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FRED & PAMELA
BUFFETT CANCER CENTER

# Fred & Pamela Buffett Cancer Center

## LB595
## Cancer and Smoking Disease Research Program

## Progress Report

## October 13, 2015

## Section 1.0

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## Section 2.0

## Director's Overview

**2.1 Overview**

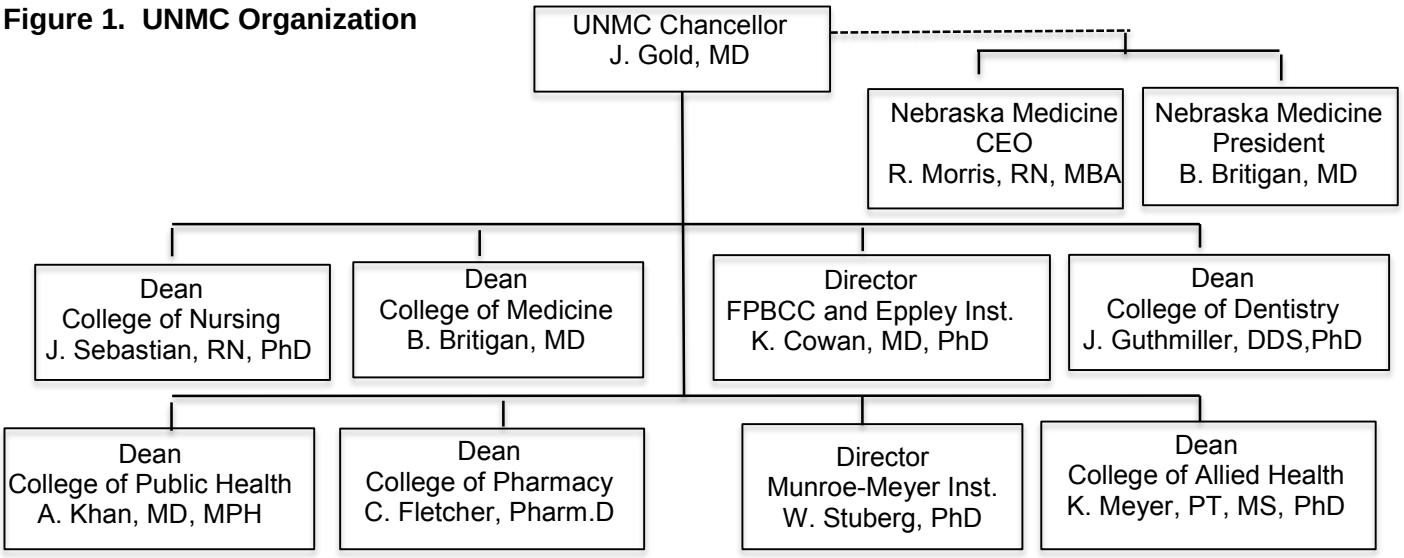
The Fred & Pamela Buffett Cancer Center (FPBCC or Buffett Cancer Center), formerly known as the UNMC Eppley Cancer Center, is located in Omaha, Nebraska and is part of the University of Nebraska Medical Center (UNMC). The name of the Cancer Center changed in June 2013 as a consequence of a generous donation from the Rebecca Susan Buffett Foundation as part of a $323 million capital campaign to build a new integrated clinical and research complex for the Buffett Cancer Center on the UNMC campus.

The Buffett Cancer Center is the only National Cancer Institute-designated Cancer Center in Nebraska, accessibly serving patients across Nebraska and western Iowa. The FPBCC is a matrix Cancer Center with research programs in basic, translational, clinical and population science research.

The Buffett Cancer Center takes maximum advantage of its institutional capabilities in cancer research, engaging in appropriate planning and evaluation and strategic planning. In addition to addressing important cancer research questions, the FPBCC uses its resources and expertise to address cancer-related issues in its catchment area and utilizes well-established processes for integrating training and education of biomedical researchers and health care professionals into programmatic research efforts.

The Buffett Cancer Center is a matrix organization with members in each of the Colleges and Institutes at UNMC, as well as at the University of Nebraska - Lincoln and the University of Nebraska - Omaha. The position of the Buffett Cancer Center within UNMC is indicated in Figure 3. The FPBCC Director reports directly to the Chancellor of UNMC and serves on the UNMC Chancellor's Council, the major decision making body for UNMC, along with the deans of the Colleges of Medicine, Dentistry, Pharmacy, Nursing, and Public Health. As a member of the Chancellor's Council, the Buffett Cancer Center Director is directly involved in all decisions affecting UNMC and also serves as Director of the Eppley Cancer Institute, an academic unit of UNMC with 30 tenure/tenure-leading faculty appointments.

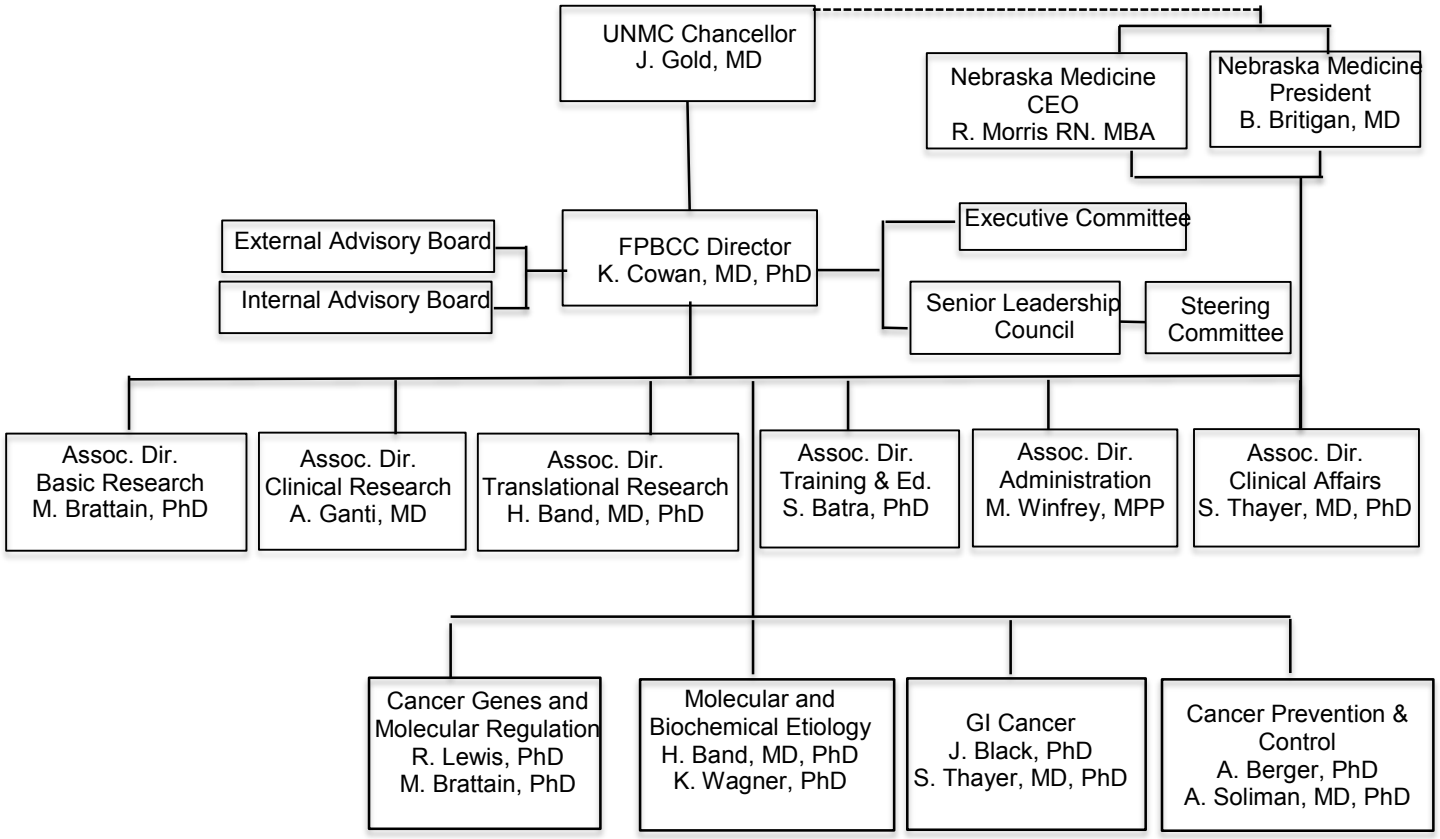
**Figure 1. UNMC Organization**




The UNMC Chancellor (Dr. Gold) also serves as the Chair of the Nebraska Medicine Board of Directors, the governing body of the affiliated clinical enterprise. With the construction of the new FPBCC cancer research and clinical care facility, a joint project between UNMC and Nebraska Medicine, the CEO and President of Nebraska Medicine appointed the FPBCC Director to the Senior Leadership Team of Nebraska Medicine. Serving on the UNMC Chancellor's Council and the Nebraska Medicine Senior Leadership Team, the two most senior and responsible cabinets within the academic and clinical enterprise, respectively, assures that the FPBCC Director is involved in all strategic initiatives that affect UNMC and Nebraska Medicine. Importantly, the FPBCC Director specifically reviews strategic and business plans for recruitment of all FPBCC clinical

oncology faculty and for clinical oncology program development directly with the CEO/President of Nebraska Medicine and the Dean of the College of Medicine. The FPBCC Director serves on the UNMC Research Resources Board, which oversees plans for research program development.
Figure 4. Fred & Pamela Buffett Cancer Center Organization

**Figure 2. Fred & Pamela Buffett Cancer Center Organization**




As shown in Figure 2 (Fred & Pamela Buffett Cancer Center Organization), the FPBCC has six Associate Directors, including the following: 1) Associate Director for Basic Research, 2) Associate Director for Clinical Research, 3) Associate Director for Translational Research, 4) Associate Director for Education and Training, 5) Associate Director for Administration and External Affairs, and 6) Associate Director for Clinical Affairs/Physician-in-Chief.

Dr. Julie Vose served as the Associate Director for Clinical Research from the last review through Aug 1, 2015. With her recent appointment as President of the American Society for Clinical Oncology and the time commitment required for that prestigious position, Dr. Vose elected to step down from her role as the FPBCC Associate Director for Clinical Research, and Dr. Apar Ganti, Associate Professor of Oncology/Hematology, was appointed the Associate Director for Clinical Research. Dr. Ganti is the PI for the ALLIANCE for Clinical Trials in Oncology and has served as a Member of the Respiratory Committee within the ALLIANCE/CALGB since April 2010 and on the ALLIANCE Health Outcomes Committee since April 2012. He is a member of the NCI Head and Neck Working Group. In addition, Dr. Ganti is an active participant in the Oncology Program of the Veterans' Health System (VA) and serves as the Chair of the VA Respiratory Disease Focused Expert Panel, which provides scientific and clinical leadership within the VA system in the field of respiratory malignancies.

The research activities of the FPBCC are organized into four Research Programs (see Table 1), overseen by Leaders with complementary expertise (including two physician scientists). Two Research Programs are based

on scientific themes and one is disease-based (GI Cancer). The FPBCC also has one developing program (Cancer Prevention and Control Program, CPCP) with Amr Soliman MD, MPH and Ann Berger, PhD, APRN, PhD as Co-Leaders.

| Table 1. Fred & Pamela Buffett Cancer Center Research Programs | |
|---|---|
| **Research Program** | **Leaders** |
| Molecular & Biochemical Etiology | Hamid Band, MD, PhD; Kay-Uwe Wagner, PhD |
| Cancer Genes & Molecular Regulation | Robert Lewis, PhD; Michael Brattain, PhD |
| Gastrointestinal Cancer | Jennifer Black, PhD; Sarah Thayer, MD, PhD |
| Cancer Prevention & Control (Developing Program) | Ann Berger, PhD, APRN; Amr Soliman MD, PhD |

**Multidisciplinary Working Groups (MWGs)** are disease-focused groups (Breast, Genitourinary, Head & Neck, Brain, Gynecological, and Pediatric Cancers, as well as Lymphoma/Leukemia) that have a clinical and a laboratory-based scientific leader to foster clinical/translational research and promote collaborations with FPBCC Research Programs.

**The Senior Leadership Council (SLC)** composition is shown in Table 2 and includes Associate Directors (Assoc Dir), Program Leaders, Directors of the Pancreatic Cancer SPORE and Breast Cancer Center of Excellence and a leader from the University of Nebraska - Lincoln campus. As the primary decision and policy-making body of the FPBCC, the SLC meets monthly and at an annual retreat to review Cancer Center activities and update strategic plans. The SLC addresses appointments of membership and the allocation of developmental funds, including support for faculty recruitments, enhancement of shared facilities, and pilot grant funding. The SLC plays a major role in strategic planning and interactions with the EAB.

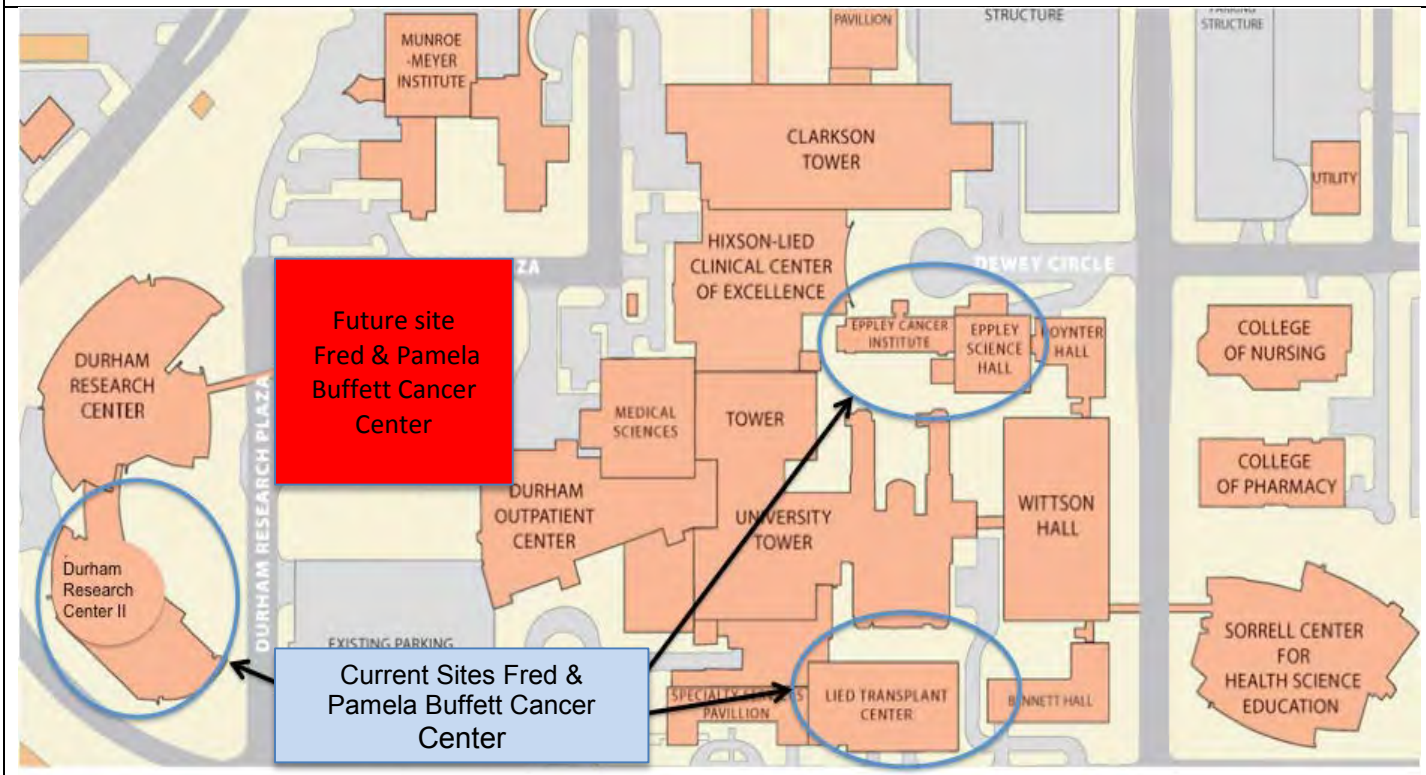
| Table 2. Fred & Pamela Buffett Cancer Center Senior Leadership Council | |
|---|---|
| M. Brattain, PhD | Assoc Dir Basic Research; Co-Leader Cancer Genes and Molecular Regulation |
| H. Band, MD, PhD | Assoc Dir Translational Research; Co-Leader Molecular and Biochemical Etiology |
| J. Black, PhD | Co-Leader Gastrointestinal Cancer |
| R. Lewis, PhD | Co-Leader Cancer Genes and Molecular Regulation |
| S. Thayer, MD, PhD | Assoc Dir Clinical Affairs; Co-Leader Gastrointestinal Cancer |
| A. Ganti, MD | Assoc Dir Clinical Research |
| M.A. (Tony) Hollingsworth, PhD | PI. Pancreatic Cancer SPORE |
| S. Batra, PhD | Assoc Dir Training and Education |
| K. Wagner, PhD | Co-Leader Molecular and Biochemical Etiology |
| A. Soliman, MD, MPH | Co-Leader Cancer Prevention and Control |
| A. Berger, APRN, PhD | Co-Leader Cancer Prevention and Control |
| V. Band, PhD | Co-Director Breast Cancer Center of Excellence |
| M. Simpson, PhD | Assistant Director Cancer Research University of Nebraska – Lincoln |
| M. Winfrey, MPP | Assoc Director for Administration and External Affairs |

## 2.2 Progress and Plans

### Cancer Center Facilities

The FPBCC is primarily located on the main campus of UNMC and its affiliated hospital Nebraska Medicine. As the only NCI-designated Cancer Center in Nebraska, the catchment area for the FPBCC is the state of Nebraska, in addition to metropolitan Omaha and surrounding areas (western Iowa). In addition to the main UNMC and Nebraska Medicine campus, the FPBCC also provides multidisciplinary cancer care at the Village Pointe Cancer Center (12 miles west of the main campus), at the Nebraska Medicine Bellevue Medical Center, (10 miles south of the main campus), and in Shenandoah, IA (60 miles southeast of Omaha). The FPBCC served more than 13,893 new cancer patients (analytic plus non-analytic) since 2010 and has seen 28,596 unique patients with a diagnosis of cancer in this period. A map of the campus of UNMC and its affiliated hospital, Nebraska Medicine, is depicted below (Figure 3). Highlighted are current FPBCC research and clinical facilities (circles) and the future site of the $323 M (625,000 gsf) FPBCC cancer research and clinical care facility that is scheduled to open in the spring of 2017.

**Figure 3. Map of UNMC/Nebraska Medicine Campus with current and Future FPBCC sites**




As shown in Figure 4, the new Buffett Cancer Center facility includes the Suzanne and Walter Scott Cancer Research Tower (260,000 gsf), with 98 laboratories, and the C.L. Werner Cancer Hospital (365,000 gsf), with a multidisciplinary outpatient cancer clinic and treatment facility and a 108-bed inpatient cancer hospital. The new FPBCC complex, specifically designed to have offices for all of the clinical faculty and research faculty located together on each floor, is the largest construction project in the history of the University of Nebraska and the largest public-private partnership in the state's history. Ground breaking for the new facility was in May 2013, a "topping off" ceremony celebrating completion of the 10th story was held in August 2015, and the state-of-the-art Buffett Cancer Center facility is scheduled to open in the spring of 2017.

**Figure 4. Future Fred & Pamela Buffett Cancer Center (opening spring 2017)**


**Cancer Center Organization**

Dr. Jeffrey Gold, a nationally recognized pediatric and adult cardiac surgeon, was appointed the Chancellor of UNMC in 2014, replacing Dr. Harold Maurer. Dr. Gold was recruited from the University of Toledo, where he served as Chancellor and Executive Vice President of Bioscience and Health Affairs and Executive Dean of the College of Medicine since 2005. Chancellor Gold also serves as the Chair of the Nebraska Medicine Board of Directors, the governing body of the clinical enterprise. The Cancer Center Director reports directly to the Chancellor of UNMC and serves on the Chancellor's Council, the major decision-making body for UNMC, thus making the FPBCC Director a dean level position. Since the new $323 M (625,000 gsf) Buffett Cancer Center facility is a joint project between UNMC and Nebraska Medicine, the clinical enterprise affiliated with UNMC, the CEO/President of Nebraska Medicine appointed the Buffett Cancer Center Director to its Senior Leadership Team. Serving on the two most senior and responsible cabinets within the academic and clinical enterprise assures that the Buffett Cancer Center Director is involved in all strategic initiatives that affect UNMC and the clinical enterprise. Importantly, the FPBCC Director specifically reviews strategic and business plans for recruitment of all FPBCC clinical oncology faculty and clinical oncology program development directly with the CEO/President of Nebraska Medicine and the Dean of the College of Medicine. Since the last review, the FPBCC also established a new Executive Committee (EC), which includes the FPBCC Director, the UNMC Chancellor and Vice Chancellor of Business and Finance, as well as the Nebraska Medicine President/CEO and the College of Medicine Dean. The EC meets weekly (with the Buffett Cancer Center Director serving as Chair) to review plans and ongoing construction of the new FPBCC complex, administrative issues, policies and procedures, as well as plans for expansion of clinical programs.

