Breast Cancer Research Stamp Program

CDMRP
DEPARTMENT OF DEFENSE
CONGRESSIONALLY DIRECTED MEDICAL RESEARCH PROGRAMS

Congressionally Directed Medical Research Programs

HISTORY

The Congressionally Directed Medical Research Programs (CDMRP) was created in 1992 from a grassroots effort led by the breast cancer advocacy community that resulted in a congressional appropriation of funds for breast cancer research. This initiated a unique partnership among the public, Congress, and the military. Since then, the CDMRP has grown to encompass multiple targeted programs and has managed over $16.3 billion in Congressional Special Interest funds from its inception through fiscal year 2022 (FY22). Congress provides overarching intent for each individual CDMRP program, such as the Breast Cancer Research Program (BCRP), and specifies the funding amount as part of the annual Department of Defense (DOD) Appropriations Bill.

APPLICATION REVIEW PROCESS

The CDMRP uses a two-tier review process for evaluating applications that involves dynamic interaction between scientists, consumers from advocacy communities, clinicians, members of the military, and other specialists as applicable. The first tier of evaluation is a scientific peer review of the applications, measured against established criteria for determining scientific merit. The second tier is a programmatic review by the Programmatic Panel, which compares applications to each other and makes recommendations for funding based on scientific merit, potential impact, adherence to the intent of the award mechanism, relevance to program goals, and portfolio composition.

Breast Cancer Research Stamp Program

About the Program

As a result of breast cancer advocacy efforts, the Stamp Out Breast Cancer Act (Public Law 105-41) led to the U.S. Postal Service's issuance of a new first-class stamp, the Breast Cancer Research Stamp (BCRS), in 1998. The BCRS became the first semipostal stamp in U.S. history.

The U.S. Postal Service provides the net revenues from sales of the BCRS, which currently costs 75 cents, to two designated funding agencies, the DOD and National Institutes of Health (NIH), to support breast cancer research. By law, the U.S. Postal Service allocates 30% of the total amount raised to the DOD and 70% to the NIH. The Breast Cancer Research Stamp Reauthorization Act of 2019 reauthorized the stamp through 2027.

Total Breast Cancer Research Stamp proceeds received (FY99–FY21)

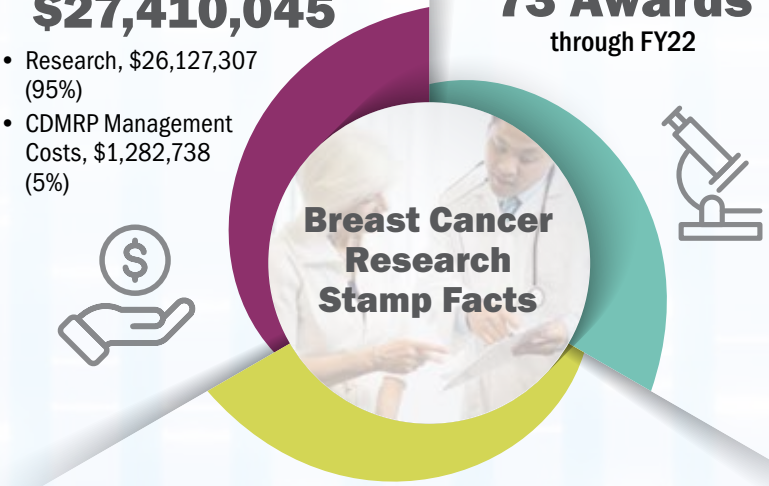
$27,410,045

- Research, $26,127,307 (95%)
- CDMRP Management Costs, $1,282,738 (5%)

These proceeds have been used to fully or partially fund

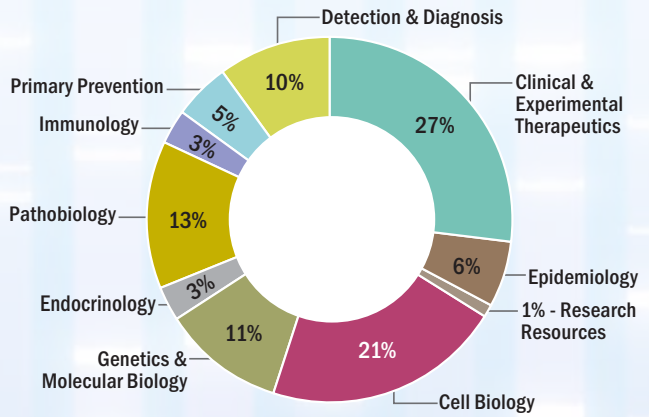
73 Awards

through FY22



Funded awards encompass a diversity of research areas:

- Detection and Diagnosis
- Clinical and Experimental Therapeutics
- Epidemiology
- Research Resources
- Genetics and Molecular Biology
- Cell Biology
- Endocrinology
- Pathobiology
- Immunology
- Primary Prevention



FY99-FY21 Breast Cancer Research Stamp Award Portfolio Composition by Percentage of Funding Invested

Recent Research Advancements

Dr. Carl Maki

Targeting Prolyl Peptidases in Triple-Negative Breast Cancer

Carl Maki, Ph.D., Rush University Medical Center

FY15 Breakthrough Award - Funding Level 1

Triple negative breast cancer (TNBC) is an aggressive type of cancer with limited treatment options and poor prognosis, resulting in an urgent need for new forms of treatment. One enzyme that represents a potential therapeutic target for TNBC is called prolyl endopeptidase (PREP), an enzyme expressed at high levels in multiple cancers, including breast cancer. Previous studies have provided evidence that PREP plays an important role in cancer cell proliferation and survival, suggesting PREP inhibitors could have potential as a treatment option for cancer. With BCRS support, Dr. Carl Maki and his team investigated the effects of a PREP inhibitor, Y-29794, on TNBC cell lines and mouse models with the hopes of identifying a novel therapeutic for this aggressive breast cancer subtype.

The researchers confirmed through in vitro studies that Y-29794 inhibits the endopeptidase activity of PREP in TNBC cells. In addition, Y-29794 was shown to inhibit the survival and proliferation of multiple TNBC cell lines. At low doses, Y-29794 slowed cell cycle progression in TNBC cells, whereas high doses induced cell death. The team next investigated the effects of Y-29794 on the IRS1-AKT-mTORC1 survival and growth signaling pathway, which is often upregulated in TNBC. Y-29794 caused a decrease in Insulin Receptor Substrate 1 (IRS1) protein levels, a reduction in activated AKT protein, and a decrease in the mechanistic target of rapamycin complex 1 (mTORC1) protein activity. These findings suggest that IRS1-AKT-mTORC1 is one pathway through which Y-29794 likely inhibits TNBC cell survival and proliferation. Interestingly, depletion of PREP alone was not sufficient to inhibit the IRS1-AKT-mTORC1 pathway or reduce cell proliferation or survival, suggesting that Y-29794 targets other proteins in addition to PREP to elicit its effects in TNBC cells. Importantly, when tested in in mouse models of TNBC, the researchers demonstrated that treatment with Y-29794 caused a significant reduction in TNBC tumor growth. Taken together, the findings from Dr. Maki's research support the possibility that Y-29794, or a compound with similar mode of action, may be an effective treatment option for TNBC.

Perez RE, Calhoun S, Shim D, et al. 2020. Prolyl endopeptidase inhibitor Y-29794 blocks the IRS1-AKT-mTORC1 pathway and inhibits survival and in vivo tumor growth of triple-negative breast cancer. *Cancer Biology & Therapy* 21(11):1033-1040.

Recently Funded FY21 Awards

Dr. Anna Vilgelm

Harnessing Innate Immunity to Improve Metastatic Breast Cancer Therapy

Anna Vilgelm, M.D., Ph.D., The Ohio State University

Breakthrough Award - Funding Level 1

Patients with hormone receptor positive/human epidermal growth factor receptor 2-negative (HR+/HER2-) metastatic breast cancer are routinely treated with a combination of CDK4/6 protein growth inhibitors and hormonal therapy. Over time, however, tumors eventually acquire resistance to the growth inhibitors and progress. Dr. Vilgelm and her team hypothesize that a combination of CDK4/6 inhibitors and natural killer cells may sensitize tumors for a more effective treatment and prevent relapses, since the immune cells can target cancerous cells weakened by the growth inhibitors. With BCRS support, her team will test the combination therapy in a preclinical setting. This research has the potential to lead to an effective therapy for metastatic breast cancer that reduces the risk of relapse.

