory, Berkeley	9	$2,642,699
Northern California Cancer Center, Union City	1	$203,388
Public Health Institute, Berkeley	1	$86,175
Salk Institute for Biological Studies, San Diego	1	$86,400
Scripps Research Institute, La Jolla	4	$678,532
Sidney Kimmel Cancer Center, San Diego	2	$892,800
Stanford University, Palo Alto	8	$2,013,397
The Burnham Institute, La Jolla	11	$2,652,813
University of California, Berkeley	1	$812,340
University of California, Davis	2	$200,328
University of California, Irvine	2	$128,122
University of California, Los Angeles	3	$514,087
University of California, San Diego	1	$499,796
University of California, San Francisco	11	$1,318,679
University of Southern California, Los Angeles	4	$549,393

2002 CBCRP Application Evaluation & Review Committees

Grant applications in 2002 were initially reviewed and scored for scientific merit in six peer review Committees. The Committees are composed of distinct types of reviewers, and they reviewed grants modeled on established practice at the National Institutes of Health (NIH). The Chair leads the review process and is a senior researcher in breast cancer areas associated with the Committee's central topic or priority issue. Committee members have broad expertise in topics associated with individual applications. Breast cancer Advocate reviewers are women active in breast cancer issues (many of whom are also living with the disease), and they bring their personal knowledge and commitment to the review process. Often the Advocates have specialized training in grant review, such as the NBCC's Project LEAD. Each committee also has a California Advocate Observer, who is not assigned applications for review and does not vote, but represents the California advocacy community. The Observer gains insight into the research evaluation process and provides feedback to the Program on this process. Ad Hoc members participate by teleconference and bring their specialized expertise to the review of individual applications.

Over the past five years, the CBCRP has developed, tested, and phased in a scoring system that allows our expert reviewers to better differentiate applications that are especially innovative and that have the most potential impact on breast cancer. This has improved our ability to choose the most innovative and creative research for funding. In the past, the majority of research funding agencies, including the CBCRP and the NIH, rated proposals with a single scientific merit score. With this method, for example, an application with an excellent research plan to test an idea that wasn't particularly novel could receive the same score as an application with an average research plan to test a very novel idea. CBCRP's new scoring method, which separates scientific merit into component elements specific for each award type, can better differentiate specific qualities in each application. Some key scientific merit components include:

- Innovativeness
- Impact
- Approach
- Feasibility
- Career Development
- Translational potential (TRC award type)
- Cross-disciplinary elements (TRC award type)
- Community Involvement (CRC award type)
- Community Benefit (CRC award type)

After the completion of all review committees, the CBCRP ranks the application pool by average scientific merit, which is the combined average of the scientific merit components for the application's award type. The lowest third (approximately) of applications ranked by average scientific merit are excluded from further consideration for funding.

Next, applications having sufficient scientific merit are then examined by the CBCRP's advisory Council for programmatic relevance. The following criteria are used:

- Responsiveness to the CBCRP's priority issues and award types
- Multidisciplinary approach
- Translational potential
- Focus on the underserved
- Strength of individual scientific merit component scores
- Balance of overall portfolio
- Emphasis on relatively underfunded areas
- Inclusion of advocates and sensitivity to advocacy issues/concerns

In addition, we place some of our Priority Issues and Award Types into a primary category, and these applications are given first consideration for funding.

Finally, the advisory Council recommends the grants to be funded, based upon (1) the review committee scientific average and component merit scores and (2) the programmatic relevance. This two-tiered process ensures both scientific excellence and relevance of the research to CBCRP's mission and goals.

The CBCRP wishes to thank the participants in our 2002 Review Committees for their service and dedication to our Program.