**Clinical Trials Network Expansion**

The FPBCC Director joined other Big Ten Cancer Center Directors to establish the B1G 10 Cancer Research Consortium (BTCRC) in 2013. The BTCRC leverages scientific and clinical expertise in each of the B1G 10 Cancer Centers to develop collaborative trials that can more rapidly move scientific discoveries into new cancer treatments. The BTCRC provides an important platform for established cancer research leaders to collaborate and mentor junior faculty across the consortium. BTCRC studies will focus on developing early phase investigator-initiated trials, encouraging mentorship of junior faculty by senior faculty, and facilitating multidisciplinary translational research collaborations across the BTCRC institutions. Clinical trial working groups with representation from each Cancer Center review concepts for BTCRC clinical trials. The first

BTCRC clinical trial was recently opened, with numerous other trials and concepts in the pipeline. The BTCRC provides an important new avenue to open trials expeditiously across 12 academic institutions and to provide additional training and mentorship for FPBCC junior clinical investigators.

The FPBCC Clinical Trials Network is a regional network that has been expanded since the last CCSG renewal and now includes 6 hospitals across Nebraska, as well as Avera Health, a large regional health care provider across South Dakota, and Trinity Health CancerCare Center in Minot, ND. The FPBCC Office for Cancer Clinical Research also developed new policies and procedures for oversight and training for multi-institutional clinical investigations, and added personnel to the Office for Cancer Clinical Research to oversee investigator-initiated multi-site clinical trials.

**Research Infrastructure Enhancements**

The FPBCC has also supported enhancements to FPBCC shared resources and facilities. First and foremost, the FPBCC Senior Leadership, with the approval of the EAB, developed plans for expansion and broader implementation of bioinformatics services in the Buffett Cancer Center. The aim of this expansion was to accommodate the needs of FPBCC Members in a broad array of research activities in molecular biology, genomics, proteomics, and high-throughput data. The FPBCC worked with the UNMC Vice Chancellor for Research to recruit Chittibabu Guda, PhD (CGMRP) from SUNY Albany to UNMC in 2011 as Director of the Bioinformatics Shared Resource (BISR). Dr. Guda expanded the BISR to offer a wide range of services including (i) analysis of Next-Generation Sequencing (NGS)-based genomics data; (ii) analysis of array-based and systems biology data; and (iii) use of computer programming, machine-learning, and high-performance computing in research projects. The BISR has supported FPBCC collaborative research and facilitated recruitment of several new FPBCC investigators studying genomics, epigenomics, proteomics, and metabolomics since the last review.

Over the past four years, the FPBCC has also provided financial support to establish new resources for research including the 1) Computational Chemistry Resource (CCR), 2) Synthetic and Medicinal Chemistry Resource (SMCR), 3) Pharmacokinetic/Pharmacogenomic Resource (PKPG); and 4) Metabolomics Facility (MF). The CCR, established in collaboration with the Holland Computing Center at the University of Nebraska - Lincoln, performs virtual small molecule screens against defined targets with known structures using a >5.5 M compound virtual library, allowing FPBCC Members to identify small molecules that can be readily purchased and tested empirically for their role in tumor formation. The SMCR synthesizes: 1) compounds for probing novel biological targets that are not commercially available; 2) structurally validated active molecules identified from high-throughput screening assays for additional studies; and 3) chemical probes (fluorescently labeled or biotinylated compounds) to develop assays and/or identify potential targets. The SMCR can also provide scale-up services (mg to grams) for *in vivo* studies to demonstrate proof-of-concept. The PKPGR was established by Dr. Mahato (GICP), Chair of the Pharmaceutical Sciences Department, to facilitate the development and application of pharmacokinetics (PK), pharmacodynamics (PD) and pharmacogenomics (PG) for early phase clinical trials and research conducted at the FPBCC. The PKPGR has collaborated with Drs. Grem and Lin (GICP) on the following clinical trials: 1) Phase I study of hypofractionated stereotactic radiotherapy and concurrent HIV protease inhibitor nelfinavir as part of a neoadjuvant regimen in patients with locally advanced pancreatic cancer, 2) Phase I trial of sequential pralatrexate followed by a 48-hour infusion of 5- fluorouracil given in adult patients with solid tumors, and 3) Phase I trial of epirubicin, cisplatin and capecitabine in adult cancer. Dr. Robert Powers (Department of Chemistry, University of Nebraska - Lincoln), leads the Metabolomics Facility (MF) which provides an unbiased approach to predict *in vivo* mechanisms of drug action from NMR and mass spectrometry data, to facilitate the development of cancer therapeutics and elucidate pathways affected by oncogenes.

**Faculty Recruits**

The Fred & Pamela Buffett Cancer Center has been actively recruiting additional faculty to strengthen its research programs. Over the past 13 years, over 100 new faculty members have been recruited to the Fred & Pamela Buffett Cancer Center. Below is a list of new Cancer Center faculty members that were recruited since January 2014.

**Shannon Buckley, Ph.D. –** Dr. Buckley joined the University as an Assistant Professor in the Department of Genetics, Cell Biology and Anatomy in the UNMC College of Medicine. She was recruited from NYU School of Medicine. Her research interest centers on the molecular mechanisms regulating stem cell fate decisions that may also be linked to cancer.

**Martin Conda-Sheridan, Ph.D. –** Dr. Conda-Sheridan joined the University as an Assistant Professor in the Department of Pharmaceutical Sciences in the UNMC College of Pharmacy. He was recruited from Northwestern University, and joined the Fred & Pamela Buffett Cancer Center in March 2015. His main interests are the design of complex multifunctional biomaterials and bioactive small molecules for medicinal applications in cancer.

**Peng Xiao, Ph.D. –** Dr. Peng is an Assistant Professor in the Department of Genetics, Cell Biology and Anatomy in the UNMC College of Medicine. Before joining UNMC, he was an Assistant Professor in the School of Medicine at Creighton University for seven years. His research interests are in the fields of cancer genomics and biostatistics.

**Nicole deRosa, M.D. –** Dr. deRosa is an Assistant Professor in the Division of Surgical Oncology, and she was recruited from the University of Texas M.D. Anderson Cancer Center where she completed her Fellowship in Surgical Oncology. Her research interests include health outcomes research, immunotherapy strategies for melanoma, and identification of biomarkers in melanoma and sarcoma. Additionally, Dr. deRosa is interested in exploring biomarkers in melanoma and sarcoma as a tool for patient selection for therapy and as prognostic models.

**James Padussis, M.D. –** Dr. Padussis is an Assistant Professor in the Division of Surgical Oncology, and he was recruited from the University of Pittsburgh Medical Center where he completed his Fellowship in Surgical Oncology. His clinical interests include pancreatic cancer, gastric cancer, colorectal cancer and peritoneal based malignancies. In addition, my research interests include: the development and outcomes of minimally invasive approaches to pancreatic and foregut malignancies, resident education in robotic-assisted surgery and novel approaches to regional chemotherapy delivery.

**Chi Zhang, M.D., Ph.D. –** Dr. Zhang was recruited as an Assistant Professor in the Department of Radiation Oncology in the College of Medicine. Before joining UNMC, he completed his residency at Columbia University Medical School. He specialized in the treatment of patients with Glioblastoma and this is also the focus of his research

**Aaron Mohs, Ph.D. –** Dr. Aaron Mohs joined the University as an Assistant Professor in the Department of Pharmaceutical Sciences in the UNMC College of Pharmacy. He was recruited from Wake Forest University Health Sciences, and joined the Fred & Pamela Buffett Cancer Center in April 2015. His research focuses on the development of new fluorescent imaging contrast agents to guide surgical resection of tumors. He is also interested in developing new drug delivery systems that target tumor metabolism. Dr. Mohs is currently funded by the National Institute of Biomedical Imaging and Bioengineering (R01EB019449) and the NCI (R00CA153916).

**Cancer Center Strategic Ongoing Recruitments**

The FPBCC Director is currently working with the Dean of the College of Public Health to recruit a new

Associate Director for Cancer Prevention and Population Sciences. The FPBCC is committed to strengthening cancer prevention and population science research with the goal of achieving NCI Comprehensive Cancer Center designation, and Chancellor Gold added achievement of NCI Comprehensive Cancer Center designation as a goal in the 2015 UNMC strategic plan. With financial support from the University of Nebraska Programs of Excellence Fund and community support for a new endowed chair, a search is currently underway for a nationally recognized leader to serve as the FPBCC Associate Director for Cancer Prevention and Population Sciences.

The FPBCC is also currently recruiting the following leadership positions that support the mission and strategic plan of the Cancer Center. The Director of the Cancer Center serves on the recruitment committee for each position.

- Director Breast Center
- Bone Marrow Transplant Director
- Chair, Department of Internal Medicine

Cancer Center Senior Leadership identified the following areas of strategic priority for the Cancer Center. As a result, the Cancer Center is collaborating with UNMC departments to recruit individuals that can meet these identified needs.

- Genomics / Epigenomics / Informatics
- Tumor Microenvironment / Cancer Stem Cells
- Chemical Biology / Drug Development / Drug Delivery
- Tumor Immunology – Immunotherapeutics
- Cancer Prevention and Control

The Director of the Cancer Center is also the Chair of the Executive Committee for the Cancer Center. This committee was established in 2013 and it includes the following members: UNMC Chancellor, Dean of Medicine, CEO of the Clinical Enterprise/Hospital, and 13 other senior leaders from UNMC, the hospital, the University Foundation and the community. This ensures that the Cancer Center has input at the highest level during the planning and development phases of the new Cancer Center. Additionally, the Director is a key spokesperson for the new Cancer Campus. He provides and presents information to foundation boards, community leaders, the media and all interested parties, which has helped lead to a successful $323 million capital campaign for the Cancer Center, and also leads the Phase II $100 M capital campaign for Cancer Center program development.

## 2.3 Scientific Accomplishments

The following sections identify scientific highlights and accomplishments by Fred & Pamela Buffett Cancer Center members. Scientific accomplishments are divided by scientific program with Cancer Center member names in bold. For a complete list of all Cancer Center members, please see Section 10.0.

***Cancer Genes and Molecular Regulation Program (CGMRP):***

**Mission and Themes**
The mission of the CGMRP is to test in a clinical setting the targets identified and authenticated by program members. The CGMRP is organized to promote collaboration and catalyze the translation of scientific discoveries from all FPBCC basic research program members, while providing FPBCC members with translational research programs access to potential new targets for therapeutic development and evaluation. The research interests of CGMRP faculty are organized around three themes through which the goals of the CGMRP (above) will be accomplished:

1) **Cancer Target Identification:** designing conceptual and technical approaches for the identification of cancer targets; and (3)

2) **Cancer Target Validation:** validating putative targets for cancer therapy and developing and evaluating small molecules directed at those targets

3) **Drug Delivery/Translation:** analyzing and testing preclinical models for cancer therapy and methods for cancer drug delivery.

The specific scientific expertise of CGMRP members facilitated intra-programmatic and inter-programmatic collaborations. CGMRP leadership continues to provide seed funding and the Cancer Center continues to provide critical shared resource support, which led to an extensive number of published papers during the last period. Examples of papers resulting from intra-programmatic publications include:

- A collaboration between Dr. Lewis and investigators at the UT Southwestern Cancer Center (Sci Signal 6:ra90, 2013). Describing a new marine-derived, renewable natural products resource and a method for linking bioactive derivatives of this library to the proteins and biological processes that they target in cells. They used cell-based screening and computational analysis to match gene expression signatures produced by natural products to those produced by small interfering RNA (siRNA) and synthetic microRNA (miRNA) libraries. With this strategy, they matched proteins and miRNAs with diverse biological processes and also identified putative protein targets and mechanisms of action for several previously undescribed marine-derived natural products. They confirmed mechanistic relationships for selected siRNAs, miRNAs, and compounds with functional roles in autophagy, chemotaxis mediated by discoidin domain receptor 2, or activation of the kinase AKT. This approach may be an effective method for screening new drugs while simultaneously identifying their targets.

- A collaboration between Drs. Opavsky, Simpson, Karpf and Lewis (Mol and Cell Biol, *33*, 4321-4333, 2013) showed that loss of Dnmt1 delays lymphomagenesis by suppressing normal hematopoiesis and impairing tumor cell proliferation. Acute inactivation of Dnmt1 in primary lymphoma cells rapidly induced apoptosis, indicating that Dnmt1 is required to sustain T-cell lymphomas. Using high-resolution genome-wide profiling, they identified differentially methylated regions between control and Dnmt1-deficient lymphomas, demonstrating a locus-specific function for Dnmt1 in both maintenance and *de novo* promoter methylation. Dnmt1 activity is independent of the presence of Dnmt3a or Dnmt3b in *de novo* promoter methylation of the H2-Ab1 gene. Collectively, these data show for the first time that Dnmt1 is critical for the prevention and maintenance of T-cell lymphomas and contributes to aberrant methylation by both *de novo* and maintenance methylation.

Dr. Vose (Leukemia and Lymphoma*, 54*, 708-713, 2013) determined the maximum tolerated dose (MTD) of BI 2536, a Plk1 inhibitor, as a 1 h infusion once every 3 weeks in post-transplant relapsed (n = 17) and transplant-naive (n = 24) patients with relapsed/refractory NHL. Median treatment cycles were 2 and 1.5, respectively. MTD was 175 mg for both populations; dose-limiting toxicities were grade 4 thrombocytopenia and neutropenia. Most treatment-related adverse events were grade 1/2; drug-related grade 3/4 events included thrombocytopenia and neutropenia. Four patients achieved responses (three complete and one partial at doses ≥ 150 mg, all post-transplant relapsed patients) for an overall response rate of 9.8%. BI 2536 exhibited multi-compartmental pharmacokinetics with a high volume of distribution. The activity and safety of BI 2536 in this pretreated patient population support Plk inhibitors as a therapeutic strategy in oncology.

Additionally, a paper was published as a result of a pilot project funded by the CGMRP.

- The human protein DnaJ homologue subfamily A member 1 (DNAJA1) was previously shown to be downregulated 5-fold in pancreatic cancer cells and has been targeted as a biomarker for pancreatic cancer, Drs. Powers and Singh (GICP) in a collaborative effort (Biochemistry 53, 1360-72, 2014) showed that the overexpression of DNAJA1 suppresses the stress response capabilities of the oncogenic transcription factor, c-Jun, and results in the diminution of cell survival. DNAJA1 likely activates a DnaK protein by forming a complex that suppresses the JNK pathway, the hyperphosphorylation of c-Jun, and the anti-apoptosis state found in pancreatic cancer cells. A high-quality nuclear magnetic resonance solution structure of the J-domain of DNAJA1 combined with a bioinformatics analysis and a ligand affinity screen identifies a potential DnaK binding site, which is also predicted to overlap with an inhibitory binding site, suggesting DNAJA1 activity is highly regulated.

- Dr. Garrison demonstrated that incorporation of one or more 2-nitroimidazoles into a gastrin-releasing peptide receptor (BB2r)-targeted peptide significantly increases the in vitro retention of the agent in hypoxic prostate cancer cells. The study described herein represents our first investigation of the in vivo properties of these hypoxia-enhanced BB2r-targeted agents in a PC-3 xenograft mouse model. On the basis of the initial 1-h uptake in PC-3 tumors, the peptide demonstrated tumor retention of 21.0% 72 h after injection. Micro-SPECT/CT imaging of the peptide radioconjugate resulted in clear delineation of the tumors. These data showed that BB2r-targeted agents incorporating 2-nitroimidazole moieties demonstrated improved retention, demonstrating that further exploration into the potential of hypoxia-selective trapping agents for BB2r-targeted agents, as well as other targeted compounds, is warranted.

Cancer Center supported shared resources were also critical to several additional publications including:

- Dr. Powers (ACS Chem Biol 9,1138-44, 2014) developed an open-source platform for complete NMR metabolomics data handling, MVAPACK, and described its application on an example metabolic fingerprinting data set. Data handling in the field of NMR metabolomics has historically been reliant on either in-house mathematical routines or long chains of expensive commercial software. Thus, while the relatively simple biochemical protocols of metabolomics maintain a low barrier to entry, new practitioners of metabolomics experiments are forced to either purchase expensive software packages or craft their own data handling solutions from scratch. This inevitably complicates the standardization and communication of data handling protocols in the field, which will be alleviated, at least partially, by MVAPACK.

- Based on an award to Dr. Karpf (recently transferred to the MBEP) the extent to which DNA methylation of repetitive elements (RE) is altered in epithelial ovarian cancer (EOC) patient tumors and white blood cells (WBC) was determined compared to normal tissue controls (Gynecol Oncol.132, 462-467, 2014). REs were significantly hypomethylated in EOC compared to normal ovarian surface epithelia and fallopian tube surface epithelia, and LINE1 and Alu methylation showed a significant direct association in these tissues. In contrast, WBC RE methylation was significantly higher in EOC cases compared to controls. RE methylation in patient-matched EOC tumors and pre-treatment WBC did not correlate. EOC showed robust RE hypomethylation compared to normal tissues from which the disease arises. In contrast, RE are

generally hypermethylated in EOC patient WBC compared to controls. EOC tumor and WBC methylation did not correlate in matched patients, suggesting that RE methylation is independently controlled in tumor and normal tissues. Despite the significant differences observed over the population, the range of RE methylation in patient and control WBC overlapped, limiting their specific utility as an EOC biomarker. However, his data demonstrated that DNA methylation is deranged in normal tissues from EOC patients, supporting further investigation of WBC DNA methylation biomarkers suitable for EOC risk assessment.

**Collaborative Efforts**

Of 13 current NCI/NIH awards in which CGMRP members participate, one (R01GM074876, PI Caplan) is an intra-programmatic collaboration with another CGMRP member (Naslavsky) serving as PI and co-PI. One award (5R01CA157774, PI Lewis) is an inter-programmatic collaboration with Dr. Brattain (GICP) as co-investigator along with Drs. Michael White and John MacMillan from the NCI-designated Simmons Cancer Center at UT Southwestern. This collaborative effort led to the discovery of a novel approach, termed functional signature ontology (FUSION) for identifying molecular targets and cognate small molecule inhibitors that can be explored for cancer therapy. A paper describing these results was published recently (Potts *et al*., Sci Signaling, 2013).

In a collaboration based on R01GM074876, Drs. Caplan and Navslasky (Mol Biol Cell 24, 1776-90, 2013) proposed a mechanism for the biogenesis of recycling endosome (RE) tubules. They demonstrated that MICAL-L1 and the BAR-domain protein syndapin2 bind to phosphatidic acid, which they identified as a novel lipid component of RE. Their studies demonstrated that direct interactions between these two proteins stabilize their association with membranes, allowing for nucleation of tubules by syndapin2. The presence of phosphatidic acid in liposomes enhanced the ability of syndapin2 to tubulate membranes *in vitro*. Their results highlight a new role for phosphatidic acid in endocytic recycling and provide new insights into the mechanisms by which tubular REs are generated.

Extensive collaborations are ongoing between investigators focused on evaluating therapy for lymphoma. In addition to the work by Drs. Vose and Opavsky listed above, investigators determined the extent to which MYC and BCL2 protein expression in tissue would predict survival in DLBCL (Br J Haematol 165, 382-391, 2014). Patients with low expression of BCL2 (≤30%) and MYC (≤50%) had the best prognosis, whereas those with high BCL2 (>30%) and MYC (>50%) had the worst outcome. The combination of the BCL2 and MYC was an independent predictor of overall survival (OS) and event-free survival (EFS) (P = 0·015 and P = 0·005, respectively). The risk of death was nine times greater for patients with high BCL2 and MYC compared to those with low expression. High BCL2 and MYC was a strong predictor of poor OS (P < 0·001) and EFS (P = 0·0017) in patients with the germinal center B-cell (GCB) type, but not in the non-GCB type. In DLBCL, high co-expression of MYC and BCL2 was an independent predictor of poor survival, and could be used to stratify patients for risk-adapted therapies.