Dr. Sandy Chang

Targeting Replication Stress in Triple-Negative Breast Cancer

Sandy Chang, M.D., Ph.D., Yale University

Breakthrough Award – Funding Level 1

A hallmark of triple-negative breast cancer (TNBC) is genomic instability, resulting in DNA breaks and chromosomes linking together. Proper function of telomeres, which are repetitive DNA sequences that cap the ends of chromosomes, is an important protection mechanism against acquisition of an unstable genome. Dr. Chang's team discovered that the telomere-binding protein TRF2 interacts with Claspin, a protein that plays important roles in DNA replication. Furthermore, removal of Claspin from TNBC cells led to loss of cell growth and induced cell death while not affecting normal cells. With BCRS program support, Dr. Chang aims to expand the mechanistic understanding of how Claspin helps reduce telomere replication stress, with the potential to ultimately lead to the development of novel therapeutics for targeted treatment of TNBC.

High-Impact Research and Accomplishments Supported by the Breast Cancer Research Stamp

173 Publications

26 Patents

- Demonstrated a relationship between breast cancer incidence and outdoor concentrations of hazardous air pollutants, strongly suggesting that environmental exposure could contribute to an increased risk of breast cancer.
- Advanced understanding of the immune-modulated microenvironment of postpartum breast involution that promotes pregnancy-associated breast cancer, revealing new therapeutic strategies to target immunosuppression and enhance the anti-tumor immune response.
- Developed a high-resolution imaging technique, called second harmonic generation, to quantitatively analyze tumor structural changes and predict metastasis of estrogen receptor-positive breast cancer. Harmonigenic™ Corporation has retained the option for a provisional patent for this technology.
- Identified predictive biomarkers for response of triple-negative breast tumors to chemo- and radiotherapy, providing the opportunity for new targeted therapeutics to resensitize breast tumors to chemotherapy and radiation treatments and, ultimately, reduce metastatic burden in patients.

Recent Publications Resulting from BCRS-Funded Research

Karaayvaz-Yildirim M, Silberman RE, Langenbucher A, et al. 2020. Aneuploidy and a deregulated DNA damage response suggest haploinsufficiency in breast tissues of BRCA2 mutation carriers. *Science Advances* 6(5):eaay2611.

Shivange G, Mondal T, Lyerly E, Gatesman J, Tushir-Singh J. 2020. Analyzing tumor and tissue distribution of target antigen-specific therapeutic antibody. *Journal of Visualized Experiments* 16(159).

Zareei A, Jiang H, Chittiboyina S, et al. 2020. A lab-on-chip ultrasonic platform for real-time and nondestructive assessment of extracellular matrix stiffness. *Lab on a Chip* 20(4):778-788.

Beck AP, Li H, Ervin SM, et al. 2019. Inhibition of microbial beta-glucuronidase does not prevent breast carcinogenesis in the polyoma middle T mouse. *bioRxiv* 746602.

Chhetri A, Chittiboina S, Atrian F, et al. 2019. Cell culture and coculture for oncological research in appropriate microenvironments. *Current Protocols in Chemical Biology* 11(2):e65.

Ervin SM, Li H, Lim L, et al. 2019. Gut microbial beta-glucuronidases reactivate estrogens as components of the estrobolome that reactivate estrogens. *The Journal of Biological Chemistry* 294(49):18586-18599.

Parashar D, Geethadevi A, Aure MR, et al. 2019. miRNA551b-3p activates an oncostatin signaling module for the progression of triple-negative breast cancer. *Cell Reports* 29:4389-4406.

Yin H, Xiong G, Guo S, Xu C, Xu R, Guo P, Shu D. 2019. Delivery of anti-miRNA for triple negative breast cancer therapy using RNA nanoparticles targeting to stem cell Marker CD133. *Molecular Therapy* 27(7):1252-1261.

Brenot A, Knolhoff BL, DeNardo DG, and Longmore GD. 2018. SNAIL1 action in tumor cells influences macrophage polarization and metastasis in breast cancer through altered GMCSF secretion. *Oncogenesis* 7(3):32.

Chittiboyina S, Bai Y, and Lelièvre SA. 2018. Microenvironment-cell nucleus relationship in the context of oxidative stress. *Frontiers in Cell and Developmental Biology* (6):23.