Basic Breast Biology Committee

Chair:

Margaret (Peggy) C. Neville, Ph.D.
Professor of Physiology and Biophysics
School of Medicine
University of Colorado Health Sciences Center
Denver, CO 80262

Members:

Michael F. Clarke, M.D.
Professor
Simpson Memorial Institute
University of Michigan
Ann Arbor, MI 48109-0668

James DiRenzo, Ph.D.
Assistant Professor of Pharmacology and Toxicology
Department of Pharmacology
Dartmouth Medical School
Hanover, NH 03755-3835

Leena Hilakivi-Clarke, Ph.D.
Associate Professor, Oncology
Georgetown University
Washington, DC 20007

Russell Hovey, Ph.D.
Assistant Professor
Department of Animal Science
University of Vermont
Burlington, VT 05405

Patricia J. Keely, Ph.D.
Assistant Professor
University of Wisconsin
Department of Pharmacology
Madison, WI 53706

M. Stephen Meyn, M.D., Ph.D., FRCP(C)
Professor
University of Toronto
The Hospital for Sick Children
Toronto, ON M5G 1X8

J. Thomas Pento, Ph.D.
Professor of Pharmacology and Toxicology
College of Pharmacy
University of Oklahoma Health Sciences Center
Oklahoma City, OK 73190

Terry Riss, Ph.D.
Project Manager, Cell Reg./Signal Transduction
Promega Corporation
Madison, WI 53711-5399

Mary Sharon Stack, Ph.D.
Associate Professor
Department of Cell and Molecular Biology
Northwestern University School of Medicine
Chicago, IL 60611

Alan Wells, M.D., D.M.S.
Professor
Department of Pathology
University of Pittsburgh
Pittsburgh, PA 15261

Advocate Members:

Debbie Basile
Babylon Breast Cancer Coalition
Babylon, NY 11702

Michele W. Ganon, M.B.A., Ph.D.
National Breast Cancer Coalition
Danbury, CT 06810

Selma J. Morris, M.Ed.
Breast Health Initiative
Decatur, GA 30030

California Advocate Observer:

Lee Lane
National Breast Cancer Coalition
Coronado, CA 92118

Ad-Hoc Members:

Elizabeth S. Garrett, Ph.D.
Assistant Professor of Oncology
The Johns Hopkins Oncology Center
Oncology Biostatistics
Baltimore, MD 21205

Richard W. Kriwacki, Ph.D.
Assistant Member
Department of Structural Biology
St. Jude Children's Research Hospital
Memphis, TN 38105

James P. Landers, Ph.D.
Professor of Chemistry
Department of Chemistry
University of Virginia
Charlottesville, VA 22904-4319

David Mankoff, M.D., Ph.D.
Associate Professor of Radiology
Division of Nuclear Medicine
University of Washington Medical Center
Seattle, WA 98195

Mario Marchand, Ph.D.
Associate Professor
School of Information Technology and Engineering
University of Ottawa
Ottawa, ON K1N 6N5

Michael D. Morris, Ph.D.
Professor of Chemistry
University of Michigan
Department of Chemistry
Ann Arbor, MI 48105

Community Research Collaboration and Sociocultural, Behavioral, and Psychological Committee

Chair:

Electra D. Paskett, Ph.D.
Professor
Ohio State University
School of Public Health
Columbus, OH 43210-1240

Members:

Deborah Bowen, Ph.D.
Member and Professor
Cancer Prevention Research Program
Fred Hutchinson Cancer Research Center
Seattle, WA 98109

Karen H. Dow, Ph.D.
Associate Professor
School of Nursing
University of Central Florida
Orlando, FL 32816

Paula M. Lantz, Ph.D.
Associate Professor
School of Public Health
University of Michigan
Ann Arbor, MI 48109-2029

Frances Marcus Lewis, Ph.D.
Professor
Family and Child Nursing
University of Washington
Seattle, WA 98195-7262

Alfred C. Marcus, Ph.D.
Chair, Center for Behavioral & Community Studies
Center for Behavioral and Community Studies
AMC Cancer Research Center
Denver, CO 80214

Marianne N. Prout, M.D.
Associate Professor
Boston University School of Public Health
Department of Epidemiology
Boston, MA 02118

John K. Worden, Ph.D.
Research Professor
Office of Health Promotion Research
University of Vermont
Burlington, VT 05401-3444

Advocate Members:

Deborah Clark
Oklahoma Breast Care Center
Oklahoma City, OK 73120

Susan M. Cohen, J.D.
New York Breast Cancer Network
New York, NY 10007

California Advocate Observer:

Kathy Walters, J.D.
Community Breast Health Project
Palo Alto, CA 94301-1704

Ad-Hoc Members:

Debra Barton, RN, PhD, AOCN
Clinical Nurse Researcher
Mayo Clinic
Rochester, MN 55905

Nancy Keating, M.D.
Instructor
Harvard Medical School
Department of Health Care Policy
Cambridge, MA 02115-5819

Charles L. Shapiro, M.D.
Director of Breast Medical Oncology
Ohio State University
Columbus, OH 43210

James T. Thigpen, M.D.
Director of Medical Oncology
Department of Medicine
University of Mississippi School of Medicine
Jackson, MS 39216

Etiology and Prevention Committee

Chair:

Susan Harlap, M.D.
Research Professor
Department of OBGYN
NYU Medical Center
New York, NY 10016

Members:

Christine Ambrosone, Ph.D.
Director, Cancer Epidemiology Program
Derald H. Ruttenberg Cancer Center
Mount Sinai School of Medicine
New York, NY 10029

Bradley A. Arrick, M.D., Ph.D.
Associate Professor of Medicine
Dartmouth Medical School
Hanover, NH 03755

Melissa L. Bondy, Ph.D.
Assistant Professor of Epidemiology
M.D. Anderson Cancer Center
Houston, TX 77030

Gail M. Clinton, Ph.D.
Department of Biochem. & Mol. Biology
Oregon Health Sciences University
Portland, OR 97201

Andreas I. Constantinou, Ph.D.
Associate Professor
University of Illinois at Chicago
Functional Food for Health Program
Chicago, IL 60612

Joan E. Cunningham, Ph.D.
Research Assistant Professor
University of South Carolina
Columbia, SC 29203

Marco M. Gottardis, Ph.D.
Bristol-Myers Squibb
Princeton, NJ 08543

Gary L. Johanning, Ph.D.
Assistant Professor
University of Alabama
Birmingham, AL 35294-3361

James D. Shull, Ph.D.
Professor
Eppley Institute for Research in Cancer
University of Nebraska Medical Center
Omaha, NE 68198-6805

Andrew T. Vaughan, Ph.D.
Professor
Department of Radiation Oncology
Loyola University
Maywood, IL 60153

Douglas Yee, M.D.
Professor
University of Minnesota
Minneapolis, MN 55455

Advocate Members:

Barbara Balaban
West Islip Breast Cancer Coalition
New York, NY 10023

Cynthia Geoghegan
Wilton, CT 06897

Janice Malett, RN, MPH, WOCN
SHARE
Larchmont, NY 10538

California Advocate Observer Member:

Kathleen Scheible
San Francisco, CA 94122

Ad-Hoc Members:

Celia Byrne, Ph.D.
Instructor of Medicine
Channing Laboratory, Nurses' Health Study
Boston, MA 02115

Carol Friedman, Ph.D.
Professor
Dept of Med Informatics
Columbia University
New York, NY 10032

Jennifer A. Harvey, M.D.
Associate Professor of Radiology
University of Virginia
Department of Radiology
Charlottesville, VA 22904

Susan L. Hendrix, D.O.
Associate Professor
Department of Obstetrics & Gynecology
Wayne State University
Detroit, MI 48201

Michael A. Hollingsworth, Ph.D.
Eppley Institute, Univ. of Nebraska Medical Center
Department of Biochemistry and Molecular Biology
Omaha, NE 68198-6805

Wei-Zen Wei, Ph.D.
Member
Karmanos Cancer Institute
Wayne State University
Detroit, MI 48201

Martin J. Yaffe, Ph.D.
Professor
Department of Imaging Research
Sunnybrook Health Science Centre
Toronto, Ontario, Canada, M4N 3M5

Innovative Treatments and Earlier Detection Committee

Chair:

Mary (Nora) L. Disis, M.D.
Associate Professor
Division of Oncology
University of Washington
Seattle, WA 98195-6527

Members:

Rajesh Agarwal, Ph.D.
Professor, Department of Pharmaceutical Sciences
School of Pharmacy
University of Colorado Health Sciences Center
Denver, CO 80262

Emmanuel Akporiaye, Ph.D.
Professor
Department of Microbiology & Immunology
University of Arizona - Life Sciences North
Tucson, AZ 85724