In another study (Biol Blood Marrow Transplant 19, 123-128, 2013), Drs. Vose and Armitage investigated the standard outpatient dose of 131-Iodine tositumomab (75 cGy) combined with high-dose carmustine, etoposide, cytarabine, and melphalan (BEAM) followed by autologous stem cell rescue for the treatment of chemotherapy-sensitive relapsed or refractory, or high-risk first complete remission (CR) patients with diffuse large B cell non-Hodgkin's lymphoma (DLBCL). Forty patients with chemotherapy-sensitive persistent or relapsed or high/intermediate or high international prognostic index DLCBL were treated in a phase II trial combining 75 cGy 131-Iodine tositumomab with high-dose BEAM followed by autologous stem cell transplantation. The CR rate after transplantation was 78%, and the overall response rate was 80%. Short-term and long-term toxicities were similar to historical control patients treated with BEAM alone. With a median follow-up of 6 years (range, 3-10 years), the 5-year overall survival (OS) was 72% (95% confidence interval [CI], 55%-83%), and the 5-year progression-free survival (PFS) rate was 70% (95% CI, 53%-82%). The PFS and OS were encouraging in this group of chemotherapy-sensitive persistent, relapsed, or high-risk patients with DLBCL. A follow-up phase III trial with 131-Iodine tositumomab/BEAM vs rituximab/BEAM was planned based on this information.

***Molecular Biochemical Etiology Program (MBEP):***

**Scientific Goals of the Program**

The overarching goal of investigations by members of the MBEP program is to discover and validate mechanisms of cancer initiation and progression that may lead to novel biomarkers and therapeutic targets, with an emphasis on breast, prostate and ovarian cancers. The following programmatic goals provide a pathway to this end:

1) Discover alterations of molecular mechanisms that maintain intact genomes.
2) Discover alterations in intracellular signaling mechanisms and tumor cell-microenvironment interactions.
3) Validate cancer mechanisms, biomarkers, and targets using cell-based *in vitro* and animal models.

**Program Themes**

The MBEP is organized into 3 themes that closely align with the goals delineated above.
1. Genome Instability and Cancer
2. Signaling Mechanisms in Cancer
3. Cellular Basis of Cancer

Members within each of the three major themes of the MBEP have continued to make outstanding scientific progress over the past year. Listed below are examples of major advances within each of theme, with emphasis on studies involving intra- and inter-programmatic collaborations, and key support from the Cancer Center as pilot funding and/or support of critical Cores.

***Theme 1: Genetic and Epigenetic Basis of Cancer***

- **A small molecule directly inhibits the p53 transactivation domain from binding to replication protein A.** Mutations or deletions of p53 represent the single most frequent genetic event in cancer. Replication protein A (RPA), is essential for DNA replication, repair and DNA damage signaling. RPA possesses six ssDNA-binding domains (DBDs), and that near the N-terminus of the largest subunit, RPA70, (DBD-F) functions as a binding site for p53 and other DNA damage and repair proteins that contain amphipathic alpha helical domains. Intra-programmatic collaboration between Drs. Parkhurst and Oakley demonstrated direct binding of both ssDNA and the transactivation domain 2 of p53 (p53TAD2) to DBD-F, as well as DBD-F-directed dsDNA strand separation by RPA. All of which were inhibited by fumaropimaric acid (FPA). FPA bound directly to RPA, resulting in a conformational shift as determined through quenching of intrinsic tryptophan fluorescence in full length RPA. Use of structural analogues of FPA and RPA mutants provided further insights on chemical/biochemical properties required for inhibition, and suggested that protein binding, DNA modulation and inhibitor binding all occur within the same site on DBD-F. These studies reveal how disruption of p53-RPA interactions may modulate the regulatory functions of p53 and RPA, thereby impacting cellular pathways that control the cell cycle and maintain the integrity of the human genome. These studies were published in Nucleic Acid Research (Nucleic Acids Research, 41(3), 2047-2059, 2013.).

- **Genome-wide mutation avalanches induced in diploid yeast cells by a base analog or an APOBEC deaminase.** Mechanisms that contribute to mutational lesions in cancer are of great significance. The cytidine deaminase APOBEC is physiologically involved in generating mutations to diversify the immunoglobulin gene, but has been implicated as a source of mutations in multiple cancers, such as cervical, bladder, lung, head and neck, and breast cancers. Cancer-associated mutations occur in somatic diploid cells, yet classic studies of the molecular mechanisms of mutagenesis have been performed in haploids. In a collaboration with members of the Bioinformatics (RJ Boissey) and Molecular Biology (A Dhar and JD Eudy) Cores, and with the support of a Cancer Center Pilot grant, Dr. Youri Pavlov's group demonstrated that the parameters of the mutation process are different in diploid cell populations. By studying the genomes of drug-resistance mutations induced in yeast diploids by base analog 6-hydroxylaminopurine (HAP) or APOBEC from lamprey, they demonstrated a stunning load of thousands of

unselected mutations, while haploid mutants contained almost an order of magnitude fewer mutations. A plausible explanation is provided by their findings that the progeny of haploid cells with mutations in essential genes were never recovered, while diploid cells with heterozygous essential gene mutations survived, propagating large mutational loads. Their study suggests that hypermutability due to transient faults of the mutation prevention pathways or temporary inability to remove the deaminase, with spikes of mutability, may explain the sudden acquisition of multiple mutational changes during evolution and carcinogenesis. These studies were published in PLoS Genetics (PLoS Genet. 2013;9(9):e1003736, 2013.)

***Theme 2: Molecular and Biochemical Basis of Cancer***

- **Cytoplasmic localization of alteration/deficiency in activation 3 (ADA3) predicts poor clinical outcome in breast cancer patients.** Transcriptional activation by estrogen receptor (ER) is a key step in breast oncogenesis, and overexpression of ER coactivator SRC-3 is associated with poor clinical outcomes in breast cancer. The laboratory of Dr. Vimla Band previously discovered ADA3, an evolutionarily-conserved and essential component of HAT complexes, as an ER coactivator and a positive regulator of cell cycle progression and DNA damage mitigation. In the current intra-programmatic collaboration with Dr. Hamid Band, they teamed up with breast cancer pathologists Dr. Emad Rakha and colleagues at University of Nottingham Hospital in UK to interrogate breast cancer tissue microarrays from over 900 breast cancer patients with long-term follow-ups for potential significance of ADA3 expression/localization in breast cancer. Their analyses demonstrated that predominant nuclear ADA3 staining correlated with ER+ status, whereas predominant cytoplasmic ADA3 staining correlated negatively with ER+ status and positively with ErbB2, EGFR, and Ki67. Cytoplasmic ADA3 was positively correlated with higher histological grade, mitotic counts, Nottingham Prognostic Index, and positive vascular invasion. Significantly, cytoplasmic expression of ADA3 was associated with reduced breast cancer-specific and distant metastasis-free CSS and DMFS in ErbB2+/EGFR+ patients. Thus, cytoplasmic localization of ADA3 together with ErbB2+/EGFR+ status could signify a particularly poor prognosis in breast cancer. These studies were published in Breast Cancer Research and Treatment (Breast Cancer Research and Treatment, 137(3), 721-731, 2013) and have spurred studies of the role of Ada3-containing HAT complexes in ErbB2-driven breast cancer as a platform for therapeutic targeting.

- **Autophagy control by the VEGF-C/NRP-2 axis in cancer and its implication for treatment resistance.** A major contributor to cancer mortality is metastatic progression and treatment resistance of tumors recurring following initially successful therapeutic intervention. A better understanding of mechanisms that promote resistance to therapy should help develop new treatment modalities and improve current ones. One pathway contributing to therapy resistance is autophagy, a self-digestive process that can eliminate unnecessary or damaged organelles to protect cancer cells from death. Dr. Kaustubh Datta's group defined a novel role of VEGF-C/Neuropilin 2 (NRP-2) axis in the activation of autophagy, which helps cancer cell survival following treatment. Inhibition of mTOR complex 1 activity by this axis is the underlying mechanism for the activation of autophagy. Furthermore, they identified two VEGF-C/NRP-2-regulated genes, LAMP-2 and WDFY-1, previously suggested to participate in autophagy and vesicular trafficking. Upregulation of WDFY-1 following VEGF-C or NRP-2 depletion contributed to cytotoxic drug-mediated cell death. These results identify a targetable pathway that promotes survival of cancer cells subject to chemotherapy-induced stress. These studies were published in Cancer Research (Cancer Research, 73(1), 160-171, 2013.).

***Theme 3: Cellular Basis of Cancer***

- **Essential role for Dnmt1 in the prevention and maintenance of MYC-induced T-cell lymphomas.** The Myc-induced lymphoma model provides an elegant system to identify molecular determinants of oncogenesis of hematopoietic stem cells along distinct lineages. In prior work, Dr. Rene Opavsky and colleagues have shown non-random DNA, hyper- and hypo-methylation of distinct sets of genes. DNA methyltransferase 1 (Dnmt1) is a key enzyme involved in the somatic inheritance of DNA methylation

signatures and thereby epigenomic stability. In an intra- and inter-programmatic collaboration, with Dr. Adam Karpf and Drs. Rob Lewis and Melanie Simpson (CGMR), they genetically inactivated Dnmt1 in the MYC-induced T-cell lymphomagenesis model. Loss of Dnmt1 delayed lymphomagenesis by suppressing normal hematopoiesis and by impairing tumor cell proliferation. Acute inactivation of Dnmt1 in primary lymphoma cells induced rapid apoptosis, indicating that Dnmt1 is required to sustain T-cell lymphomas. In high-resolution genome-wide methylome studies (in collaboration with David Klinkebiel of the DNA Methylation Core Facility), they identified regions differentially methylated in Dnmt1-deficient vs. Control lymphomas, demonstrating locus-specific function of Dnmt1 in both maintenance and de novo promoter methylation. Dnmt1 activity was required independent of the presence of Dnmt3a or Dnmt3b in de novo promoter methylation of an index gene H2-Ab1. This study provides first evidence for a critical role of Dnmt1 in the prevention and maintenance of T-cell lymphomas and towards aberrant de novo as well as methylation during oncogenic progression. These results were published in Molecular and Cellular Biology (Molecular and Cellular Biology, 33(21), 4321-4333, 2013.).

- A role for IRF4 in the development of CLL. The laboratory of Dr. Runqing Lu is investigating the roles of Interferon regulatory factor 4 (IRF4), a critical transcriptional regulator of B-cell development and function, in lymphomagenesis. A recent genome-wide single-nucleotide polymorphism (SNP) association study identified IRF4 as a major susceptibility gene in chronic lymphocytic leukemia (CLL). Although the SNPs located in the IRF4 gene were linked to a downregulation of IRF4 in CLL patients, whether a low level of IRF4 is critical for CLL development remains unclear. In rodents, CLL cells are derived from B1 cells, a subset dramatically expanded in immunoglobulin heavy chain Vh11 knock-in mice. Dr. Lu bred a Vh11 knock-in allele into IRF4-deficient mice (IRF4(-/-)Vh11). In an intra-programmatic collaboration with Dr. Karen Gould, they show that IRF4(-/-)Vh11 mice develop spontaneous early-onset CLL with 100% penetrance. Further analysis showed that IRF4(-/-)Vh11 CLL cells proliferate predominantly in spleen and express high levels of Mcl-1, which mediates resistant to apoptosis overcome by reconstitution with ectopic IRF4. This study provided the first demonstration of a causal relationship between low levels of IRF4 and development of CLL, and established the IRF4(-/-)Vh11 mice as a novel model for dissecting molecular pathogenesis of CLL and to test new therapeutic avenues. These findings were published in Blood (Blood. 2013 Oct 17;122(16):2848-55, 2013.)

**Collaborative Efforts**

There have been extensive collaborative efforts between MBEP investigators and scientists of other Research Programs within the Cancer Center. For example, Dr. Kay-Uwe Wagner (MBEP) serves as a core facility director in the NCI-funded (U54) program of the Pancreatic Tumor Micro-environment Network. As part of this initiative, he collaborated inter-programmatically with Drs. Batra and Hollingsworth (GICP) to examine the role of the c-Myc oncogene in pancreatic cancer (PDAC) initiation, maintenance, and progression. An investigative team led by Dr. Hallgeir Rui from the Kimmel Cancer Center in Philadelphia contributed clinical data by determining the expression of the c-MYC oncogene in human pancreatic cancer tissue arrays using quantitative imaging. The experimental part of this study showed that, in contrast to earlier studies, expression of Myc is sufficient to induce metastatic PDAC in genetically engineered mice. Dr. Wagner's novel mouse model for reversible pancreatic cancer revealed that c-Myc is also required for tumor maintenance at primary and metastatic sites. Nonetheless, dormant cancer stem cells contribute to residual disease in this model following the complete ablation of c-Myc expression (*Cancer Research 73 (6):1821-1830*).

As part of an investigative team led by Dr. Steven Ziegler at the Benaroya Research Institute at Virginia Mason in Seattle, Dr. Wagner also contributed to a study published in the prestigious journal *Nature Immunology* that signaling through Jak2 and Stat5 is essential for thymic stromal lymphopoietin (TSLP)-dependent activation of dendritic cells and chemokine production, suggesting that Jak2/Stat5 signaling is a critical component for the promotion of type 2 immunity at barrier surfaces (*Nat Immunol. 2013 Apr;14(4):364-71*).

**Drs. San Ming Wang** and **Kenneth Cowan** (MBEP) teamed up with the well-regarded hereditary cancer researcher **Dr. Henry Lynch** from Creighton University to identify unknown family-specific genetic alterations

that modify the predisposition in BRCAx familial breast cancer. As part of this project, they sequenced the entire coding regions of the genome for individual family member using exome sequencing, and they identified 55 nonsynonymous germline variants affecting 49 genes in multiple members of the family. The results of this study suggest that 22 of these 49 genes play a role in the predisposition towards familial breast cancer (The Breast Journal, 19:520-528, 2013). Beyond the scope of this line of investigations, Dr. Wang is a member of a multi-institutional consortium that aims to identify unknown germline mutations that modify the onset of BRCAx familial breast cancer through combining exome data from all research laboratories around the world. Specifically, Dr. Wang contributed exome data that was collected by his investigative team, which received financial support from the cancer center.

Research conducted in the laboratory of Dr. Polina Shcherbakova focuses on the characterization of mutations in the replicative DNA polymerase genes that elevate genomic instability and promote cancer development. Dr. Shcherbakova initiated a collaboration with Dr. Lynch from Creighton University to identify rare DNA polymerase variants in families with multiple colorectal adenomas and early onset colorectal cancer. As part of these efforts, the team just completed a study on the significance of the P286R substitution in the conserved ExoI motif of Pol in a collection of 53 sporadic colorectal cancer specimens. Despite many possible ways to inactivate Pol proofreading, this particular genetic alteration has been repeatedly observed in hypermutable colorectal tumors. To understand the reasons for the recurrent appearance of the P286R variant, Dr. Shcherbakova's team characterized the functional consequences using the yeast model system. An analogous substitution in the yeast Pol produced an unusually strong mutator phenotype exceeding that of proofreading-deficient mutants by two orders of magnitude. This argues that the P286R mutation acts at some level other than loss of exonuclease to elevate cancer risk, thus challenging the idea that hypermutated human cancers must result from loss of exonucleolytic proofreading. The P286R change also conferred a strong mutator effect when present in the heterozygous state, defining the DNA polymerases genes as an unusual class of tumor suppressors, for which loss of heterozygosity is not required to promote tumorigenesis. The results of this study were published as a priority report in the journal *Cancer Research* (Cancer Res. 74(7):1895-901, 2014).

In order to strengthen the clinical focus in the area of breast cancer, Drs. Vimla Band and Hamid Band initiated a very active collaboration with Dr. Emad Rakha, who is a breast cancer pathologist at University of Nottingham Hospital in the United Kingdom and who contributed TMAs with follow-up clinical records from a large set (>900) of breast cancer patients. Dr. H. Band and V. Band in an inter-programmatic collaboration with Drs. Amar Natarajan and David Kelly (CGMR) have carried out an imaging-based kinase inhibitor screen to identify kinases that mediate/modulate ErbB2 downregulation from the cell surface upon inhibition of HSP90. These studies have revealed a critical role of members of the PKC family in endocytic recycling and signaling of ErbB2 that is linked to cell migration and metastatic traits (Bailey TA et al. JBC, in revision). These findings, together with previous intra-programmtic collaborations between Drs. Vimla Band, Hamid Band and Kay Wagner, and inter-programmatic collaborations between Vimla Band and Surinder Batra (GICP), Drs. V. Band, Kay Wagner, H. Band, S. Batra, Jennifer Black (GICP) and R. Singh (CGMR) have joined forces towards a developing program project grant (PPG) proposal focused on ErbB2-driven tumor progression and metastasis. In addition, Drs. V. Band, H. Band, K. Cowan and K Wagner have initiated discussions with Dr. Ronald Weigel of the University of Iowa Cancer Center to plan a joint Breast Cancer SPORE.

***Gastrointestinal Cancer Program (GICP)***

**Mission and Themes:**
The mission of the GICP is to understand the pathogenesis and pathophysiology of GI cancers, identify and validate new diagnostic and prognostic tools for GI cancer management, and develop new therapeutic options for patients with GI malignancies. To address this mission, the GICP has been organized into three interactive themes with the following goals:

1) **Mechanisms of GI Tumorigenesis:** To understand basic mechanisms of GI tumor development and identify abnormalities that may serve as novel biomarkers or therapeutic targets.
2) **Biomarkers:** To develop and validate biomarkers for GI cancer detection, prognosis, and risk stratification.

3) **Novel Treatment Approaches:** To explore novel therapies for GI malignancies in preclinical models and human clinical trials.

***Theme 1:*** Program members in Theme 1 have research interests in (1) the development/differentiation of the pancreas and colon; (2) signaling pathways underlying aberrant cell proliferation, survival and invasion/metastasis in pancreatic/colon cancer (TGFβ, EGFR, IGFR, PKA, PKC), (3) Mucins in pancreatic/colon cancer growth and metastasis, and (4) microRNA-mediated regulation in pancreatic/colon cancer. A key accomplishment that relates to these research interests is described below:

- MUC1-Induced Tumor Stromal Metabolic Crosstalk in Pancreatic Cancer (Chaika *et al. PNAS* 21:13787, 2012). This intra-programmatic collaboration involving Dr. Pankaj Singh (a new member of the Cancer Center recruited to the Eppley Institute as an Associate Professor), Tony Hollingsworth, and Keith Johnson identified MUC1 as a master regulator of the metabolic program of pancreatic cancer cells. MUC1 was shown to facilitate metabolic alterations in hypoxic environments that enable tumor cells to survive and proliferate under stress conditions. Studies demonstrated that MUC1 occupies the promoters of multiple glycolytic genes and enhances their activity in a HIF1α-regulated manner. MUC1 was further shown to physically interact with HIF1α, and to stabilize HIF1α protein and enhance its activity. Notably, MUC1 was found to enhance HIFα occupancy of glycolytic gene promoters. These novel findings led to a new R01, as well as DOD, and PanCan-AACR funding for Dr. Singh and form the basis of Project 4 of the SPORE in Pancreas competitive renewal (Targeting Metabolic Alterations to Improve Survival in Pancreatic Cancer). The SPORE received a score of 18 and is expected to be funded.

***Theme 2:*** Major goals of program members in Theme 2 include (1) the identification of biomarkers for the early diagnosis and prognosis of pancreatic cancer, (2) enhancing the biomedical computing infrastructure for the identification of pancreatic cancer risk factors and predictors of survival, and (3) the identification of prognostic biomarkers for stage II/stage III colon cancer. Two important accomplishments in this theme are described below:

- MicrRNA-192 Suppresses CRC Liver Metastasis (Geng *et al. Oncogene*, In Press). This intra-programmatic collaboration involved basic and clinician scientists, including Dr. Jenny Wang (Project Leader), Chandrakanth Are (Surgical Oncology), Michael Brattain, and Geoffrey Talmon (Pathology). Dr. Wang's group demonstrated that expression of miRNA-192, a miRNA that is induced by TGF-β signaling, is inversely correlated with metastatic potential of colon cancer cells. Expression of miR-192 contributes to growth factor deprivation stress (GFDS)-induced apoptosis in these cells, while miRNA-192 deficiency confers resistance to cell death. Notably, ectopic expression of miRNA-192 in metastatic HCT-116 cells markedly suppressed metastatic colonization of the liver in an orthotopic model. miRNA-192 was further demonstrated to regulate the expression of genes associated with cell survival, E-cadherin expression, and angiogenesis, including Bcl2, the transcription factor Zeb2, and VEGFA. Importantly, expression of miRNA-192 is significantly reduced in human colon cancer samples, particularly in stage IV tumors. Expression of miRNA-192 may, therefore, provide prognostic information in colon cancer. In addition, these findings indicate that restoration of miR-192 expression, or antagonism of its target genes (Bcl-2, Zeb2 or VEGFA), may have considerable therapeutic potential for anti-metastatic therapy in patients with colon cancer.