Lelièvre SA and Chittiboyina S. 2018. Microphysiological systems to study microenvironment-cell nucleus interaction: Importance of tissue geometry and heterogeneity. *Microphysiological Systems* (2):12.

Meyer MA, Baer JM, Knolhoff BL, et al. 2018. Breast and pancreatic cancer interrupt IRF8-dependent dendritic cell developent to overcome immune surveillance. *Nature Communications* 9(1):1250.

Pennock N, Martinson H, Guo Q, et al. 2018. Ibuprofen supports macrophage differentiation, T cell recruitment, and tumor suppression in a model of postpartum breast cancer. *Journal for the Immunotherapy of Cancer* 6(1):98.

Qi Y, Xu R. 2018. Roles of PLODs in collagen synthesis and cancer progression. *Frontiers in Cell and Developmental Biology* (6):66.

Shang R, Archibald R, Gelb A, and Luke GP. 2018. Sparsity-based photoacoustic image reconstruction with a linear array transducer and direct measurement of the forward model. *Journal of Biomedical Optics* 24(3):1-9.

Shivange G, Urbanek K, Przanowski P, et al. 2018. A single-agent dual-specificity targeting of FOLR1 and DR5 as an effective strategy for ovarian cancer. *Cancer Cell* 34(2):331-345.

Yeung KT and Yang J. 2017. Epithelial-mesenchymal transition in tumor metastasis. *Molecular Oncology* 11(1):28-39.

Xu C, Haque F, Jasinski DL, et al. 2017. Favorable biodistribution, specific targeting and conditional endosomal escape of RNA nanoparticles in cancer therapy. *Cancer Letters* (14):57-70.

Breast Cancer Research Stamp Program
Funded Awards

FY	PI	Amount	Institution	Log Number	Proposal Title
FY99	Roger Daly	$283,649	Garvan Institute	BC990035	Identification of Novel Prognostic Indicators for Breast Cancer through Analysis of the EMS1/Cortactin Signaling Pathway
	Thomas Deuel	$5,000[1]	Scripps Institute	BC990698	Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor-Promoting Pathways in Human Breast Cancer
	Wolf Heyer	$111,444	University of California, Davis	BC990034	In Vitro Recombination Activities of the Breast Cancer Predisposition Protein BRCA2
	Elizabeth Musgrove	$222,652	Garvan Institute	BC990037	Role of Cyclin D1 and p27 in Steroidal Control of Cell Cycle Progression in the Mammary Gland in Vivo
	Sudhir Shah	$279,000	University of Arkansas	BC990024	Role of a Novel Matrix-Degrading Metalloproteinase in Breast Cancer Invasion
	Lihong Wang	$317,510	Texas A&M University	BC990044	Scanning Microwave-Induced Acoustic Tomography
	Michael White	$334,094	University of Texas Southwest Medical Center	BC990022	Isolation of Factors that Disrupt Critical Protein/Protein Interactions within the Telomerase Holoenzyme for Use in Breast Cancer Therapeutics
	Daniel Wreschner	$225,000	Tel Aviv University	BC990013	Analysis of the Secreted Novel Breast Cancer-Associated MUC1/Zs Cytokine
FY00	Eileen Adamson	$578,183	Burnham Institute	BC000975	Cripto: A Target for Breast Cancer Treatment