Guy Besson, Ph.D.
Chief Technical Director
Fischer Imaging Corporation
Denver, CO 80241

Rosalyn Blumenthal, Ph.D.
Director Tumor Biology
Garden State Cancer Center
Belleville, NJ 07109

David K. Bol, Ph.D.
Group Leader
Bristol-Myers Squibb
Princeton, NJ 08543

James T. Dalton, Ph.D.
Associate Professor
College of Pharmacy - Division of Pharmaceutics
Ohio State University
Columbus, OH 43210

Ram Ganapathi, Ph.D.
Staff Scientist
Taussig Cancer Center
The Cleveland Clinic Foundation
Cleveland, OH 44195

Mark A. Green, Ph.D.
Professor of Medicinal Chemistry
Division of Nuclear Pharmacy
Purdue University
West Lafayette, IN 47907-1333

Andrew Karellas, Ph.D.
Professor of Radiology
Department of Radiology
Worcester, MA 01655-0331

H. Kim Lyerly, M.D.
Professor
Department of Surgery
Duke University Medical Center
Durham, NC 27710

Edward R. Sauter, M.D., Ph.D.
Assistant Professor of Surgery
Thomas Jefferson University
Philadelphia, PA 19107

Gerald A. Soff, M.D.
Assistant Professor
Northwestern University
Division of Hematology/Oncology
Chicago, IL 60611

David A. Talmage, Ph.D.
Associate Professor of Clinical Nutrition
Columbia University, Institute of Human Nutrition
Hammer Health Sciences Center
New York, NY 10032

Nancy S. Templeton, Ph.D.
Assistant Professor
Center for Cell and Gene Therapy
Baylor College of Medicine
Houston, TX 77030

Philip M. Toleikis, Ph.D.
Director Pharmacology & Toxicology
Angiotech Pharmaceuticals, Inc.
Vancouver, BC V6T 1Z4

Advocate Members:

Jessica Henderson, Ph.D.
Oregon Breast and Cervical Cancer Coalition
Corvallis, OR 97330

Claudia C. Kruggel
Breast Cancer Today
West Lafayette, IN 47906

Brenda MacGibbon-Taylor, Ph.D.
University of Quebec, Montreal
Department of Mathematics
University of Quebec, Montreal
Montreal, Quebec, CANADA H3C 3P8

California Advocate Observer Member:

Janet Howard-Espinoza
Women of Color
Inglewood, CA 90301

Ad-Hoc Member:

Mark B. Williams, Ph.D.
Associate Professor
Department of Radiology
University of Virginia
Charlottesville, VA 22908

Pathogenesis Committee

Chair:

Ann D. Thor, M.D.
Lloyd E. Radar Professor and Chair
Department of Pathology
University of Oklahoma Health Sciences Center
Oklahoma City, OK 73104

Members:

Marie Audette, Ph.D.
Professeure
Centre de Recherche du CHUQ, Lab. d'Endo. Moleculaire
Universite Laval
Sainte-Foy, Quebec G1V4G2

James Kaput, Ph.D.
Director, Eukaryotic Biology
NutraGenomics
2201 West Campbell Park Drive
Chicago, IL 60612

Thomas Kelly, Ph.D.
Associate Professor
Department of Pathology
Arkansas Cancer Research Center
Little Rock, AR 72205-7199

William G. Kerr, Ph.D.
Associate Professor
Moffitt Cancer Center - Immunology Program
University of South Florida
Tampa, FL 33612

Rachel E. Klevit, D. Phil.
Professor
Department of Biochemistry
University of Washington
Seattle, WA 98195-7742

Scott Kurtzman, M.D.
Associate Professor of Surgery
Department of Surgery
University of Connecticut Health Center
Farmington, CT 06030-3955

Zheng-gang Liu, Ph.D.
Tenure Track Investigator
CCR, NCI, NIH
Cell and Cancer Biology Branch
Bethesda, MD 20892

James B. McCarthy, Ph.D.
Professor
Lab Medicine and Pathology
University of Minnesota
Minneapolis, MN 55455

Steffi Oesterreich, Ph.D.
Assistant Professor of Medicine
Breast Center
Baylor College of Medicine
Houston, TX 77030