- Improving the Diagnosis of Pancreatic Cancer: A combination of Secretory MUC5AC and CA19.9 (*Lancet Oncology*, In Review).: Failure to detect pancreatic cancer early results in 74% death within the first year of diagnosis and the 5-year survival for pancreatic cancer patients is 6%. The best treatment for pancreatic cancer remains surgery, which increases survival from 6% to 25%**.** However, only 10-20% of pancreatic cancers are resectable on presentation. There is, therefore, a desperate need to identify biomarkers for early, resectable disease. This important problem was addressed through an intra- and inter-programmatic collaborative effort involving Drs. Surinder Batra, Tony Hollingsworth, Aaron Sasson, Patrik Johansson, Jane Meza and other investigators from the Mayo Clinic and the University of Pittsburgh. Together, these investigators developed a highly sensitive immunoassay for the detection of the secreted mucin, MUC5AC, in almost 800 blood samples from healthy controls, patients with acute or chronic pancreatitis, and early

(resectable) or late stage pancreatic cancer. Importantly, elevated MUC5AC levels were observed in both early and late pancreatic cancer cases relative to all controls, a result that was confirmed in human pancreatic cancer samples at various stages obtained through the UNMC Rapid Autopsy Program (RAP) established twelve years ago by Dr. Tony Hollingsworth. Further analysis of the data demonstrated that MUC5AC levels can distinguish early pancreatic cancer from benign lesions or chronic pancreatitis with high specificity and sensitivity, pointing to the diagnostic potential of MUC5AC for early disease. Additional studies demonstrated that a combination of MUC5AC with the marker CA19.9 (FDA-approved as an indicator of pancreatic tumor burden) improves the sensitivity and specificity for differentiating early pancreatic cancer from controls. Together, these exciting findings identify MUC5AC as a promising biomarker for early detection of pancreatic cancer. The results have been confirmed in a blinded multicenter validation trial (involving the Mayo Clinic and the University of Pittsburgh) and additional validation will be performed using NCI specimen reference sets.

***Theme 3:*** Research interests in this theme include (1) Targeting CDK5 inhibition in pancreatic and colon cancer, (2) Targeting the survivin/XIAP survival complex in pancreatic and colon cancer, (3) Targeting radioresistance in pancreatic cancer, (4) Immune response modulation using Flt3L/gemcitabine combinations in pancreatic cancer, (5) Targeting MUC4 for chemosensitization in pancreatic cancer, and (6) improved delivery of gemcitabine using micelles. Intra- and inter-programmatic efforts are ongoing to develop CDK5 as a therapeutic target for pancreatic and colon cancer. CDK5 is an atypical member of the CDK family of serine/threonine kinases, which is activated by p35 and p39 (not cyclins). Although its functions have been studied mainly in brain, extra-neuronal roles in angiogenesis, cell survival migration, and metastasis have been noted in different types of cancer.

- Inhibition of CDK5 as a Treatment for Pancreatic Cancer (Eggers *et al.*, *Clin Cancer Res* 17:6140, 2011: In an intra- and inter-programmatic study, Dr. Tony Hollingsworth and his colleagues Drs. Pankaj Singh, Michel Ouellette, Jean Grem, and Amar Natarajan determined that the CDK5 gene and its activators p35 and p39 are amplified in a majority of human pancreatic cancers. Importantly, mutant K-Ras, a characteristic of more than 90% of human pancreatic cancers, increases CDK5 kinase activity. CDK5 activity, in turn, enhances pancreatic cancer cell growth, invasion and metastasis *in vitro*. Conversely, inhibition of CDK5 kinase activity using a CDK5 dominant negative or the drug roscovitine significantly decreases the rate of cell growth, migration, and invasion of pancreatic cancer cells *in vitro* and *in vivo*. Inhibition of CDK5 activity with the potent pyrazole CDK5 inhibitor CP668863 (Pfizer) nearly eliminated soft agar colony formation of S2-013 pancreatic ductal adenocarcinoma cells and transformed human pancreatic nestin expressing cells at concentrations achievable in blood *in vivo*. Athymic nude mice orthotopically challenged with S2-013 tumors showed significantly reduced tumor size with less invasion and metastasis when treated with the pyrazoles CP681301 or CP668863 (Pfizer). There was also a significant reduction in blood vessel formation at the invasion front in treated animals. These studies formed the basis for Project 1 of a SPORE in Pancreas led by Dr. Hollingsworth. Proposed studies will further evaluate the effects of CDK5 inhibition with the Pfizer compounds in xenograft models as well as develop a novel CDK5 inhibitor, 20-223, generated in-house by Dr. Natarajan of the CGMRP Program. Phase I clinical trials are planned with these compounds.

- CDK5 Inhibitors for the Treatment of Metastatic Colon Cancer (Chowdhury *et al.*, *J. Biol. Chem.* 286:30937, 2011; Chowdhury *et al., PLoS One* 6:e19335, 2011): An intra- and inter-programmatic study led by Dr. Brattain, in collaboration with Drs. Natarajan and Hollingsworth, determined that CDK5 is markedly upregulated in metastatic colon cancer cells relative to the primary tumor in mice and in liver metastases relative to the primary colon tumor in patients. Additional studies determined that TGFβ suppresses CDK5 expression in colon cancer cells *in vitro* and *in vivo*. CDK5 inhibition using siRNA or a novel CDK5 inhibitor, 20-223, developed in-house by Dr. Natarajan downregulated the survivin/XIAP survival complex and promoted apoptosis of colon cancer cells. Based on these and other findings, this group is planning to test a drug combination consisting of the histone deacetylase inhibitor, Belinostat, to restore TGFβ receptor expression in colon cancer cells (where it expression is often suppressed), the CDK5 inhibitor 20-223 and the transcriptional inhibitor of survivin, YM155, for the treatment of metastatic

colon cancer. These findings form the basis of Project 4 of a developing multi-institutional GI SPORE application co-led by Drs. Surinder Batra (GICP) and Hemant Roy (Boston University Medical Campus), with planned submission in September 2016.

**Collaborative Efforts**

A major strength of the GICP lies in the strong collaboration that exists between Program members. Collaborative efforts with members from the CRGMP and MBEP Programs are also strong (see examples above). These interactions have led to several multi-investigator grants, including a SPORE in Pancreas led by Dr. Hollingsworth (recently reviewed, impact score of 18), a U54 Pancreatic Tumor Micro-Environment Network (TMEN) grant led by Dr. Batra, and a U01 Early Diagnosis of Pancreatic Cancer grant led by Dr. Hollingsworth. The strong track record of interaction between program members is anticipated to support future multi-investigator grants, including developing SPORE (see above) and P01 grants in colon cancer. Pilot Funds were recently awarded to a group of GICP members (Drs. Michael Brattain, Jennifer Black, Adrian Black, and Jing (Jenny) Wang) and CGRMP Program Leader Dr. Robert Lewis to support a P01 application focused on addressing two major challenges in colon cancer management: therapy of metastatic colon cancer and treatment decision-making for Stage II/III colon cancer. Projects include: **(1)** WDR5 in colon tumorigenesis (Lewis), **(2)** Enhancing pro-apoptotic PKA signaling for treatment of metastatic colon cancer (Brattain), **(3)** Identification of mechanisms of differential TGFβ function in regulating miRNA-192 (Wang), **(4)** A protein kinase C α – Id1 signaling axis in colon cancer (Black), and **(5)** Tissue Specimen Core. It is anticipated that these interactions will facilitate new scientific findings in the future.

**Cancer Prevention and Control Program (CPCP)**

The goal of the Cancer Prevention and Control Program is to improve the current knowledge base for promoting overall reductions in cancer incidence, morbidity and mortality, and identify ways to:

- Estimate cancer incidence and mortality among populations in Nebraska
- Enhance primary and secondary cancer prevention
- Improve symptom management/supportive care, quality of life, and survivorship

Cancer Prevention and Control Program includes the following three research themes:

1. Population-based Epidemiologic Research to investigate incidence and mortality and the roles of environment, lifestyle, genes and other biomarkers in development & outcomes of cancer

2. Symptom Management Research to improve management of the most common and distressing symptoms associated with cancer and cancer treatment, daily function, caregiving, and quality of life

3. Social and Behavioral Research to prevent cancer and adopt a healthy lifestyle

Below are examples of Cancer Prevention and Control Program research projects that were recently published in peer-reviewed journals.

**Theme 1: Population-based Epidemiologic Research**

Drs. Watanabe-Galloway and Islam collaborated on a study that examined geographic and race/ethnic disparities in access to end of life care among elderly patients with lung cancer. The study sample consisted of 91,039 Medicare beneficiaries with lung cancer who died in 2008. The key outcome measures included the number of emergency room visits, the number of inpatient admissions and the number of intensive care unit (ICU) days in the last 90 days of life, hospice care ever used and hospice enrollment within the last 3 days of life. Medicare beneficiaries with lung cancer residing in rural, remote rural, and micropolitan areas had more ER visits in the last 90 days of life as compared to urban residents. Urban residents however, had more ICU days in the last 90 days of life and were more likely to have ever used hospice as compared to residents of

rural, remote rural and micropolitan counties. Racial minority lung cancer patients had more ICU days, ER visits and inpatient days than non-Hispanic White patients, and also were less likely to have ever used hospice care or be enrolled in hospice in the last 3 days of life. Lung cancer patients with very low socioeconomic status (SES) were less likely to ever use hospice or be enrolled in hospice care in the last 3 days of life, as compared to those who had very high SES. Geographic, racial and socioeconomic disparities in end of life care call for targeted efforts to address access barriers for these groups of patients. (Nayar, et al. 2014. *Disparities in end of life care for elderly lung cancer patients*. *Journal of Community Health, 39*(5), 1012-1019.)

Dr. Soliman and his collaborators conducted a study that evaluate current knowledge of cervical cancer and screening practices among the Bhutanese refugee women in Omaha, Nebraska. The study aimed to investigate cervical cancer and screening knowledge and perceptions about the susceptibility and severity of cervical cancer and perceived benefits and barriers to screening. Self-administered questionnaires and focus groups based on the Health Belief Model were conducted among 42 healthy women from the Bhutanese refugee community in Omaha. The study revealed a significant lack of knowledge in this community regarding cervical cancer and screening practices, with only 22.2% reporting ever hearing of a Pap test and 13.9 % reporting ever having one. Only 33.3 % of women were in agreement with their own perceived susceptibility to cervical cancer. Women who reported ever hearing about the Pap test tended to believe more strongly about curability of the disease if discovered early than women who never heard about the test (71.4 vs. 45.0 %, for the two groups. respectively). Refugee populations in the United States are in need for tailored cancer education programs especially when being resettled from countries with high risk for cancer. (Haworth et al. 2014. *Knowledge, attitudes, and practices for cervical cancer screening among the Bhutanese refugee community in Omaha, Nebraska*. *Journal of Community Health, 39*(5), 872-878.)

**Theme 2: Symptom Management Research**

Dr. Schumacher and her collaborators examined oncology patients with persistent pain treated in outpatient settings and their family caregivers that have significant responsibility for managing pain medications. The aim of the study was to describe day-to-day pain medication management from the perspectives of oncology outpatients and their family caregivers who participated in a randomized clinical trial of a psychoeducational intervention called the Pro-Self(©) Plus Pain Control Program. In this article, the researchers focused on pain medication management by patients and family caregivers in the context of multiple complex health systems. The health systems context for pain medication management included multiple complex systems for clinical care, reimbursement, and regulation of analgesic prescriptions. Pain medication management processes particularly relevant to this context were getting prescriptions and obtaining medications. Responsibilities that fell primarily to patients and family caregivers included facilitating communication and coordination among multiple clinicians, overcoming barriers to access, and serving as a final safety checkpoint. Significant effort was required of patients and family caregivers to insure safe and effective pain medication management. The study concluded that health systems issues related to access to needed analgesics, medication safety in outpatient settings, and the effort expended by oncology patients and their family caregivers require more attention in future research and health-(Schumacher, et al. 2014. Pain medication management processes used by oncology outpatients and family caregivers part I: Health systems contexts. *Journal of Pain and Symptom Management, 48*(5), 770-783.)

**Theme 3: Social and Behavioral Research**

Drs. Siahpush, Pinard and Yaroch collaborated on a research project with the aim to compare the risk of all-cause mortality and mortality from all cancers combined, lung cancer, respiratory diseases, cardiovascular diseases and diabetes mellitus between normal-weight smokers and overweight or obese ex-smokers. Data were from 1997 to 2004 National Health Interview Survey (with response rates ranging from 70% to 80%) which were linked to records in the National Death Index. Mortality follow-up was through 31 December 2006. The sample was limited to normal-weight smokers and overweight/obese ex-smokers 25 years of age and

older (n=52,819). HR from Cox regression was computed to represent mortality effect. Results showed that in both women and men, normal-weight smokers, relative to overweight or obese ex-smokers, had a higher risk of mortality from all causes combined, all cancers combined, lung cancer, cardiovascular and respiratory diseases. Among women, there was no difference in mortality risk from diabetes mellitus between normal-weight smokers and overweight or obese ex-smokers. Among men, there was some evidence that the risk of mortality was higher in obese ex-smokers than normal-weight smokers. Overall, the study concluded that mortality risk is smaller in overweight or obese ex-smokers than normal-weight smokers. Smoking cessation interventions can tailor messages that highlight the greater reduction in mortality associated with quitting, compared with potential weight gain. (Siahpush, M., 2014. *It is better to be a fat ex-smoker than a thin smoker: Findings from the 1997-2004 national health interview survey-national death index linkage study*. *Tobacco Control, 23*(5), 395-402.

**Collaborative Efforts**

To stimulate collaborative research projects the Cancer Prevention and Control Program holds monthly meetings with program members as guest speakers. The CPCP meeting is organized by the Program Leaders and is a joint effort by the CPCP and the College of Public Health graduate course in Cancer Epidemiology. Additionally, the Cancer Center and the College of Public Health partnered over the past year to support the following collaborative pilot grant:

- PI: Shinobu Watanabe-Galloway - An Examination of Factors Influencing Colorectal Cancer Screening of Rural Nebraskans Using Data from Clinics Participating in an Accountable Care Organization

- PIs: Hongmei Wang, & Jungyoon Kim - Nebraska Refugee Cancer Cohort Initiative

Over the next project period, the Cancer Center will continue to provide support to Cancer Prevention and Control Program collaborative projects.

**2.4 Education and Training**

The Buffett Cancer Center has a broad spectrum of educational activities coordinated by the Associate Director for Training and Education (Dr. Batra).

**Graduate Students.** FPBCC Members are very active in training graduate students in multiple doctoral programs at UNMC. One of these educational programs is the Cancer Research Graduate Program (CRGP), which is based in the Eppley Institute and directed by Dr. Joyce Solheim (GICP). The CRGP is focused on training students in basic and translational cancer research, with particular emphasis on developing expertise to lead cancer research projects in academia and industry, as well as in grant-writing proficiency, and presentation and publication skills. Three graduate programs based in the College of Medicine (the Biochemistry & Molecular Biology Graduate Program led by Dr. Paul Sorgen (MBEP), the Pathology & Microbiology Graduate Program headed by Dr. Rakesh Singh (CGMRP), and the Genetics, Cell Biology, & Anatomy Graduate Program directed by Dr. Karen Gould (MBEP), feature many FPBCC Members and provide preparation for cancer research and teaching careers. Furthermore, the majority of faculty and students in the Pharmaceutical Sciences Graduate Program in the College of Pharmacy (directed by Dr. David Oupicky (CGMRP)) are also involved in cancer research. Many faculty and students with a concentration in cancer are participating in graduate programs in the College of Public Health, which includes the Biostatistics Graduate Program, the Epidemiology Graduate Program (led by Dr. Shinobu Watanabe-Galloway, CPCP), the Environmental Health, Occupational Health, and Toxicology Graduate Program, and the Health Promotion and Disease Prevention Research Graduate Program (led by Dr. Ghada Soliman, CPCP). The graduate program in the College of Nursing, led by the Assistant Dean for Research Dr. Ann Berger (Co-Leader, CPCP), has a strong contingent of faculty and students with research interests in cancer. Several of the faculty and students engaged in cancer research projects in the Oral Biology Department of the College of Dentistry participate in the Medical Sciences Interdepartmental Area Graduate Program.

**Cancer Epidemiology Education in Special Populations (CEESP).** The CEESP Program is a training and educational program led by Amr Soliman, MD, PhD, which prepares MPH and PhD students in the field of cancer epidemiology research in special populations (international and minority settings). The CEESP Program provides educational opportunities for students to learn about cancer epidemiology in special populations as well as translation of epidemiology into cancer control and prevention interventions. Furthermore, the program provides mentored field internships for students through ongoing faculty research projects in international and minority settings in the U.S. CEESP is funded by an NCI R25 training and education grant (R25CA112383, PI Dr. Soliman, CPCP).

**Special Training for K-12 Native American Students.** Given the significant health disparities and the severe underrepresentation of Native Americans in health care and research professions, UNMC faculty have worked for the past decade with Native American communities in Nebraska and South Dakota to increase appreciation for and content knowledge of science and health care through NIH-funded Science Education Partnership Awards (SEPA). This concerted effort through SEPA partner schools has seen an increase in students' interest in higher education. One member of the Rosebud tribe, a SEPA alumnus, is currently doing a research internship at NIH. In addition to partnerships with Native American communities, a partnership has been forged with the Native Indigenous Centered Education (NICE) program of the Omaha Public Schools. This program serves K-12 Native American students enrolled in local public schools. With support from the CCSG, M. Godfery, SEPA PI initiated a program with upper level Native American high school students. Students meet monthly during the academic year to learn about cancer, cancer research, and basic research techniques and strategies. During the summer, students are offered research positions in laboratories at UNMC. Three NICE students completed the entire academic year program of monthly meetings and two students accepted positions in the FPBCC summer undergraduate research program.

Additional efforts in Education and Training include a wide variety of FPBCC- and UNMC-sponsored seminars and educational programs in cancer. These interdisciplinary seminars enhance interactions between clinical and translational researchers and foster collaborations between researchers. They also serve as avenues for junior investigators and students to interact with local, regional and national leaders and gain valuable insights into the development of a successful academic career.

- Buffett Cancer Center Grand Rounds: A monthly lecture presented by nationally recognized speakers, as well as FPBCC faculty, focusing on cutting-edge cancer research and cancer care.
- Buffett Cancer Center Program Research Seminars: In order to maximize interactions across FPBCC Research Programs, each program (MBEP, CGMRP, GICP) has a monthly research seminar presented by FPBCC Members and nationally recognized invited speakers.
- Eppley Cancer Institute Research Seminars: A weekly series of lectures by nationally recognized basic and translational researchers.
- Breast Cancer Training Program: This program, which supports pre- and post-doctoral research in breast cancer, sponsors a monthly seminar by FPBCC faculty and invited guest lecturers.
- Pancreatic Cancer Research Meeting: A biweekly meeting of researchers and clinicians in pancreatic cancer to discuss basic, translational and clinical research activities and review the progress of the SPORE program in Pancreatic Cancer and the NCI Biomarker program in pancreatic cancer.
- Drug Delivery and Nanomedicine: A monthly seminar series of outside invited guest speakers in drug delivery and nanomedicine.
- Immunology Interest Group Lecture Series: A monthly seminar provided by guest lecturers in cancer immunology and immunotherapeutics.
- Lymphoma Study Group Meeting: The Lymphoma Study Group, a regional consortium led by FPBCC members and including medical oncologists and hematologists in Nebraska and surrounding communities, hosts a yearly meeting to discuss joint investigational protocols and provide a review of the American Society of Hematology meeting.