	Emmanuel Akporiaye	$454,500	University of Arizona	BC000662	Tumor-Mediated Suppression of Dendritic Cell Vaccines
	Linda Penn	$296,142	University of Toronto	BC000651	Exploiting the Novel Repressed Transactivator Assay to Identify Protein Interactors and Peptide Inhibitors of the Myc Oncoprotein
FY01	Qiuyin Cai	$560,144	Vanderbilt University	BC010713	Genetic Polymorphisms, Mitochondrial DNA Damage, and Breast Cancer Risk
	Kermit Carraway	$427,225	University of California, Davis	BC010296	Identification of a Functional Human Homolog of Drosophila Kek1, an Inhibitor of Breast Tumor Cell Growth
	Preet Chaudhary	$312,000	University of Texas Southwest Medical Center	BC010310	The Role of Ectodysplasin A (EDA) and Its Receptors in the Pathogenesis of Breast Cancer
	Robert Geahlen	$425,425	Purdue University	BC010725	Characterization of Syk in Breast Carcinoma Cells
	William Rosner	$454,181	St. Luke's-Roosevelt Hospital Center	BC010710	Autocrine and Paracrine Control of Breast Cancer Growth by Sex Hormone-Binding Globulin
FY02	Q. Ping Dou	$491,999	Wayne State University	BC020507	Synthetic Beta-Lactam Antibiotics as a Selective Breast Cancer Cell Apoptosis Inducer: Significance in Breast Cancer Prevention and Treatment
	Andrew Godwin	$504,000	Fox Chase Cancer Center	BC020911	The Nuclear Death Domain Protein p84N5, a Candidate Breast Cancer Susceptibility Gene
	Archibald Perkins	$490,500	Yale University	BC021042	Rapid Genomic Approach to Cancer Gene Discovery in Breast Cancer
FY03	Gina Chung	$490,447	Yale University	BC031926	Quantitative in Situ Assessment of the Somatostatin Receptor in Breast Cancer to Assess Response to Targeted Therapy with 111-in-Pentetreotide
	Rudolf Kaaks	$367,639	German Cancer Research Center (DKFZ)	BC030208	Fatty Acid Synthesis Gene Variants and Breast Cancer Risk: A Study within the European Prospective Investigation into Cancer and Nutrition (EPIC)
	Paul Yaswen	$508,790	Lawrence Berkeley National Laboratory	BC030545	Functional Analysis of BORIS, a Novel DNA-Binding Protein
	Elad Ziv	$767,171	University of California, San Francisco	BC030551	Admixture and Breast Cancer Risk among Latinas
FY04	Mina Bissell	$386,569	Lawrence Berkeley National Laboratory	BC044087	Use of HA-Metal Nanoparticles to Identify and Characterize Tumorigenic Progenitor Cell Subsets in Breast Tumors
	Christina Clarke	$588,738	Northern California Cancer Center	BC044177	The Hygiene Hypothesis and Breast Cancer: A Novel Application of an Etiologic Theory for Allergies, Asthma, and Other Immune Disorders
	Todd Giorgio	$453,000	Vanderbilt University	BC043908	Surface Functionalized Nanoparticles and Nanocrystals for Proximity-Modulated, Early Neoplasia Detection, Imaging, and Treatment of Breast Cancer
	Mark Lemmon	$475,500	University of Pennsylvania	BC044225	Harnessing Novel Secreted Inhibitors of EGF Receptor Signaling for Breast Cancer Treatment