Susan E. Pories, M.D., FACS
Assistant Professor of Surgery
Beth Israel Deaconess Medical Center
Breast Care Center
Boston, MA 02215

Patricia Schoenlein, Ph.D.
Associate Professor
Cellular Biology & Anatomy , CB1112/ 1115
Medical College of Georgia
Augusta, GA 30912

Gail E. Sonenshein, Ph.D.
Professor
Department of Biochemistry
Boston University School of Medicine
Boston, MA 02118

Erik (Rik) W. Thompson, Ph.D.
Associate Professor
St. Vincent's Institute of Medical Research
University of Melbourne
Fitzroy, Victoria, 3065 Australia

Advocate Members:

Roberta C. Gelb
SHARE
New York, NY 10011

Diane L. Roth
Y-ME National Breast Cancer Organization
Oak Lawn, IL 60453

Sandra Stanford
Alamo Breast Cancer Foundation
San Antonio, TX 78249-1832

California Advocate Observer Member:

Emilia Sebestyen
USC Norris Cancer Survivors' Advisory Council
Westlake Village, CA 91361

Tumor Progression Committee

Chair:

Nita J. Maihle, Ph.D.
Professor of Biochemistry & Molecular Biology
Department of Biochemistry & Molecular Biology
Mayo Clinic
Rochester, MN 55905-0001

Members:

Anne M. Bowcock, Ph.D.
Joint Director of the Division of Human Genetics
Department Genetics
Washington University
St. Louis, MO 63110

Jeffrey T. Holt, M.D.
Professor
Department of Cell Biology
Vanderbilt University
Nashville, TN 37232

Michael S. Kinch, Ph.D.
Associate Director
MedImmune, Inc
Gaithersburg, MD 20878

Dawn A. Kirschmann, Ph.D.
Assistant Research Scientist
Department of Anatomy and Cell Biology
University of Iowa, College of Medicine
Iowa City, IA 52242-1109

Richard C. Kurten, Ph.D.
Assistant Professor
Department of Physiology and Biophysics
Arkansas Cancer Research Center
Little Rock, AR 72205-7199

Michael T. Lewis, Ph.D.
Assistant Professor
The Breast Center
Baylor College of Medicine
1 Baylor Plaza , MS: 600
Houston, TX 77030

Peggy L. Porter, M.D.
Head, Breast Cancer Research Program
Divisions of Human Biology and Public Health Sciences
Fred Hutchinson Cancer Research Center
Seattle, WA 98109

Karin D. Rodland, Ph.D.
Staff Scientist
Molecular Biosciences Division
Pacific Northwest National Laboratory
Richland, WA 99352

Debra F. Skafar, Ph.D.
Associate Professor
Department of Physiology
School of Medicine, Wayne State University
Detroit, MI 48201

Thomas E. Smithgall, Ph.D.
Professor
Department of Molecular Genetics and Biochemistry
University of Pittsburgh School of Medicine
Pittsburgh, PA 15261

Saraswati Sukumar, Ph.D.
Associate Professor and Director of Basic Research
Johns Hopkins University - School of Medicine
Baltimore, MD 21231

Danny R. Welch, Ph.D.
Associate Professor
Jake Gittlen Cancer Research Institute
Pennsylvania State University, College of Medicine
Hershey, PA 17033-2390

Advocate Members:

Margaree S. Crosby, Ed.D.
Clemson University
Greenville, SC 29602

Dale Eastman
Alamo Breast Cancer Foundation
San Antonio, TX 78230

Eve Kosofsky Sedgwick, Ph.D.
City University of New York
New York, NY 10011

California Advocate Observer Member:

Edare K. Carroll
San Francisco Medical Society
San Francisco, CA 94109

California Breast Cancer Research Program
University of California - Office of the President
300 Lakeside Drive, 6th Floor
Oakland, CA 94612-3550
Toll-Free: 1-888-313-BCRP (2277)
Phone: (510) 987-9884
Fax: (510) 587-6325
E-mail: cbcrp@ucop.edu
Web: http://cbcrp.ucop.edu

Printed on recycled chlorine-free paper sith soy based ink.