- Pan-Pacific Lymphoma Conference: Presented biennially by FPBCC faculty and internationally recognized guest lecturers to review research in the biology and treatment of lymphoma.
- Annual Short Course in Cancer Biology: The Short Course in Cancer Biology is an annual two to four day intensive course on a topic of special relevance to cancer research, presented by four nationally recognized visiting faculty who provide didactic and research-oriented presentations to students, fellows and faculty.
- Regional Educational Conference on Thoracic Oncology and GI Oncology: This is a regional conference that provides updates on clinical and research aspects of these malignancies.
- Neuro-Oncology Educational Conference: A regional conference on the clinical and research aspects of Neuro-Oncology that takes place every other year.

**2.5 Impact of the LB595 Grant**

The Fred & Pamela Buffett Cancer Center has made significant progress over the past year. First, the Cancer Center's National Cancer Institute (NCI) Cancer Center Support Grant was submitted in September 2015 and it is anticipated that it will once again be recommended for 5 years of funding by the NCI. This grant provides the Cancer Center with NCI-designation which recognizes the Fred & Pamela Buffett Cancer Center as one of the top Cancer Centers in the nation. One of the key elements in past favorable reviews was the commitment of the State and the University of Nebraska Medical Center to the Cancer Center, and this will again play a significant role when the Cancer Center renews its designation in 2015. Overall, LB595 funding has played a pivotal role in the Cancer Center's ability to remain competitive as an NCI designated Cancer Center. For example, LB595 funding has facilitated the recruitment of key clinical, translational and basic sciences researchers to the Cancer Center. Furthermore, LB595 funding provided valuable support for the enhancement of shared resource facilities and common scientific equipment in the Cancer Center. In all, the LB595 award through recruitment, pilot project funding, and bridge funding has had a major impact on the growth and productivity of the Fred & Pamela Buffett Cancer Center.

**2.6 Collaborations between UNMC and Creighton University**

Affiliate Cancer Center Memberships: Cancer Researchers with appointments outside of the University of Nebraska can be granted Affiliate Membership to the Fred & Pamela Buffett Cancer Center upon request. Applicants must demonstrate an interest in cancer research and/or education and a willingness to participate in collaborative clinical, translational or basic research and/or educational programs of the Fred & Pamela Buffett Cancer Center. Currently the Fred & Pamela Buffett Cancer Center has four affiliate members from Creighton University.

Breast Cancer Research Project: Supported by funding from the Fred & Pamela Buffett Cancer Center **San-Ming Wang, M.D.**, an Associate Professor in the Department of Genetics, Cell Biology and Anatomy, continues to collaborate with **Dr. Henry Lynch** of Creighton University on a study to investigate if there are unknown germline predisposition genes in *BRCA*-negative familial breast cancer. Using the latest exome sequencing method, they analyzed the entire protein coding region in the genomes of eight individual members in a *BRCA1*, *BRCA2, p53 and PTEN*-negative breast cancer family, of whom five were breast cancer and three were unaffected individuals.

Center for Cellular Signaling: This National Institute of Health funded project established a Center for Cellular Signaling that augments and strengthens the research capacity within the Dental Schools in Nebraska. The Center includes scientists from three research universities in Nebraska: University of Nebraska Medical Center, University of Nebraska at Lincoln, and Creighton University. The objectives of the Center are 1) to expand the current focus on cellular signaling, with a concentration on its role in tumorigenesis; 2) to increase the research profile of Nebraska's dental schools, with the ultimate goal of being included in the top dental schools in the country in NIH funding; and, most importantly, 3) to contribute to the development of promising

young faculty, so that they will become prominent members of the scientific community as evidenced by significant NIH funding, publication of important manuscripts, service on review panels and invitations to speak across the country.

Pancreatic Cancer Collaborative Registry (PCCR): Based at the Eppley Institute, the mission of the PCCR is to unite centers with expertise in pancreatic cancer research. The registry is set to facilitate the uniform collection of critical information and biological samples to develop prevention and treatment strategies against this devastating disease. There are currently 10 centers involved in the registry, including: UNMC, Creighton University, New York Medical College, Johns Hopkins Hospital, University of Washington, Evanston Northwestern University Healthcare, University of Pittsburgh, Mayo Clinic, University of Alabama Birmingham, and the National Cancer Institute.

Dr. Henry Lynch, professor and chairman of Preventive Medicine and Public Health, professor of Medicine, and director of the Hereditary Cancer Institute at Creighton University Medical Center, participates in this collaboration by collecting blood samples and specific genetic profile information of family members of a pancreatic cancer patient where there is a history of pancreatic cancer, as well as those families in which there has been no prior pancreatic cancer. Dr. Lynch and his team meet with and interview all family members and all of this information is provided to UNMC's Simon Sherman, Ph.D., director of the Bioinformatics Shared Resources at UNMC. Dr. Lynch's extensive collection of familial pancreatic cancer data involving 48,700 familial cancer syndrome cases of which, 590 are pancreatic cancer cases (his collective work over the past three decades) has been incorporated into the PCCR, and he continues to provide leadership in promoting and expanding Pancreatic Cancer research with the use of the developed tools.

Hematological Malignancies Collaboration: An additional collaboration between the Fred & Pamela Buffett Cancer Center and the Creighton University Cancer Center includes the Center for Lymphoma and Leukemia Research at UNMC in which Dr. Lynch provides his expertise on hereditary cancer research for a research project that is studying families with increased incidence of hematological malignancies.

Kicks for a Cure: Money raised by the Kicks for a Cure annual soccer exhibition fundraiser will be used to promote cancer research at the Fred & Pamela Buffett Cancer Center and the Creighton University Cancer Center. To date, monies raised from this collaborative effort since its beginning ten years ago have been used to support women's cancer research at UNMC, including the breast cancer research project described above.

Midwest Student Biomedical Research Forum: The Midwest Student Biomedical Research Forum (MSBRF) aims to support and nurture student research in the health sciences. This event is designed to give students an opportunity to present their original research in either an oral or poster meeting format.

## Section 3.0

## Cancer Center Funding

As shown in the chart on the next page, LB595 made up 2.47% of the annual funding for the Cancer Center, and extramural grants made up 77.80% of the Cancer Center's overall funding for FY 2014/2015. It is important to note that LB 595 funding is the only major non-philanthropic funding source that provides the Cancer Center Director and the Senior Leadership team the discretion to significantly support faculty recruitment, innovative cancer research pilot projects and cutting edge scientific equipment. As a result, LB595 plays a major and essential role in the Cancer Center's ability to fulfill its mission and successfully support the infrastructure of cancer research at the University of Nebraska.

The state of Nebraska provides outstanding support for ongoing research activities in the Cancer Center through a variety of mechanisms (see Table below). First, the University and the state of Nebraska provides approximately $5 million per year directly to the Eppley Institute for Research in Cancer for faculty salaries and administration.

The Cancer Center has received support from the state of Nebraska through the Nebraska Legislative Bill LB506, which provided $0.50 million in important investigator-initiated, externally peer-reviewed R01-type grant support for research in smoking-related diseases in FY2014/2015. In addition, the Cancer Center also received additional support through the Nebraska Research Initiative, which provides funds to support shared resources and research programs at UNMC.

In 2002, the state passed landmark legislation (LB692), which directs Tobacco Settlement Funds to the State of Nebraska to support biomedical research. During the past year, the Cancer Center has obtained approximately $2.5 million from the Tobacco Settlement Fund to support the recruitment of new Cancer Center faculty.

Immediately following the successful completion of the Phase I capital campaign for construction of the new FPBCC complex, the FPBCC initiated a $100 M Phase II capital campaign for faculty recruitment and program development. Thus far, $44 M has been raised through private philanthropy for the Phase II capital campaign for faculty recruitment and program development. In addition, the Chancellor of UNMC and the CEO of Nebraska Medicine have committed an additional $10 M to FPBCC faculty recruitment. The FPBCC Director, the CEO of Nebraska Medicine, and the Dean of the College of Medicine will oversee the use of the funds for the FPBCC Phase II capital campaign. Additionally, over the years, the Director of the FPBCC has worked closely with the University of Nebraska Foundation to raise philanthropic funds to support the FPBCC. In addition to the Phase II Capital Campaign, the FPBCC Director also has direct authority over $17.9 M in endowed funds (generate approximately $3 M annually) and approximately $19 M in spendable funds in the University of Nebraska Foundation. These FPBCC funds are discretionary and can be used by the Director to support FPBCC new initiatives

**Fred & Pamela Buffett Cancer Center 2014/2015 Funding**

| Category | Amount ($ Millions) | % |
|---|---|---|
| State Support | 5 | 9.49% |
| LB506 | 0.5 | 0.95% |
| LB595 | 1.3 | 2.47% |
| Nebraska Research Initiative | 0.87 | 1.65% |
| Tobacco Settlement Funds | 2.5 | 4.74% |
| Extramural Grants | 41 | 77.80% |
| NCI Cancer Center Support Grant (CCSG) | 1.53 | 2.90% |
| TOTAL | **52.7 M** | **100%** |

## Section 4.0

## Extramural Funding

### 4.1 Extramurally Funded Projects

The following tables describe the organizations and current funding of the cancer center:

1. Listing of all extramurally funded grants of the Fred & Pamela Buffett Cancer Center as of August 31, 2015. As shown, the Fred & Pamela Buffett Cancer Center currently has over **$42** Million in total extramural funding.
2. Program Codes are listed as follows: CGMR; MBE; GIC; CPC; T=Training;
   ZY= Center Grant; N/A= non-programmatically aligned