Continued on next two pages.

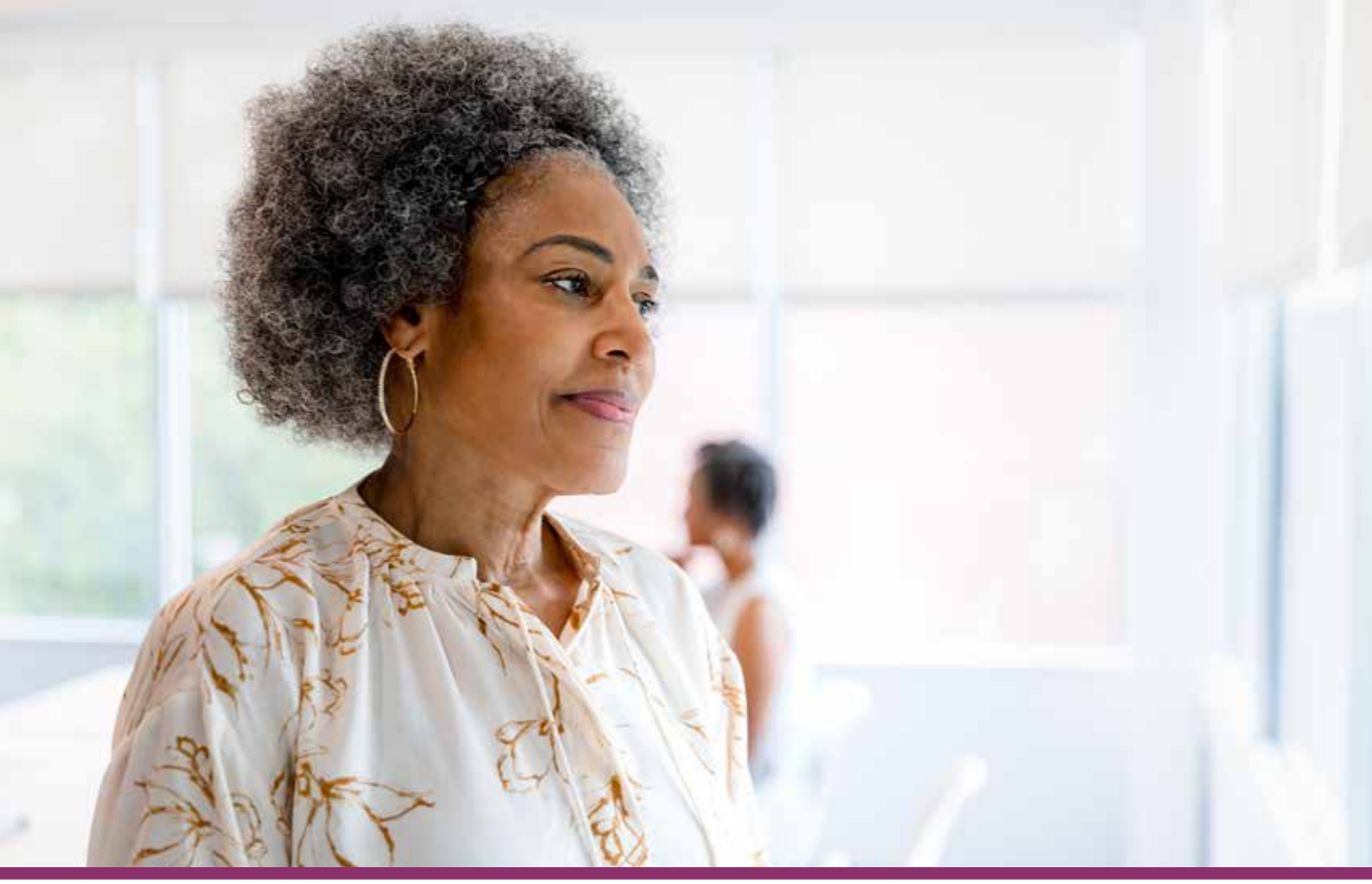
Breast Cancer Research Stamp Program Funded Awards