**PEER-REVIEWED RESEARCH PROJECTS**

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Band | Hamid | NCI | 5R01CA087986-17 | 11/1/2007 | 6/30/2016 | Tyrosine Kinase Regulation Via Protein Degradation | 181,340 | 269,290 | MBE | 100 | 181,340 | 269,290 |
| Band | Hamid | NCI | 5R01CA105489-11 | 4/1/2010 | 1/31/2016 | Targeting Endocytic Recycling of EGF Receptor in Cancer | 174,783 | 259,552 | MBE | 100 | 174,783 | 259,552 |
| Band | Hamid | NCI | 3R01CA105489-11S1 | 4/1/2010 | 1/31/2016 | Targeting Endocytic Recycling of EGF Receptor in Cancer | 28,455 | 42,825 | MBE | 100 | 28,455 | 42,825 |
| Band | Vimla | NCI | 5R01CA144027-05 | 3/1/2011 | 2/29/2016 | Ecd as a Regulator of Cell Cycle and Breast Oncogenesis | 207,500 | 308,138 | MBE | 100 | 207,500 | 308,138 |
| Band | Vimla | NCI | 3R01CA144027-05S1 | 3/1/2011 | 2/29/2016 | Ecd as a Regulator of Cell Cycle and Breast Oncogenesis | 35,138 | 49,363 | MBE | 100 | 35,138 | 49,363 |
| Band | Vimla | DOD | W81XWH-14-1-0567 | 9/30/2014 | 9/29/2017 | The Role of Calcium Signaling in ErbB2-driven Oncogenesis through a Novel Link between Ecdysoneless and SPCA2 | 125,000 | 189,375 | MBE | 100 | 125,000 | 189,375 |
| Batra | Surinder | NCI | 5R01CA138791-05 | 5/1/2010 | 2/29/2016 | Novel Deregulated Genes in the Etiology and Progression of Human Prostate Cancer | 18,086 | 27,056 | GIC | 100 | 18,086 | 27,056 |
| Batra | Surinder | NCI | 5U54CA163120-04 | 9/26/2011 | 7/31/2016 | Pancreatic Tumor Microenvironment Network (TMEN) | 521,998 | 775,167 | GIC | 100 | 521,998 | 775,167 |
| Batra | Surinder | NCI | 1R01CA183459-01A1 | 9/19/2014 | 8/31/2019 | Targeting Mucin and EGFR Axis in Pancreatic Cancer | 207,586 | 311,659 | GIC | 100 | 207,586 | 311,659 |
| Batra | Surinder | NCI | 1U01CA185148-01A1 | 5/1/2015 | 4/30/2020 | MIC-1 and its functional partners in prostate cancer racial disparity | 228,250 | 324,705 | GIC | 100 | 228,250 | 324,705 |
| Batra | Surinder | NCI | 1R01CA195586-01A1 | 7/17/2015 | 6/30/2020 | Targeted Radiation Therapy for Pancreatic Cancer | 290,671 | 435,945 | GIC | 100 | 290,671 | 435,945 |
| Becker | Donald | NIGMS | 5P30GM103335-03 | 8/1/2014 | 7/31/2017 | Redox Biology Center | 596,636 | 868,106 | ZY | 100 | 596,636 | 868,106 |
| Bevins | Rick | NIDA | 5R01DA034389-04 | 6/1/2014 | 5/31/2017 | Pharmacological Interventions to Diminished Nicotine Associated Responding | 194,861 | 289,370 | NA | 100 | 194,861 | 289,370 |
| Bhakat | Kishor | NCI | 7R01CA148941-04 | 8/1/2013 | 7/31/2016 | Regulatory Functions of APE1 Acetylation | 181,148 | 272,628 | MBE | 100 | 181,148 | 272,628 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Black | Jennifer | NIDDK | 5R01DK06063 2-11 | 1/1/2012 | 11/30/2015 | Regulation of Cyclin D1 Expression in the Intestine | 43,055 | 65,658 | GIC | 100 | 43,055 | 65,658 |
| Black | Jennifer | NCI | 1R21CA19189 4-01A1 | 7/16/2015 | 6/30/2017 | Evaluating the PKC Enzyme System in Human Colon Cancer | 130,500 | 196,403 | GIC | 100 | 130,500 | 196,403 |
| Brattain | Michael | NCI | 5R01CA05480 7-23 | 9/25/2012 | 7/31/2017 | Cell Survival Determinants of Metastasis in IGF1R-Dependent CRC | 156,355 | 232,187 | CGMR | 100 | 156,355 | 232,187 |
| Bronich | Tatiana | NIGMS | 5P20GM10348 0-07 | 9/26/2008 | 5/31/2018 | Nebraska Center for Nanomedicine | 1,499,456 | 2,240,774 | ZY | 100 | 1,499,456 | 2,240,774 |
| Bronich & Kabanov (UNC) | Tatiana & Alexander | NCI | 1U01CA19891 0-01 | 8/14/2015 | 7/31/2020 | Targeted Core Shell Nanogels for Triple Negative Breast Cancer (Kabanov) | 88,825 | 133,682 | CGMR | 100 | 88,825 | 133,682 |
| Caplan | Steven | NIGMS | 5R01GM07487 6-08 | 5/1/2006 | 7/31/2016 | Molecular Mechanisms Controlling Endocytic Recycling | 187,796 | 281,118 | CGMR | 100 | 187,796 | 281,118 |
| Cowan | Kenneth | NCI | P30CA036727 -28 | 8/5/2011 | 7/31/2016 | UNMC Eppley Cancer Center Support Grant | 1,000,000 | 1,485,000 | ZY | 100 | 1,000,000 | 1,485,000 |
| Cowan | Kenneth | NCI | 3P30CA03672 7-28S1 | 8/5/2011 | 7/31/2016 | UNMC Eppley Cancer Center Support Grant (CURE) | 32,371 | 48,718 | ZY | 100 | 32,371 | 48,718 |
| Cowan | Kenneth | ACS | IRG-13-041-01 | 1/1/2013 | 12/31/2016 | Institutional Research Grant | 60,000 | 60,000 | MBE | 100 | 60,000 | 60,000 |
| Datta | Kaustubh | NCI | 1R01CA18243 5-01A1 | 2/1/2015 | 1/31/2020 | Neuropilin-2 Axis in Docetaxel Resistance and Prostate Cancer Bone Metastasis | 228,750 | 344,269 | MBE | 100 | 228,750 | 344,269 |
| Deegan | Rebecca | NCI | 1R01CA17888 8-01A1 | 9/8/2014 | 8/31/2019 | MnTE-2-PyP as a radioprotector in prostate cancer therapy | 231,759 | 330,057 | MBE | 100 | 231,759 | 330,057 |
| Dhawan | Punita | VA | | 7/1/2013 | 6/30/2017 | Role of Claudin-1 in Colon Cancer | 190,000 | 286,900 | GIC | 100 | 190,000 | 286,900 |
| Dong | Jixin | NIGMS | 5R01GM10906 6-02 | 1/10/2014 | 12/31/2018 | Regulation and Functional Dissection of YAP in Mitosis | 190,000 | 285,950 | CGMR | 100 | 190,000 | 285,950 |
| Dong | Jixin | DOD | W81XWH-14-1-0150 | 8/1/2014 | 7/31/2017 | Validation of YAP as a Therapeutic Target in Prostate Cancer | 75,000 | 113,625 | CGMR | 100 | 75,000 | 113,625 |
| Garrison | Jered | NCI | 5R01CA17905 9-02 | 6/1/2014 | 5/31/2019 | Enhancement of BB2r-Targeted Radiotherapy for Prostate Cancer Utilizing Hypoxia-Selective Trapping Agents | 207,500 | 312,288 | CGMR | 100 | 207,500 | 312,288 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gould | Karen | NIAID | 5R01AI075167-05 | 6/2/2010 | 5/31/2016 | Estrogen Receptor Alpha Regulation of Lupus Development & Pathogenesis | 43,594 | 74,863 | MBE | 100 | 43,594 | 74,863 |
| Hollingsworth & Batra | Michael & Surinder | NCI | 5U01CA111294-10 | 9/27/2004 | 6/30/2016 | Early Diagnosis of Pancreatic Cancer | 187,717 | 277,585 | GIC | 100 | 187,717 | 277,585 |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer | 1,436,545 | 2,162,000 | GIC | 100 | | |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer: Project 1 - Inhibition of CDK5 as a treatment for pancreatic cancer | | | GIC | | 234,110 | 352,335 |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer: Project 2 - Novel Target(s) in the Radiosensitization of Pancreatic Cancer | | | GIC | | 231,000 | 347,655 |
| Hollingsworth & Brattain | Michael & Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer: Project 3 - Novel Strategies for Pancreatic Cancer Treatment | | | CGMR | | 231,968 | 349,112 |
| Hollingsworth & Singh | Michael & Pankaj | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer: Project 4 - Targeting metabolic alterations to improve survival in pancreatic cancer | | | GIC | | 232,905 | 350,522 |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer Admin Core | | | ZY | | 163,210 | 245,631 |
| Hollingsworth & Bridge | Michael & Julia | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer Tissue Core | | | ZY | | 87,673 | 131,948 |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer RAP Core | | | ZY | | 81,930 | 123,305 |
| Hollingsworth & Meza | Michael & Jane | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer Biostatistics Core | | | ZY | | 44,034 | 66,271 |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer Career Development | | | ZY | | 75,855 | 114,162 |
| Hollingsworth | Michael | NCI | 2P50CA127297-06A1 | 9/5/2008 | 8/31/2019 | SPORE in Pancreatic Cancer Developmental Core | | | ZY | | 53,860 | 81,059 |
| Hyde | Ricia | NCI | 5R00CA148963-03 | 9/20/2013 | 8/31/2016 | Analysis of Initiating Events in Inv(16) Associated Myeloid Leukemia | 160,737 | 241,530 | MBE | 100 | 160,737 | 241,530 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Iqbal | Javeed | LLS | 6129-14 | 10/1/2013 | 9/30/2016 | Mutation and Epimutations in Peripheral T-cell Lymphoma | 180,018 | 200,000 | CGMR | 100 | 180,018 | 200,000 |
| Islam | KM | PCORI | CE-12-11-4351 | 7/1/2013 | 6/30/2016 | Patient-Defined Treatment Success and Preferences in Stage IV Lung Cancer Patients | 484,043 | 595,718 | NA | 100 | 484,043 | 595,718 |
| Johnson | Keith | NIGMS | 5P30GM106397-02 | 9/5/2013 | 7/31/2018 | Nebraska Center for Cellular Signaling | 727,583 | 1,028,905 | ZY | 100 | 727,583 | 1,028,905 |
| Johnson | Keith | DOD | W81XWH-12-1-0390 | 9/1/2012 | 8/31/2015 | Connexins and Cadherin Crosstalk in the Pathogenesis of Prostate Cancer | 125,000 | 185,625 | GIC | 100 | 125,000 | 185,625 |
| Johnson | Keith | NCI | 5R03CA188634-02 | 7/1/2014 | 6/30/2016 | Studies on Cadherin/Catenin Complexes | 50,000 | 75,250 | GIC | 100 | 50,000 | 75,250 |
| Karpf | Adam | DOD | W81XWH-12-1-0456 | 9/30/2012 | 9/29/2015 | Functional Assessment of the Role of BORIS in Ovarian Cancer Using a Novel in vivo Model System | 17,923 | 18,028 | MBE | 100 | 17,923 | 18,028 |
| Lewis | Robert | NCI | 5R01CA157774-04 | 4/12/2012 | 3/31/2017 | Novel Effectors of Colon Tumorigenesis | 208,457 | 309,559 | CGMR | 100 | 208,457 | 309,559 |
| Li | Rongshi | NCI | 5R01CA173056-03 | 9/14/2013 | 3/31/2016 | Targeting the CXCL 12/CXCR4 Axis towards the Therapy of Metastatic Cancers | 251,467 | 310,905 | CGMR | 100 | 251,467 | 310,905 |
| Lin | Ming-Fong | DOD | W81XWH-13-1-0264 | 9/15/2013 | 9/14/2015 | Nebraska Prostate Cancer Research Program | 92,014 | 99,375 | MBE | 100 | 92,014 | 99,375 |
| Lu | Runqing | NIAID | 5R21AI107237-2 | 2/1/2014 | 1/31/2016 | IRF4 Functions as a Negative Regulator of Notch Signaling in the Development of MZ B Cells. | 125,000 | 188,125 | MBE | 100 | 125,000 | 188,125 |
| Lyubchenko | Yuri | NIGMS | 5R01GM096039-04 | 7/1/2011 | 7/31/2016 | Protein Self-Assembly into Nanoaggregates | 190,000 | 282,150 | MBE | 100 | 190,000 | 282,150 |
| Lyubchenko | Yuri | NIGMS | 3R01GM096039-04S1 | 7/1/2011 | 7/31/2016 | Protein Self-Assembly into Nanoaggregates | 104,390 | 146,383 | MBE | 100 | 104,390 | 146,383 |
| MacDonald | Richard | NCI | 1R21CA198292-01 | 7/1/2015 | 6/30/2017 | IGF-II-Based Approach to Therapy for Pancreatic Cancer | 125,000 | 187,368 | GIC | 100 | 125,000 | 187,368 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mahato | Ram | NSF | 1122029 | 8/15/2011 | 7/31/2016 | Sequence Specific Targeting of Nucleic Acids Using Intramolecular Triplexes: Energetics and Hydration | 147,811 | 219,499 | GIC | 100 | 147,811 | 219,499 |
| Mahato | Ram | NIGMS | 1R01GM113166-01A1 | 7/15/2015 | 3/31/2019 | Polymeric Nanomedicines of Hedgehog Inhibitor and miRNA for Treating Pancreatic Cancer | 237,000 | 356,087 | GIC | 100 | 237,000 | 356,087 |
| Mahato | Ram | NIBIB | 1R01EB017853-01A1 | 7/1/2014 | 5/31/2018 | Polymeric Nanomedicines of Small Molecules and miRNAfor Treating Pancreatic Cancer | 227,968 | 343,092 | GIC | 100 | 227,968 | 343,092 |
| Mahato | Ram | DOD | W81XWH-10-1-0969 | 9/1/2013 | 9/30/2015 | Micellar Drug Delivery and Proteomics Analysis for Effective Treatment of Resistant Prostate Cancer | 139,279 | 211,008 | GIC | 100 | 139,279 | 211,008 |
| Mahato | Ram | NIBIB | 1R13EB020461-01 | 4/1/2015 | 3/31/2016 | Research and Development of Novel Drug Delivery Systems Symposium | 8,000 | 8,000 | GIC | 100 | 8,000 | 8,000 |
| Marky | Luis | NSF | MCB-1410208-002 | 11/18/2013 | 11/17/2015 | IPA - National Science Foundation - Luis Marky | 180,863 | 180,863 | MBE | 100 | 180,863 | 180,863 |
| Mehta | Parmender | DOD | W81XWH-12-1-0389 | 9/1/2012 | 8/31/2015 | Connexins and Cadherin Cross-Talk in the Pathogenesis of Prostate Cancer | 125,000 | 185,625 | CGMR | 100 | 125,000 | 185,625 |
| Mohs | Aaron | NCI | 7R00CA153916-06 | 07/01/14 | 03/31/16 | Nanotechnology for Minimally Invasive Cancer Detection and Resecetion | 50,613 | 76,173 | CGMR | 100 | 50,613 | 76,173 |
| Mohs | Aaron | NIBIB | 7R01EB019449-02 | 7/15/2015 | 6/30/2018 | Hyaluronic Aluronic Acid Based Nanoparticles for Trageted Image-Guided Tumor Surgery | 220,500 | 331,852 | CGMR | 100 | 220,500 | 331,852 |
| Natarajan | Amarnath | NCI | 3R21CA182820-02S1 | 1/1/2014 | 12/31/2015 | Phosphorylated Form of Activated IKKbeta and Pancreatic Cancer | 34,815 | 48,937 | CGMR | 100 | 34,815 | 48,937 |
| Natarajan | Amarnath | NCI | 5R21CA182820-02 | 1/1/2014 | 12/31/2015 | Phosphorylated Form of Activated IKKbeta and Pancreatic Cancer | 130,500 | 196,403 | CGMR | 100 | 130,500 | 196,403 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Opavsky | Rene | NCI | 1R01CA188561-01A1 | 4/1/2015 | 3/31/2020 | The Tumor Suppressor Function of Dnmt3a in Chronic Lymphocytic Leukemia | 228,750 | 344,269 | CGMR | 100 | 228,750 | 344,269 |
| Oupicky | David | NIBIB | 1R21EB019175-01A1 | 4/1/2015 | 3/31/2017 | Nanoparticles based on histone deacetylase inhibitors for combination treatments | 162,198 | 202,505 | CGMR | 100 | 162,198 | 202,505 |
| Oupicky | David | NIBIB | 1R01EB015216-01A1 | 8/1/2014 | 7/31/2018 | Multilayered redox-responsive nanoparticles for delivery of drug-siRNA combinations | 225,000 | 338,625 | CGMR | 100 | 225,000 | 338,625 |
| Oupicky | David | NIBIB | 1R21EB020308-01 | 4/15/2015 | 1/31/2017 | Dual-function nanoparticles for oral treatment of inflammatory bowel disease | 138,188 | 201,313 | CGMR | 100 | 138,188 | 201,313 |
| Palanimuthu Ponnusamy | Moorthy | NCI | 1K22CA175260-01A1 | 9/1/2014 | 8/31/2017 | hPaf1/PD2 in Pancreatic Cancer Stem Cells | 114,146 | 123,278 | MBE | 100 | 114,146 | 123,278 |
| Peng | Aimin | NCI | 5R01CA172574-03 | 4/1/2013 | 3/31/2018 | DNA Damage Checkpoint Recovery and Cancer | 206,812 | 311,253 | MBE | 100 | 206,812 | 311,253 |
| Pullen | Carol | NINR | 5R01NR010589-05 | 9/9/2010 | 6/30/2016 | Web-based Weight Loss & Weight Maintenance Intervention for Older Rural Women | 57,931 | 82,002 | NA | 100 | 57,931 | 82,002 |
| Saraf & Batra | Ravi & Surinder | NCI | 1R21CA196485-01 | 9/1/2015 | 8/31/2017 | High specificity of miRNA microarray analysis without PCR for cancer screening and research | 182,765 | 245,024 | GIC | 100 | 182,765 | 245,024 |
| Schumacher | Karen | ACS | RSG-13-167-01-CPP | 7/1/2013 | 6/30/2017 | A Mixed Methods Study of Rural Family Caregiving During Cancer | 115,550 | 138,660 | NA | 100 | 115,550 | 138,660 |
| Shcherbakova | Polina | NIEHS | R01ES015869-07 | 7/1/2009 | 2/28/2019 | Translesion Synthesis DNA Polymerases and Genome Instability | 225,000 | 338,625 | MBE | 100 | 225,000 | 338,625 |
| Sherman | Simon | NCI | 5R01CA140940-05 | 4/1/2010 | 1/31/2016 | Enhancing the Biomedical Computing Platform for Pancreatic Cancer Research | 36,940 | 54,856 | GIC | 100 | 36,940 | 54,856 |
| Sherman | Simon | NCI | 5R03CA175668-02 | 6/11/2014 | 5/31/2016 | Multi-Center Thyroid Tumor and Cancer Registry | 50,000 | 75,250 | GIC | 100 | 50,000 | 75,250 |
| Siahpush | Mohammad | NCI | 5R01CA166156-03 | 3/7/2013 | 2/29/2016 | The Effect of Point-of-Sale Tobacco Marketing on Smoking Cessation | 343,311 | 403,986 | NA | 100 | 343,311 | 403,986 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Simpson | Melaine | NCI | 1R21CA185993-01A1 | 5/19/2015 | 4/30/2017 | Defining Aberrant Steroid Elimination in Catration Resistant Prostate Cancer | 125,869 | 182,412 | CGMR | 100 | 125,869 | 182,412 |
| Singh | Pankaj | NCI | 5R01CA163649-03 | 9/25/2012 | 7/31/2017 | Targeting MUC1-induced Tumor-stromal Metabolic Cross-talk in Pancreatic Cancer | 303,555 | 456,850 | GIC | 100 | 303,555 | 456,850 |
| Singh | Pankaj | NCI | 3R01CA163649-03S2 | 9/25/2012 | 7/31/2017 | Targeting MUC1-induced Tumor-stromal Metabolic Cross-talk in Pancreatic Cancer | 15,209 | 22,890 | GIC | 100 | 15,209 | 22,890 |
| Singh | Pankaj | DOD | W81XWH-13-1-0315 | 9/15/2013 | 9/14/2016 | Targeting MUC1-Mediated Tumor-Stromal Metabolic Interactions in Triple-Negative Breast Cancer | 125,000 | 185,625 | GIC | 100 | 125,000 | 185,625 |
| Singh | Amar | NCI | 5R01DK088902-06 | 11/11/2014 | 5/31/2016 | Role of Claudin-2 in Inflammatory Diseases and Colon Cancer | 217,500 | 327,338 | GIC | 100 | 217,500 | 327,338 |
| Solheim | Joyce | NCI | 5R03CA176557-02 | 4/1/2013 | 3/31/2016 | Ewing's Sarcoma Resistance to Immunity and Radiation | 8,926 | 13,434 | GIC | 100 | 8,926 | 13,434 |
| Sorgen | Paul | NIGMS | 5R01GM072631-09 | 6/1/2006 | 11/30/2015 | Mechanisms of Gap Junction Regulation | 175,838 | 259,664 | CGMR | 100 | 175,838 | 259,664 |
| Sorgen | Paul | NIGMS | 5R01GM072631-09 | 6/1/2006 | 11/30/2015 | Mechanisms of Gap Junction Regulation | 19,171 | 28,852 | CGMR | 100 | 19,171 | 28,852 |
| Su | Kaihong | NIAMS | 5R01AR059351-04 | 9/12/2011 | 8/31/2016 | Novel Neutrophil Autoantigens in Systemic Lupus Erythematosus | 198,450 | 294,698 | NA | 100 | 198,450 | 294,698 |
| Tahirov | Tahir | NIGMS | 5R01GM101167-03 | 4/1/2014 | 3/31/2017 | Human DNA Replication Machines: Structure-Function of Polymerase Alpha-Primase | 296,311 | 426,334 | MBE | 100 | 296,311 | 426,334 |
| Teoh-Fitzgerald | Melissa | NCI | 5R01CA182086-02 | 1/1/2014 | 12/31/2018 | Extracellular Redox Signaling in Mammary Epithelial-Fibroblast Interactions | 186,750 | 281,059 | MBE | 100 | 186,750 | 281,059 |
| Teoh-Fitzgerald | Melissa | NCI | 5R01CA182086-02 | 1/1/2014 | 12/31/2018 | Extracellular Redox Signaling in Mammary Epithelial-Fibroblast Interactions | 20,750 | 31,229 | MBE | 100 | 20,750 | 31,229 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thayer | Sarah | NCI | 5R01CA169086-03 | 8/1/2013 | 5/31/2018 | PDG Links Stem Cell Niche to Pancreatic Epithelial Renewal, Repair and Cancer | 207,500 | 312,288 | GIC | 100 | 207,500 | 312,288 |
| Vinogradov | Serguei | NINDS | 5R01NS076386-04 | 7/1/2011 | 6/30/2016 | CNS Delivery of Activated Antiviral Drugs with Reduced Neurotoxicity (Nano-NRTIs) | 247,500 | 367,538 | NA | 100 | 247,500 | 367,538 |
| Vose | Julie | NHLBI | 5U10HL069233-15 | 8/1/2011 | 6/30/2017 | Nebraska/Kansas Blood and Marrow Transplant Research Network | 117,835 | 154,372 | CGMR | 100 | 117,835 | 154,372 |
| Wagner | Kay-Uwe | NCI | R01CA117930-09 | 5/1/2012 | 3/31/2017 | Growth-Regulatory Signaling Networks in Breast Cancer | 172,353 | 255,944 | MBE | 100 | 172,353 | 255,944 |
| Wahl | James | NIAMS | 1R15AR065074-01A1 | 6/1/2014 | 5/31/2017 | Mechanisms affecting desmosome dynamics | 264,000 | 397,320 | CGMR | 100 | 264,000 | 397,320 |
| Waltman | Nancy | NINR | 1R01NR015029-01 | 9/17/2014 | 6/30/2019 | Bone-Loading Exercises versus Risedronate on Bone Health in Post-Menopausal Women | 463,392 | 657,925 | NA | 100 | 463,392 | 657,925 |
| Wang | Cheng | NCI | 1R01 CA201500-01 | 10/1/2015 | 09/30/2020 | Novel Mechanisms of Cervical Cancer Development and Progression | 225,000 | 338,625 | CGMR | 100 | 225,000 | 338,625 |
| Wang | Jing | NCI | 5R01CA140988-05 | 4/1/2010 | 1/31/2016 | Mechanisms of TGF Beta Mediated Suppression of Metastasis in Colon Cancer | 64,543 | 95,849 | GIC | 100 | 64,543 | 95,849 |
| Wang | San Ming | NCI | 5R21CA180008-02 | 9/1/2013 | 12/31/2015 | (PQD3) Genetic Basis of Breast Cancer Resistance in BRCA1+ Carrier | 25,010 | 34,834 | MBE | 100 | 25,010 | 34,834 |
| Wood | Charles | NCI | 3R01CA075903-15S2 | 5/1/2015 | 4/30/2016 | Kaposi's Sarcoma and Human Herpesvirus in Africa | 416,667 | 500,000 | CGMR | 100 | 416,667 | 500,000 |
| Wood | Charles | NIGMS | 5P30GM103509-05 | 8/1/2014 | 7/31/2016 | Ne Center for Virology-COBRE Phase III | 739,403 | 1,098,014 | ZY | 100 | 739,403 | 1,098,014 |
| Wood | Charles | NINDS | 5R01NS074903-05 | 6/1/2015 | 5/31/2016 | Neuropathogenesis & Neuroinvasive | 231,061 | 343,126 | CGMR | 100 | 231,061 | 343,126 |
| Woods | Nicholas | NCI | 7R21CA184996-03 | 12/1/2014 | 3/31/2016 | Impact of BRCA1-mTORC2 Interaction on Breast Cancer Response to DNA Damage and Chemotherapy | 108,750 | 163,669 | MBE | 100 | 108,750 | 163,669 |
| Zempleni | Janos | NIFA | 2015-67017-23181 | 2/1/2015 | 1/31/2019 | Regulation of Gut Inflammation | 349,869 | 499,812 | MBE | 100 | 349,869 | 499,812 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zempleni | Janos | NIGM | 5P20GM104320-02 | 6/1/2015 | 5/31/2019 | COBRE: Ne Ctr Prevention Obesity Diseases | 1,458,217 | 2,201,907 | ZY | 100 | 1,458,217 | 2,201,907 |
| Peer-Reviewed Research Subtotals: | | | | | | | $22,195,676 | $32,171,970 | | | $22,195,676 | $32,171,970 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Becker | Donald | NSF | DBI-1461240 | 4/1/2015 | 3/3/2018 | REU Site: Training in Redox Biology | 180,697 | 262,914 | T | 100 | 180,697 | 262,914 |
| Black | Jennifer | NCI | 2T32CA009476-24A1 | 7/1/2015 | 6/30/2020 | Cancer Biology Training Program | 217,106 | 230,508 | T | 100 | 217,106 | 230,508 |
| Borgstahl | Gloria | USDED | P200A120231-14 | 8/16/2012 | 8/15/2016 | Graduate Training in Structural Biology and Molecular Biophysis | 140,877 | 140,877 | T | 100 | 140,877 | 140,877 |
| Cohen | Marlene | AMCAS | GSCNP-15-113-01-S | 7/1/2015 | 6/30/2017 | ACS Graduate Scholarship in Cancer Nursing Practice Application for Whitney Shawver | 10,000 | 10,000 | T | 100 | 10,000 | 10,000 |
| Simpson | Melaine | NIGM | 1T32GM107001-01A1 | 7/1/2015 | 6/30/2020 | Molecular Mechanisms of Disease | 109,701 | 118,477 | T | 100 | 109,701 | 118,477 |
| Soliman | Amr | NCI | 5R25CA112383-09 | 9/24/2012 | 8/31/2016 | Cancer Epidemiology Education in Special Populations | 293,630 | 317,120 | T | 100 | 293,630 | 317,120 |
| Wood | Charles | NCI | 1U54CA190155-01 | 9/17/2014 | 8/31/2019 | Cancer Research International Training and Interventional Consortium | 488,245 | 737,250 | T | 100 | 488,245 | 737,250 |
| Wood | Charles | NIAID | 5T32AI060547-10 | 9/1/2013 | 8/31/2015 | Rsch Training in Comparatice Viral Pathology | 251,875 | 272,025 | T | 100 | 251,875 | 272,025 |
| Peer-Reviewed Training Subtotals: | | | | | | | $1,692,131 | $2,089,171 | | | $1,692,131 | $2,089,171 |

**NON-PEER-REVIEW RESEARCH PROJECTS**

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alnouti | Yazen | Amgen | | 9/25/2014 | 9/24/2017 | Evaluation of Rat Bile, Feces, Urine, Liver, Ileum and Serum for Quantification of Targeted Bile Acids (Pre-Clinical Research Program) | 35,000 | 44,100 | N/A | 100 | 35,000 | 44,100 |
| Berger | Ann | HRSA | | 7/1/2015 | 6/30/2016 | Nurse Faculty Loan Program 2015-2016 | 65,284 | 65,284 | N/A | 100 | 65,284 | 65,284 |
| Bevins | Rick | NE DHHS-LB506 | 2016-04 | 7/1/2015 | 6/30/2016 | Nicotine on Alcohol Seeking | 50,000 | 50,000 | N/A | 100 | 50,000 | 50,000 |
| Bierman | Philip | OncoMed Pharmaceuticals, Inc. | 52M51-001 | 2/13/2013 | 10/12/2015 | A Phase 1 Dose Escalation Study of OMP-52M51 in Subjects with Lymphoid Malignancies | 71,647 | 89,950 | CGMR | 100 | 71,647 | 89,950 |
| Bociek | Robert | Gilead Sciences, Inc. | GS-US-313-0124 | 12/6/2013 | 12/5/2015 | A Phase 3, Randomized, Double-Blind, Placebo-Controlled Study Evaluating the Efficacy and Safety of GS-1101 CAL-101) in Combination with Rituximab for Previously Treated Indolent Non-Hodgkin Lymphomas | 59,989 | 74,936 | CGMR | 100 | 59,989 | 74,936 |
| Bridge | Julia | Cepheid | Protocol 087B & 088B | 3/15/2013 | 3/1/2018 | Evaluation of Xpert® Bladder Assay for Detection and Monitoring of Recurrence for Bladder Cancer and Protocol 088B Evaluation of Xpert® Bladder Assay for Establishing Specificity | 310,788 | 391,437 | MBE | 100 | 310,788 | 391,437 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bridge | Julia | National Comprehensive Cancer Network | | 7/1/2015 | 6/30/2016 | A Multi-institutional Analysis of Programed Cell Death Ligand-1 (PDL-1) Expression in Lung Cancer | 29,067 | 35,974 | MBE | 100 | 29,067 | 35,974 |
| Bronich | Tatiana | Vivonics, Inc. | 2110-S003 | 9/9/2013 | 9/8/2016 | Highly Stable Human Plasma Butyrylcholinesterase for Intra-Muscular Delivery | 275,578 | 417,501 | CGMR | 100 | 275,578 | 417,501 |
| Cheng | Pi-Wan | V.A. Medical Center - Omaha | | 9/1/2014 | 9/30/2015 | IPA for Ganapati Bhat | 46,074 | 46,074 | MBE | 100 | 46,074 | 46,074 |
| Cheng | Pi-Wan | NE DHHS-LB506 | 2016-08 | 7/1/2015 | 6/30/2016 | Altered N-glycans in Golgi enzymes of aggressive cancer | 50,000 | 50,000 | MBE | 100 | 50,000 | 50,000 |
| Cohen | Samuel | Laboratoire Paréva | Experiment 342 | 3/13/2015 | 10/12/2015 | Early Proliferative Effects of PHMB on the Liver Tissue of Male Wistar Han Rats | 139,240 | 181,012 | MBE | 100 | 139,240 | 181,012 |
| Coulter | Donald | Children's Hospital and Medical Center Foundation | N01358 | 10/1/2013 | 9/30/2015 | Modulation of Signal Transduction to Overcome Treatment Resistance: Targeting Neuroblastoma Stem Cells | 125,000 | 125,000 | CGMR | 100 | 125,000 | 125,000 |
| Coulter | Donald | Sammy's Superheroes | | 11/1/2014 | 10/31/2015 | Whole Exome Sequencing of Neuroblastoma Tumors Before and After Induction Therapy | 60,000 | 60,000 | CGMR | 100 | 60,000 | 60,000 |
| Cowan | Kenneth | NE DHHS-LB595 | LB595 | 7/1/2015 | 6/30/2019 | LB595 Tobacco Tax Center Research Grant | 1,300,000 | 1,300,000 | ZY | 100 | 1,300,000 | 1,300,000 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cowan | Kenneth | Helmsley Charitable Trust | | 11/1/2012 | 10/31/2016 | Northern Great Plains Personalized Breast Cancer Program | 1,112,890 | 1,218,890 | MBE | 100 | 1,112,890 | 1,218,890 |
| Davis | John | UNL | 25-6226-0413-002 | 9/1/2013 | 8/31/2016 | Causes and Consequences of Androgen Excess on Oocyte Quality | 30,000 | 42,855 | CGMR | 100 | 30,000 | 42,855 |
| Dhawan | Punita | V.A. Medical Center - Omaha | | 5/1/2015 | 9/30/2015 | IPA for Srijayaprakash Uppada | 19,189 | 19,189 | GIC | 100 | 19,189 | 19,189 |
| Fu | Kai | U of AZ | Y603229 | 8/1/2011 | 7/31/2016 | Molecular Diagnosis and Prognosis in Aggressive Lymphoma | 34,477 | 51,888 | CGMR | 100 | 34,477 | 51,888 |
| Ganti | Apar | Astex Pharmaceuticals | AT13387-05 | 5/1/2014 | 4/30/2016 | A Study of HSP90 Inhibitor AT13387 Alone and in Combination with Crizotinib in the Treatment of Non-small Cell Lung Cancer (NSCLC) | 96,725 | 102,850 | CGMR | 100 | 96,725 | 102,850 |
| Green | Michael | NE DHHS-LB506 | 2016-16 | 7/1/2015 | 6/30/2016 | Transcription Factors Alterations in Aggressive Lymphoma | 50,000 | 50,000 | CGMR | 100 | 50,000 | 50,000 |
| Gundabolu | Krishna | National Marrow Donor Program | BMT CTN 1203 | 4/1/2015 | 3/31/2016 | A Multi-center Phase II Trial Randomizing Novel Approaches for Graft-versus-Host Disease Prevention Compared to Contemporary Controls (BMT CTN 1203) | 43,587 | 62,791 | CGMR | 100 | 43,587 | 62,791 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harper | James | Children's Hospital and Medical Center Foundation | 86221 | 9/30/2011 | 9/29/2015 | Nebraska Regional Hemophilia Treatment Center - CDC | 15,278 | 16,500 | CGMR | 100 | 15,278 | 16,500 |
| Harper | James | Novo Nordisk Pharmaceuticals, Inc. | NN7999-3895 | 9/9/2014 | 9/8/2018 | Safety and Efficacy of Nonacog Beta Pegol (N9-GP) in Previously Untreated Patients With Haemophilia B (paradigm6) | 33,327 | 41,342 | CGMR | 100 | 33,327 | 41,342 |
| Harper | James | WU | 1U1EMC27865-01-00 | 9/1/2014 | 8/31/2017 | Heartland Sickle Cell Disease Network | 36,496 | 50,000 | CGMR | 100 | 36,496 | 50,000 |
| Harper | James | Novo Nordisk Pharmaceuticals, Inc. | | 11/24/2014 | 11/23/2016 | Safety and Efficacy of Turoctocog Alfa Pegol(N8-GP) in Previously Untreated Patients With Haemophilia A (pathfinder6) | 38,075 | 47,325 | CGMR | 100 | 38,075 | 47,325 |
| Hyde | Ricia | NE DHHS-LB506 | 2016-18 | 7/1/2015 | 6/30/2016 | The Role of Histone Deacylases in Inv(16) Associated Acute Myeloid Leukemia | 50,000 | 50,000 | MBE | 100 | 50,000 | 50,000 |
| Hyde | Ricia | NE DHHS-606 | Stem Cell 2015-02 | 7/1/2015 | 6/30/2016 | The role of RUNX1 and GATA2 in leukemia stem cells | 87,400 | 87,400 | MBE | 100 | 87,400 | 87,400 |
| Lagrange | Chad | Galil Medical, Inc. | | 2/21/2011 | 2/20/2016 | Tracking Renal Tumors After Crycoablation Evaluation (TRACE) Renal Registry | 36,250 | 45,675 | MBE | 100 | 36,250 | 45,675 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Langnas | Alan | UCLA | BAY 43-9006 | 1/4/2013 | 1/3/2017 | A Phase II Randomized Multicenter Placebo Controlled Blinded Study of Sorafenib Adjuvant Therapy in High Risk Orthotopic Liver Transplant (OLT) Recipients with Hepatocellular Carcinoma (HCC) | 55,704 | 70,025 | GIC | 100 | 55,704 | 70,025 |
| Levan | Tricia | V.A. Medical Center - Omaha | | 10/2/2012 | 9/30/2015 | IPA for William Roughead | 24,872 | 24,872 | MBE | 100 | 24,872 | 24,872 |
| Levan | Tricia | V.A. Medical Center - Omaha | | 2/12/2015 | 9/30/2015 | IPA for Lynette Smith | 22,745 | 22,745 | MBE | 100 | 22,745 | 22,745 |
| Lewis | Robert | NE DHHS-LB506 | 2016-22 | 7/1/2015 | 6/30/2016 | Regulation of Colon Tumor Survival by Wdr5 | 50,000 | 50,000 | CGMR | 100 | 50,000 | 50,000 |
| Lu | Runqing | American Society of Hematology | | 3/1/2015 | 2/28/2016 | Dissecting a Novel Regulatory Network Essential for CLL Developments | 150,000 | 150,000 | MBE | 100 | 150,000 | 150,000 |
| Lunning | Matthew | JANSSEN R&D, LLC | PCI-32765DBL3001 | 4/15/2014 | 4/14/2016 | A Randomized, Double-blind, Placebo-controlled Phase 3 Study of the BTK Inhibitor, PCI-32765 (Ibrutinib), in Combination withRituximab, Cyclophosphmide, Doxorubicin, Vincristine, and Predinisone (R-CHOP) | 97,887 | 104,087 | CGMR | 100 | 97,887 | 104,087 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | in Subjects with Newly Diagnosed non-Germinal... | | | | | | |
| Lunning | Matthew | TG Therapeutics, Inc. | UTX-TGR-103 | 1/24/2014 | 1/23/2016 | A Multi-center Phase I Study Evaluating the Efficacy and Safety of Ublituximab, a Third-Generation Anti-CD20 Monoclonal Antibody, in Combination with TGR-1202, a Novel PI3k Delta Inhibitor, in Patients with B-cell Malignancies. | 71,272 | 75,742 | CGMR | 100 | 71,272 | 75,742 |
| Lunning | Matthew | Pharmacyclics, Inc. | PCYC-1119-CA | 6/3/2014 | 6/2/2016 | A Multicenter Phase 1/2bStudy of the Brutonâs Tyrosine Kinase Inhibitor, Ibrutinib (PCI-32765), in Combination with Carfilzomib (Kyprolisâ¢) in Subjects with relapsed or relapsedand refractory Multiple Myeloma | 126,675 | 158,960 | CGMR | 100 | 126,675 | 158,960 |
| Lyubchenko | Yuri | UNL | 95-3101-0040-600 | 10/1/2010 | 9/30/2015 | Nebraska 2010-15 RII Project: Nanohybrid Materials & Algal Biology (EPSCoR) | 56,669 | 84,153 | MBE | 100 | 56,669 | 84,153 |
| Maness Harris | Lori | National Marrow Donor Program | 1202 | 10/24/2013 | 10/23/2015 | Prospective Multi-Center Cohort for the Evaluation of Biomarkers Predicting Risk of Complications and Mortality Following Allogeneic HCT, BMT CTN PROTOCOL #1202 | 10,591 | 13,344 | CGMR | 100 | 10,591 | 13,344 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maness Harris | Lori | MEI Pharma, Inc. | N01358 | 12/11/2013 | 12/10/2015 | A Phase II Open-Label, Single-arm, Two-Stage, Multicenter Trial of Pracinostat in Combination with Azacitidine in Elderly (Age Greater than or equal to; 65 Years) Patients with Newly Diagnosed Acute Myeloid Leukemia (AML) | 50,820 | 53,961 | CGMR | 100 | 50,820 | 53,961 |
| Meza | Jane | UNL | 24-1710-0119-004 | 7/1/2013 | 5/31/2016 | Parent Connectors: An Efficacy Study of Peer-Support for Parents of Middle-School Youth with Emotional Disturbance | 18,000 | 22,680 | N/A | 100 | 18,000 | 22,680 |
| Mott | Justin | NE DHHS-LB506 | 2016-33 | 7/1/2015 | 6/30/2016 | Cholangiocarcinoma Cell Proliferation Driven by FGFR4 | 50,000 | 50,000 | GIC | 100 | 50,000 | 50,000 |
| Naslavsky | Naava | NE DHHS-LB506 | 2016-35 | 7/1/2015 | 6/30/2016 | A Novel Immune Complement Inhibitor for Prostate Cancer | 50,000 | 50,000 | CGMR | 100 | 50,000 | 50,000 |
| Oupicky | David | NE DHHS-LB506 | 2016-38 | 7/1/2015 | 6/30/2016 | Development of antimetastatic treatments for lung cancer | 50,000 | 50,000 | CGMR | 100 | 50,000 | 50,000 |
| Rizzino | A | NE DHHS-LB506 | 2016-42 | 7/1/2015 | 6/30/2016 | Pancreatic Tumor Cells: SOX2 and MEK Inhibitors | 50,000 | 50,000 | CGMR | 100 | 50,000 | 50,000 |
| Schwarz | James | Exelixis, Inc. | XL184 306 | 2/8/2013 | 2/7/2016 | Phase 3 Randomized, Double-blind, Controlled trial of Cabozantinib (XL184) vs. Mitoxtanrone plus Prednisone in Men with Previously Treated Symptomatic Castration-resistant Prostate Cancer | 122,819 | 154,101 | GIC | 100 | 122,819 | 154,101 |
| Shcherbakova | Polina | NE DHHS-LB506 | 2016-43 | 7/1/2015 | 6/30/2016 | Mechanisms of Genome Instability in Pole Mutant Tumors | 50,000 | 50,000 | MBE | 100 | 50,000 | 50,000 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Silva-Lopez | Edibaldo | Susan G Komen - The Nebraska Affiliate | CGA-2015-NE100-BO | 4/1/2011 | 3/31/2016 | Community Breast Health Navigator and Cancer Support Program: Improving Culturally-Appropriate Breast Cancer Support Services in Douglas County, Nebraska | 50,146 | 50,146 | MBE | 100 | 50,146 | 50,146 |
| Silva-Lopez | Edibaldo | Amgen | 20120166 | 5/13/2015 | 5/12/2017 | A Phase 3b, Multicenter, Open-label, Single-arm, Expanded Access Protocol of Talimogene Laherparepevec for the Treatment of Subjects with Unresected State IIIB to IVM1c Melanoma | 58,451 | 62,088 | MBE | 100 | 58,451 | 62,088 |
| Soliman | Amr | UNL | 24-1220-0004-007 | 9/17/2014 | 8/31/2019 | Research and Training Consortium in Molecular Cancer Epidemiology in Tanzania | 104,077 | 156,636 | N/A | 100 | 104,077 | 156,636 |
| Tahirov | Tahir | SCRIPPS | 1R21AI112462-01A1 | 6/15/2015 | 5/31/2016 | Structural/biophysical Characterization of a Potent HIV Transcription Inhibitor | 40,125 | 60,388 | MBE | 100 | 40,125 | 60,388 |
| Talmadge | James | CleanCore Technologies, LLC | | 1/1/2015 | 12/31/2015 | Disinfectant Properties of Ozonated Water | 174,821 | 220,274 | CGMR | 100 | 174,821 | 220,274 |
| Toews | Myron | NE DHHS-LB506 | 2016-52 | 7/1/2015 | 6/30/2016 | Estrogen regulation of glutaminase in pulmonary LAM | 50,000 | 50,000 | N/A | 100 | 50,000 | 50,000 |
| Vose | Julie | JANSSEN R&D, LLC | PCI-32765 BTK | 1/25/2013 | 2/28/2016 | A Phase 2, Multicenter, Single-Arm Study to Evaluate the Efficacy and Safety of Single-Agent Bruton's Tyrosine Kinase (BTK) Inhibitor, Ibrutinib, in Subjects with Mantle Cell | 65,874 | 82,351 | CGMR | 100 | 65,874 | 82,351 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Lymphoma who Progress after Bortezomib Therapy | | | | | | |
| Vose | Julie | National Marrow Donor Program | 702 | 5/1/2015 | 4/30/2016 | Continued, Long-Term Follow-Up and Lenalidomide Maintenance Therapy for Patients Who Have Enrolled on BMT CTN 0702 | 20,506 | 26,248 | CGMR | 100 | 20,506 | 26,248 |
| Vose | Julie | Acerta Pharma, LLC | ACE-LY-005 | 6/11/2015 | 6/10/2018 | A Phase 1b/2 Proof-of-Concept Study of the Combination of ACP-196 and Pembrolizumab in Subjects with B-cellMalignancies | 277,397 | 295,265 | CGMR | 100 | 277,397 | 295,265 |
| Wagner | Kay-Uwe | NE DHHS-LB506 | 2016-54 | 7/1/2015 | 6/30/2016 | Role of JAK1 in Inflammatory Cytokine Signaling in PDAC | 50,000 | 50,000 | MBE | 100 | 50,000 | 50,000 |
| Wahl | Andrew | Reata Pharmaceuticals, Inc. | 408-C-1306 | 8/22/2014 | 8/21/2016 | A Randomized, Double-blind, Vehicle-controlled, Parallel-group Phase 2 Study of the Efficacy, Safety, Pharmacokinetics of RTA 408 Lotion in the Treatment of Patients at Risk for Radiation Dermatitis | 31,245 | 33,113 | MBE | 100 | 31,245 | 33,113 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wang | Dong | Johnson & Johnson Consumer Companies, Inc. | | 10/31/2014 | 10/30/2015 | Synthesis, Characterization and Evaluation of Titania-based Whitening Project | 167,912 | 211,569 | CGMR | 100 | 167,912 | 211,569 |
| Wang | Cheng | Marsha Rivkin Center for Ovarian Cancer Research | | 6/1/2015 | 11/30/2015 | The Hippo/YAP Signaling Pathway in Ovarian High Grade Serous Carcinoma | 30,000 | 30,000 | MBE | 100 | 30,000 | 30,000 |
| Wang | Cheng | Colleen's Dream Foundation | | 12/31/2014 | 12/30/2015 | Colleen's Dream Foundation - Money being given to Dr. Cheng Wang to help support his research. | 60,000 | 60,000 | MBE | 100 | 60,000 | 60,000 |
| Watanabe-Galloway | Shinobu | Great Plains Tribal Chairmen's Health Board | 5MPCMP101056-05-00 | 9/1/2010 | 8/31/2015 | National Umbrella Cooperative Agreement Program (NUCA) | 25,515 | 38,401 | N/A | 100 | 25,515 | 38,401 |
| Woods | Nicholas | NE DHHS-LB506 | 2016-56 | 7/1/2015 | 6/30/2016 | Regulation of the Fanconi Anemia Pathway by CTDP1 | 50,000 | 50,000 | MBE | 100 | 50,000 | 50,000 |
| Wyatt | Todd | UCOD | FY12.580.004 | 8/1/2011 | 7/31/2016 | Clinical Resource for Lung and Alcohol Investigations | 23,707 | 35,205 | N/A | 100 | 23,707 | 35,205 |

| PI Last | PI First | Specific Funding Source | Project # | Project Start Date | Project End Date | Project Title | Annual Project Direct Costs | Annual Project Total Costs | Prog Code | % | Annual Program Direct Costs | Annual Program Total Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wyatt | Todd | V.A. Medical Center - Omaha | | 10/1/2011 | 9/30/2015 | IPA for Jane Devasure | 69,404 | 69,404 | N/A | 100 | 69,404 | 69,404 |
| Zempleni | Janos | America n Egg Board | | 12/1/2014 | 11/30/2015 | Egg-Borne microRNAs | 45,435 | 49,979 | MBE | 100 | 45,435 | 49,979 |
| Zempleni | Janos | Gerber Fdn | | 11/22/2014 | 11/21/2017 | Role of microRNAs in Infant Formula | 260,726 | 286,799 | MBE | 100 | 260,726 | 286,799 |
| Zhang | Luwen | National Multiple Sclerosis Society | PP3446 | 4/1/2015 | 3/31/2016 | Unique Role of EBS in MS | 40,000 | 44,000 | CGMR | 100 | 40,000 | 44,000 |
| Non-Peer-Review Research Subtotals: | | | | | | | $7,104,756 | $8,014,509 | | | $7,104,756 | $8,014,509 |

**Section 5.0**

**FY 2014/2015 Budget Overview**

**5.0 LB 595 BUDGET OVERVIEW**

The following table shows the Fiscal Year 2014/2015 proposed and actual budget for the Fred & Pamela Buffett Cancer Center's LB595 award. Each component of the budget is included along with the amount and percentage initially budgeted and ultimately allocated to the following budget categories: 1) Administration, 2) Pathology Core Facility, 3) Clinical Research Support 4) Planning and Evaluation 5) Inter-Institutional Collaboration, 6) Instrumentation, Infrastructure & Core Oversight, and 7) Developmental/Recruitment Funds.

As shown below, the Buffett Cancer Center utilized carryover funds to support Cancer Center initiatives above and beyond the original budget (e.g. Clinical Research Support & Instrumentation, Infrastructure & Core Oversight.)

| Budget Categories | % of Proposed Budget | Proposed Budget | % of Actual Budget | Actual Budget Expenditures | Variance |
|---|---|---|---|---|---|
| Administration | 12.49% | $162,391 | 8.21% | $148,539 | $13,852 |
| Pathology Core Facility | 4.15% | $54,000 | 2.98% | $54,000 | $0 |
| Clinical Research Support | 19.64% | $255,350 | 25.84% | $467,566 | ($212,216) |
| Planning and Evaluation | 0.23% | $3,000 | 0.57% | $10,288 | ($7,288) |
| Inter-Institutional Collaboration | 0.19% | $2,500 | 0.13% | $2,356 | $144 |
| Instrumentation, Infrastructure & Core Oversight | 7.91% | $102,772 | 18.54% | $335,526 | ($232,754) |
| Developmental/Recruitment (Recruitment & Pilot Projects) | 55.38% | $719,987 | 43.73% | $791,508 | ($71,521) |
| **Total** | **100.00%** | **$1,300,000** | **100.00%** | **$1,809,783** | ($509,783) |

## Section 6.0

## Developmental Funds and Recruitment

## 6.0 DEVELOPMENTAL FUNDS AND RECRUITMENT

### Recruitment

Below is a list of cancer researchers that were recruited to UNMC with the support of LB595 funds. The amounts listed below represent the amount committed to their recruitment or retention from LB595 funds during FY 2013/2014.