FY	PI	Amount	Institution	Log Number	Proposal Title
FY05	Kurt Zinn[2]	$436,500	University of Alabama at Birmingham	BC050034	Novel Screening and Precise Localization of Early-Stage Breast Cancer in Animal Model
	Xin-Yun Huang	$483,600	Cornell University, Weill Medical College	BC050558	Migrastatin Analogues as Potent Inhibitors of Breast Cancer Metastasis
	Yang Liu	$448,500	The Ohio State University	BC051613	Hunting for Novel X-Linked Breast Cancer Suppressor Genes in Mouse and Human
	Jianghong Rao	$468,000	Stanford University	BC050909	Ribozyme-Mediated Imaging of Oncogene Expression in Breast Tumor Cells
FY06	Gayathri Devi	$155,085[3]	Duke University Medical Center	BC060434	Modulation of Regulatory T Cells as a Novel Adjuvant for Breast Cancer Immunotherapy
	Amy Lee	$489,000	University of Southern California	BC060145	A New Mechanism for Estrogen-Starvation Resistance in Breast Cancer
	Yi Li	$438,455	Baylor College of Medicine	BC060332	The ER/PR Status of the Originating Cell of ER-Negative Breast Cancer
	Shaker Mousa	$377,620	Albany College of Pharmacy	BC061072	Enhancing the Efficacy of Chemotherapeutic Breast Cancer Treatment with Non-anticoagulant Heparins
	Fraydoon Rastinejad	$454,500	University of Virginia	BC060108	Structural Characterization of the Interdomain Features of the Estrogen Receptor
FY07	Charlotte Kuperwasser	$817,500	Tufts University	BC063332	Mechanisms of Breast Cancer Associated with Obesity
	Kimberly Kelly	$244,450[4]	University of Virginia	BC063128	Genetically Encoded Targeted, Amplifiable, Imaging Agents for Early Detection of Breast Cancer
	Susan Gerbi	$155,550[5]	Brown University	BC063945	Hormonal Involvement in Breast Cancer Gene Amplification
FY08	Chung Park	$111,663	North Dakota State University	BC084025	In Utero Exposure to Dietary Methyl Nutrients and Breast Cancer Risk in Offspring
	Maciej Radosz	$528,939	University of Wyoming	BC083821	Breast Cancer-Targeting Nuclear Drug Delivery Overcoming Drug Resistance for Breast Cancer Therapy
	Ann Hill	$577,500	Oregon Health and Science University	BC084377	Vaccine Vector for Sustained High-Level Antitumor CTL Response
	Youngjae You	$503,666	University of Oklahoma Health Science Center	BC084623	Targeted Delivery and Remote-Controlled Release of Chemotherapeutic Agents
	Tiffany Seagroves	$166,667[6]	University of Tennessee Health Science Center	BC083846	The Role of HIF-1 Alpha in Breast Cancer: A Positive Factor in Cancer Stem Cell Expansion via Notch?
FY09	Peggy Reynolds	$730,000[7]	Cancer Prevention Institute of California	BC095145	Hazardous Air Pollutants and Breast Cancer: An Unexplored Area of Risk
	John Wysolmerski	$620,626	Yale University	BC095546	Effects of Nuclear Parathyroid Hormone-Related Protein Signaling in Breast Cancer
FY10	Pepper Schedin	$368,125[8]	University of Colorado, Denver	BC101904	The Immune Modulatory Program of Post-Partum Involution Promotes Pregnancy-Associated Breast Cancer
	Anthony Leung	$556,875[9]	Johns Hopkins University	BC101881	The Role of Poly(ADP-Ribose) in microRNA Activity in Breast Cancers
FY11	Andy Minn	$399,942	University of Pennsylvania	BC111503	Regulation of Metastasis and DNA Damage Resistance Pathways by Transposable Elements
	Xiaosong Wang	$409,693	Baylor College of Medicine	BC111902	Copy Number Signature of Recurrent Gene Fusions Reveals Potential Drug Targets in Invasive Breast Cancer
	Susana Gonzalo Hervas	$58,975[10]	St. Louis University	BC110089	Stabilization of 53BP1 in Triple-Negative and BRCA-Deficient Breast Tumors: A Novel Therapeutic Strategy
FY12	Jing Yang	$465,000	University of California, San Diego	BC121670	Regulation of Breast Cancer Stem Cell by Tissue Rigidity
	Filippo Giancotti	$174,837[11]	Memorial Sloan-Kettering Cancer Center	BC121829	Autophagy and TGF-Beta Antagonist Signaling in Breast Cancer Dormancy at Premetastatic Sites
FY13	Seth Rubin	$457,075	University of California, Santa Cruz	BC131294	Inhibition of Retinoblastoma Protein Inhibition
	Geoffrey Luke	$96,992[12]	Dartmouth College	BC133216	Noninvasive Label-Free Detection of Micrometastases in the Lymphatics with Ultrasound-Guided Photoacoustic Imaging

Breast Cancer Research Stamp Program Funded Awards

FY	PI	Amount	Institution	Log Number	Proposal Title
FY14	Dan Shu	$364,343	The Ohio State University	BC140428	Ultrastable Nontoxic RNA Nanoparticles for Targeting Triple-Negative Breast Cancer Stem Cells
	Leif Ellisen	$93,050[13]	Massachusetts General Hospital	BC140903	Defining High-Risk Precursor Signaling to Advance Breast Cancer Risk Assessment and Prevention
	Edward Brown	$7,457[14]	University of Rochester	BC140798	Prediction of Metastasis Using Second Harmonic Generation
	David DeNardo	$7,061[15]	Washington University	BC141770	Reprogramming the Metastatic Microenvironment to Combat Disease Recurrence
FY15	Ricardo Bonfil	$254,765[16]	Wayne State University	BC150621	Discoidin Domain Receptors: Novel Targets in Breast Cancer Bone Metastasis
	Carl Maki	$254,765[17]	Rush University Medical Center	BC150340	Targeting Prolyl Peptidases in Triple-Negative Breast Cancer
FY16	Sridhar Mani	$174,992[18]	Albert Einstein College of Medicine	BC161093	Inhibition of Microbial Beta-Glucuronidase as a Strategy Toward Breast Cancer Chemoprevention
	Sophie Lelievre	$353,879[19]	Purdue University	BC161889	Risk-on-a-Chip for Tailored Primary Prevention of Breast Cancers
FY17	Jogender Tushir-Singh	$282,378[20]	University of Virginia	BC170197	A Highly Superior and Selective Cancer Immunotherapy-Based Approach for Triple-Negative Breast Cancers
	Pradeep Chaluvally-Raghavan	$282,378[21]	Medical College of Wisconsin	BC170885	Targeting miR551b to Prevent Tumor Formation and Metastasis of Triple-Negative Breast Cancer
FY18	David Potter	$263,717[22]	University of Minnesota, Twin Cities	BC180596	Potentiation of Immune Checkpoint Blockade by Inhibition of Epoxyeicosatrienoic Acid-Driven Tumor Respiration
	Abhishek Sharma	$263,716[23]	Stevens Institute of Technology	BC180833	A Novel Class of Antagonists for Robust Inhibition of Mutant Estrogen Receptor Action in Endocrine-Resistant Metastatic Breast Cancer
FY19	Jeffrey Frost	$295,109[24]	University of Texas Health Science Center at Houston	BC190383	Targeting the Tumor Microenvironment and Metastatic Niche in Breast Cancer
	Hannah Rabinowich	$295,110[25]	University of Pittsburgh	BC190622	A New Persistence Mechanism for Drug-Tolerant Breast Cancer Cells
FY20	Weizhou Zhang	$104,128[26]	University of Florida	BC200100	Developing a Novel PROTAC-Based NR4A1 Degrader for Breast Cancer Therapy
	Eran Andrechek	$350,000[27]	Michigan State University	BC200335	Amplification Events Altering Tumor Microenvironment That Drive Metastasis in HER2+ Breast Cancer
FY21	Sandy Chang	$261,673[28]	Yale University	BC210086	Targeting Replication Stress in Triple-Negative Breast Cancer
	Anna Vilgelm	$261,673[29]	The Ohio State University	BC210483	Harnessing Innate Immunity to Improve Metastatic Breast Cancer Therapy

[1] Total award amount was $404,176; remaining funds were from the FY99 BCRP.
[2] The original Principal Investigator, Dr. Tandra Chaudhuri, is deceased.
[3] Total award amount was $461,933; remaining funds were from the FY06 BCRP.
[4] Total award amount was $687,397 remaining funds were from the FY06 BCRP.
[5] Total award amount was $787,325; remaining funds were from the FY06 and FY07 BCRP.
[6] Total award amount was $554,987; remaining funds were from the FY08 BCRP.
[7] Total award amount was $860,883; remaining funds were from the FY09 BCRP.
[8] Total award amount was $556,028; remaining funds were from the FY10 BCRP.
[9] Total award amount was $585,652; remaining funds were from the FY10 BCRP.
[10] Total award amount was $744,661; remaining funds were from the FY11 BCRP.
[11] Total award amount was $331,449; remaining funds were from the FY12 BCRP.
[12] Total award amount was $497,288; remaining funds were from the FY13 BCRP.
[13] Total award amount was $605,208; remaining funds were from the FY14 BCRP.
[14] Total award amount was $215,628; remaining funds were from the FY14 BCRP.
[15] Total award amount was $527,797; remaining funds were from the FY14 BCRP.
[16] Total award amount was $522,715; remaining funds were from the FY15 BCRP.
[17] Total award amount was $581,250; remaining funds were from the FY15 BCRP.
[18] Total award amount was $626,252; remaining funds were from the FY16 BCRP.
[19] Total award amount was $564,673; remaining funds were from the FY16 BCRP.
[20] Total award amount was $573,784; remaining funds were from the FY17 BCRP.
[21] Total award amount was $563,272; remaining funds were from the FY17 BCRP.
[22] Total award amount was $567,344; remaining funds were from the FY18 BCRP.
[23] Total award amount was $471,719; remaining funds were from the FY18 BCRP.
[24] Total award amount was $693,001; remaining funds were from the FY19 BCRP.
[25] Total award amount was $704,250; remaining funds were from the FY19 BCRP.
[26] Total award amount was $551,489; remaining funds were from the FY20 BCRP.
[27] Total award amount was $635,304; remaining funds were from the FY20 BCRP.
[28] Total award amount was $261,673; remaining funds were from the FY21 BCRP.
[29] Total award amount was $261,673; remaining funds were from the FY21 BCRP.



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01/2023
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The Congressionally Directed Medical Research Programs is a part of the U.S. Army Medical Research and Development Command, U.S. Army Futures Command.