**2014/2015 LB 595 Supported Faculty Recruits**

| Principal Investigator | Department | Expenditures in FY 2014/2015 |
|---|---|---|
| J. Black | Eppley Institute | $22,860 |
| K. Datta | Biochemistry/Molecular Biology | $37,311 |
| P. Dhawan | Biochemistry/Molecular Biology | $15,179 |
| R. Hyde | Biochemistry/Molecular Biology | $18,398 |
| M. Jain | Biochemistry/Molecular Biology | $22,262 |
| M. Ponnusamy | Biochemistry/Molecular Biology | $59,921 |
| A. Singh | Biochemistry/Molecular Biology | $386 |
| K. Trujillo | Biochemistry/Molecular Biology | $16,692 |
| K. Fu | Pathology/Microbiology | $37,500 |
| J. Iqbal | Pathology/Microbiology | $25,000 |
| T. Greiner | Pathology/Microbiology | $37,500 |
| K. Bhakat | Pathology/Microbiology | $28,379 |
| C. Gudas | Genetics, Cell Biology & Anatomy | $50,000 |
| S.Thayer | Surgical Oncology | $72,755 |
| M.Conda-Sheridan | Pharmaceutical Science | $50,000 |
| R. Li | Pharmaceutical Science | $18,822 |
| R. Mahato | Pharmaceutical Science | $50,000 |
| A. Mohs | Pharmaceutical Science | $50,000 |
| D. Oupicky | Pharmaceutical Science | $46,813 |
| A. Soliman | Epidemiologuy | $33,949 |
| Militsakh | Otolaryngology | $21,380 |
| R. Smith | Otolaryngology (*Adjustment*) | -$65 |
| Wang, C. | Obstetrics/Gynecology | $22,150 |
| **TOTAL** | | **$737,192** |

**Pilot Projects**

Below is a list of LB 595 funded projects in FY 2014/2015. The table lists the principal investigator, project title, and the amount of LB 595 funds used to support the project during FY 2014/2015. The Cancer Center is extremely fortunate to be the main recipient of the funds raised at the annual Cattlemen's Ball of Nebraska. Since a majority of these funds are used to support pilot research projects, the Cancer Center has utilized LB 595 funding less for pilot projects and more for research infrastructure, strategic recruitment and retention needs.

Pilot project funding helps investigators develop preliminary results for subsequent federal grant applications and to upgrade shared resources. All projects are reviewed and approved by the Director of the Cancer Center and Cancer Center Senior Leadership.

**2014/2015 LB 595 Funded Pilot Projects**

| Principal Investigator | Project Title | Expenditures in FY 2014/2015 |
|---|---|---|
| Ram Mahato, Ph.D.,<br>Dept. of Pharmaceutical Science | Center for Cancer Experimental Pilot Program | $54,316 |
| | **TOTAL** | **$54,316** |

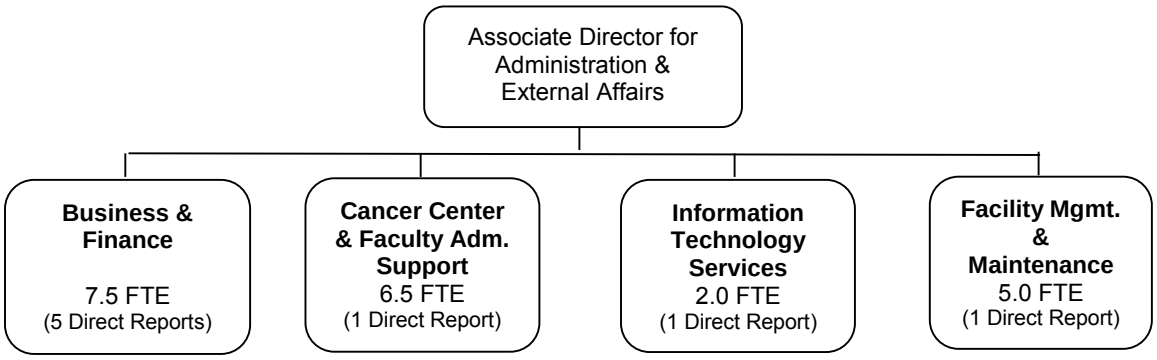
## Section 7.0

## Shared Resources

## 7.1 Administrative Core

### Administration

FPBCC Administration is comprised of the following components: 1) Business and Finance (budget and finance, research administration, human resources, outreach and public relations), 2) Administrative Support, 3) Information Technology Services, and 4) Facility Management and Maintenance. FPBCC Administration is led by Mr. Matthew Winfrey, Associate Director for Administration and External Affairs, and 21 FTEs report to the Associate Director either directly or indirectly (see Figure 1 below). Mr. Winfrey meets weekly with the FPBCC Director to discuss administrative issues and he meets regularly (at least bi-weekly) with each direct report.




FPBCC Administration is integral to the success of FPBCC meeting its goals and objectives. The specific responsibilities of FPBCC Administration includes:

- Provide administrative support to the Director and the Senior Leadership Council, including the Associate Directors and Program Leaders.
- Manage and monitor the Cancer Center's finances, including grants (pre- and post-award), contracts, institutional, and philanthropic funds.
- Responsible for the financial oversight and management of Eppley Institute faculty members, including grants, contracts, start-up funds, and budget forecasting for individual and collaborative scientific programs.
- Provide Human Resource administration for FPBCC, particularly Core Facility and/or research specialty roles.
- Oversee and monitor FPBCC-managed Shared Resources including oversight, usage, and billing rates.
- Manage the Cancer Center's space, facilities and equipment to facilitate collaboration.
- Coordinate and support the governance, planning and evaluations operations of the Cancer Center.
- Coordinate and manage outreach, public affairs, and education programs for the FPBCC to ensure clear and effective communication between the Cancer Center, the University and Hospital.
- Coordinate and support the Cancer Center's membership application and review process.
- Manage the Cancer Center's administrative support staff.

The FPBCC Director and FPBCC Administration are both located in the Eppley Cancer Institute (ECI) building, and a majority of the Administration staff members are located on the 2nd floor of the ECI. Adjacent locations of administrative staff members enable staff to work collaboratively to support the Director, FPBCC Senior Leadership, FPBCC members, and FPBCC's shared resources, and the FPBCC's infrastructure as a whole. The office suite includes a conference room (ECI 2014) that is the site for FPBCC Senior Leadership meetings, Director-sponsored meetings, and FPBCC Administration meetings.

FPBCC Administration also supports the activities of the faculty of the Eppley Institute. Every Eppley Institute faculty member is a member or associate member of the Cancer Center and FPBCC Administration manages all external and internal grants where an Eppley Institute faculty member is the Principal Investigator.

### 7.2 Pathology Core Facility

The Pathology Core Facility was created to provide comprehensive tissue processing, storage, histology, imaging, and molecular services to Fred and Pamela Buffett Cancer Center (FPBCC) investigators. The availability of expert advice and services to both new and established investigators in traditional morphologic techniques, including immunohistochemistry and electron microscopy as well as state-of-the-art imaging, molecular pathologic, and proteomic technologies (e.g. cytogenetic/molecular cytogenetic analysis, quantitative PCR, reverse-transcription PCR, next-generation sequencing, tissue microarrays, cell processing services) are emphasized in the Pathology Core Facility. A Tissue Procurement Shared Resource within the Pathology Core Facility provides fresh and processed neoplastic and non-neoplastic human tissue samples (i.e., handling, cell culture, storage, distribution, biobanking) to investigators for both prospective and retrospective studies following approval of the Institutional Review Board and Tissue Procurement Shared Resource review committee.

The Pathology Core Facility is co-directed by Drs. Julia Bridge and Geoffrey Talmon with Dr. Timothy Greiner serving as Associate Director for tissue procurement, and includes a staff of 8 with a Research Assistant Professor, an Instructor, a service manager, two molecular technologists, and three histotechnologists. Importantly, additional Pathology faculty collaborate on individual research projects and share their expertise in selecting appropriate samples, reviewing protocols, offering immunohistochemical guidance, molecular testing algorithms, reviewing study results, and creating tissue arrays.

### 7.3 Clinical Research Support

The FPBCC Office for Cancer Clinical Research (OCCR) is the centralized office that supports clinical cancer research in the Fred and Pamela Buffett Cancer Center (FPBCC) at the University of Nebraska Medical Center (UNMC). The OCCR provides centralized support for investigator-initiated trials (IIT), NCI National Clinical Trials Network and cooperative group trials (Full Member of Alliance, Children's Oncology Group, NRG) multi-institutional consortium trials (BIG10 Cancer Consortium, ACCRU) and industry-sponsored studies. The mission of the OCCR is to assist with the planning, development, conduct, quality assurance, monitoring and compliance of with regulatory agency requirements for clinical trials involving cancer treatments and care, and to provide regulatory support for cancer-related population science studies as well. The OCCR assures the highest quality of research and adherence to relevant regulations by primary upfront coordination of the study and ongoing review of research compliance.

The OCCR is a resource within the FPBCC to provide investigators support for all cancer clinical research. Approximately 20 staff members work together to support the needs of various disease-focused investigators. The OCCR works with the IRB, SRC, UNMC Physicians, Grants and Contracts, and various other groups that support cancer clinical trials throughout UNMC, the Fred & Pamela Buffett Cancer Center, Nebraska Medicine, Village Pointe Cancer Center, Bellevue Medical Center, and the VA Medical Center. The office also supports clinical cancer trials for several community partners including Saint Francis Medical Center, Grand Island, Nebraska.

The Cancer Center provides support for regulatory aspects of cancer clinical research and the coordination of correspondence among the Clinical Trials Principal Investigators, the IRB, study coordinators, and committee members for Scientific Review Committee, PRMS Internal Audit Committee, and Data and Safety Monitoring Committee. The Cancer Center also tracks all consent forms for cancer related protocols as required by the NCI.

As previously mentioned, the Buffett Cancer Center utilized carryover funds to support Clinical Research Support personnel expenses and operating costs.

### 7.4 Instrumentation, Infrastructure & Core Oversight

The Fred & Pamela Buffett Cancer Center provides support to numerous common/shared scientific resources at the University of Nebraska. LB 595 funds were utilized to support the Cancer Center Molecular Biology Shared Resource, the Tissue Science, the Structural Biology Facility, the Epigenetics Core Facility, Bioinformatics Shared Resource, and the Mass Spectrometry and Proteomics Core Facility.

The **Molecular Biology Shared Resource (MBSR)** was created in 2009 to bring together into one consolidated operation the Genomics/DNA Microarray Facility and the Molecular Biology/High-Throughput Screening (HTS) Facility. The merger enhanced the communication between the cores, maximized the utilization of staff expertise, and raised the quality of services used by representatives of all Fred & Pamela Buffett Cancer Center (FPBCC) programs. The mission of the MBSR is to support research in the Cancer Center by providing reagents, services, equipment, technical expertise, and training in genomics and molecular biology. These activities will generally be those that are not practical for the individual research laboratory to carry out for reasons of cost or lack of specialized technical skills and/or equipment. Because the goal is to support cancer research in the most cost-effective and timely manner, as well as to respond to the rapid advances in molecular biology techniques and the evolving needs of Cancer Center investigators, virtually all aspects of the services provided by the MBSR have undergone significant modernization, upgrades, and additions since our last grant proposal submission. Due to the high number of competitively priced commercial sources and the need for upgrading much of the DNA synthesis instrumentation, the MBSR is no longer providing DNA/RNA synthesis services to Cancer Center members. This reallocation of resources and personnel has resulted in the significant expansion and focus on genomic-scale studies and the services to support them. Of note: in 2011, the Genomics/DNA Microarray Facility purchased an Illumina GAIIx instrument to provide next-generation sequencing (NGS) services to Cancer Center investigators. The Illumina GAIIx was upgraded in 2012 to an Illumina HiSeq2000, followed by further upgrade to an Illumina HiSeq2500 in 2013. This year, the Genomics/DNA Microarray Facility has purchased instrumentation (described below) for the establishment of single-cell genomics technology for Cancer Center researchers.

The overall goals of the **Structural Biology Facility** is to apply structural techniques to the analysis of important cancer-related biological macromolecules, to provide basic knowledge of disease mechanisms, drive research and direct the synthesis of novel therapeutics. Atomic images of the arrangement of amino acid side chains in three dimensions gives the atomic detail needed to visualize the active sites of enzymes, see the DNA binding sites of transcription factors and view the protein-protein interactions of signaling molecules. Function can be understood through determination of atomic structures. Modification of the function of macromolecules is a key to developing specific therapies without side effects. The Structural Biology Facility has the following five laboratory components:

- Protein expression and purification (PrEP).
- Crystal screening and growth (CSG).
- Single crystal X-ray data collection.
- Small-angle X-ray scattering (SAXS) data collection.
- Nuclear magnetic resonance (NMR) data collection.

The main goals of the **Bioinformatics Shared Resource (BISR)** are to facilitate access to bioinformatics resources and technology, and to provide support and train researchers in the use of computational resources and data analysis tools in bioinformatics. Bioinformatics has become an integral part of cancer research due to the high-throughput nature of experimental data that is being generated in the research projects (broadly dubbed as ‘omics’ data). Thus, a tremendous need exists for developing computational infrastructure for the collection, processing, storage, analysis, and facilitation of the use of such data by the cancer research community. With parallel developments in computer science and high-throughput technologies in biology, biological data is being generated at a much faster pace than it can be analyzed and interpreted accurately. Moreover, the ever-changing technologies and data analysis tools make it more challenging to keep up with the changing landscape of this field. Due to this, it is hard to expect individual research laboratories to develop

and maintain sophisticated infrastructure and technical expertise in bioinformatics. The primary goal of the BISR is to provide such an environment, along with the related expertise, tools, and support accessible to all the primary and affiliated members of the Fred & Pamela Buffett Cancer Center (henceforth referred to as the FPBCC or the Buffett Cancer Center). The main objectives of the BISR include the development of needed infrastructure (hardware, software, and databases), and to provide basic and customized bioinformatics support for individual research projects. The major aims of the BISR are as follows:

The Cancer Center provides global oversight of the **Tissue Science** infrastructure at Fred & Pamela Buffett Cancer Center. Dr. Adrian Black provides expertise in the overall tissue science support area and he reviews and assesses the needs of Cancer Center researchers. During FY 2014/2015, the Buffett Cancer Center utilized LB 595 funds to purchase a Tissue Processor for common use for Cancer Center members.

The **Epigenomics Core Facility** was established to assist researchers at all university and private institutions with epigenetic analysis including DNA Methylation, Chromatin Immunoprecipitation and Real-Time Quantitative PCR gene expression analysis. The Epigenomics Core Facility is located at the Durham Research Center I on the University of Nebraska Medical Center campus and is associated with the Department of Biochemistry and Molecular Biology.

The mission of the **Mass Spectrometry and Proteomics Core Facility (MSPCF)** at the University of Nebraska Medical Center is to enhance the capacity for research. The main goals are:

- To establish an integrated proteomics program to support researchers at UNMC in their efforts to seek extramural funding,
- To provide high quality services,
- To facilitate collaborative scientific effort with other institutions of higher education within the state of Nebraska, and
- To provide a state-of-the-art environment for the education of researchers in the techniques of mass spectrometry and proteomics

The table below outlines the expenses allocated toward Instrumentation and Infrastructure Support in FY 2014/2015.

| **Instrumentation, Infrastructure & Core Oversight** | |
|---|---|
| | **Amount** |
| Shared Facility Personnel Support | $140,263 |
| NMR (Structural Biology Facility) Facility Equipment Upgrade Support | $63,605 |
| Tissue Processor Common Equipment | $54,721 |
| Tissue Processor - Fluostar Micro Plate Reader for common use | $5,012 |
| Clinical Trials Data Management - Medidata Solutions Knowledge Transfer | $42,000 |
| Epigenomics Core Facility Support | $10,000 |
| Mass Spectrometry - Proteome Software Analytics | $5,495 |
| Molecular Biology Facility - Kinase Inhibitor Library | $5,800 |
| Bioinformatics - IPA Software Support License | $8,630 |
| **Total** | **$335,526** |

## Section 8.0

## Planning and Evaluation

## 8.0 PLANNING AND EVALUATION

The FPBCC has a well-established system for program planning and evaluation that is driven by the Buffett Cancer Center strategic plan. The major leadership groups of the Cancer Center, including the Senior Leadership Committee (SLC), the Steering Committee, the Executive Committee, External Advisory Board (EAB), the Internal Advisory Board (IAB), and the Community Advisory Board provide the means by which the FPBCC Director and the FPBCC Senior Leaders conduct program planning and evaluation on an ongoing basis, consistent with the strategic plan. The Buffett Cancer Center strategic plan is developed at the FPBCC Leadership retreat and finalized following discussions with the EAB and IAB.

To enhance clinical/translational research opportunities, the FPBCC created the Steering Committee which added key clinical stakeholders to the advisory structure of the Buffett Cancer Center. The Steering Committee consists of members of the SLC as well as section/department leaders of each of the oncology clinical services (Adult Hematology-Oncology, Surgical Oncology, Radiation Oncology, Pediatric Hematology-Oncology, Gynecological Oncology, Head and Neck Oncology, Thoracic Surgical Oncology, and Neurosurgical Oncology). The Steering Committee meets quarterly to discuss faculty recruitments, new clinical/translational initiatives, and shared facilities (including plans for the new FPBCC facility) for clinical/ translational research program development. The Steering Committee also reviewed and recommended enhancements to shared facilities including the CPDMU/Office for Cancer Clinical Research, the Tissue Science Shared Resource, expansion of cancer registries and expansion of the Multidisciplinary Working Groups.

Eight new members have been added to the EAB over the past 2 years to provide additional expertise as the Research Programs have evolved. Ernie Hawk, MD, MPH (Vice President of Cancer Prevention and Population Science at MD Anderson Cancer Center) was specifically added to the EAB to provide guidance in the development of cancer control, prevention and population science research in the FPBCC. In addition, twelve of the current EAB members hold leadership positions at NCI Comprehensive Cancer Centers.

The FPBCC utilizes several major governance structures that are actively involved and responsible for planning, evaluation, policy and decision-making including the: 1) the Senior Leadership Committee 2) Steering Committee, 3) the Executive Committee, 4) the EAB, 5) the Clinical Research Committee, 6) the IAB, 7) the Cancer Health Disparities Committee and 8) the Community Advisory Board. Their functions are strengthened and enhanced by annual planning retreats, other ad hoc reviews, and additional advisory groups.

### Senior Leadership Committee

The Senior Leadership Committee (SLC) includes Associate Directors, Program Leaders, Directors of the Pancreatic SPORE and Breast Cancer Center of Excellence and an FPBCC research leader from the University of Nebraska - Lincoln campus. As the primary decision and policy-making body of the FPBCC, the SLC meets monthly and at an annual retreat to review Buffett Cancer Center activities, identify priorities and update the Strategic Plan. The SLC addresses appointments of membership and the allocation of funds for faculty recruitments, enhancement of shared facilities, and pilot grant funding. The SLC plays a major role in strategic planning and interactions with the EAB.

### Executive Committee

The FPBCC Executive Committee was established to provide a forum to ensure synchronous activities of the FPBCC with UNMC and our clinical partner, Nebraska Medicine. The membership of the Executive Committee includes leaders from 1) Buffett Cancer Center (Director; Associate Directors for Clinical Research, Clinical Affairs, and Administration; Chair of Radiation Oncology; Chief, Hematology/Oncology; and Chief Surgical Oncology); 2) UNMC (Chancellor, Vice Chancellor (VC) of Business and Finance, VC External Affairs); and 3) Nebraska Medicine (President, CEO, CFO, VP of Marketing, Executive Director of Oncology Service Line) and leaders from the University of Nebraska Foundation. The Executive Committee developed the plans for the new Buffett Cancer Center facility, supervised the fundraising campaign, and is actively engaged in weekly meetings overseeing the construction of the $323M cancer research and clinical care complex facility.

**Steering Committee**
The FPBCC Steering Committee was formed to provide advice and develop plans to enhance multidisciplinary clinical and translational research activities. This committee consists of members of SLC and the section/department leaders of each of the oncology clinical services (Adult Hematology-Oncology, Surgical Oncology, Radiation Oncology, Pediatric Hematology-Oncology, Gynecological Oncology, Head and Neck Oncology, Thoracic Surgical Oncology, and Neurosurgical Oncology). The Steering Committee meets quarterly to discuss plans for the new FPBCC facility, faculty recruitments, new clinical/translational initiatives, and shared facilities. Members of the Steering Committee participate in clinical/ translational research program development for the FPBCC and in the disease-oriented MWGs.

**Clinical Research Committee**
The Clinical Research Committee (CRC) consists of the Associate Director of Clinical Research, Administrator for Clinical Research, Administrator for Regulatory Affairs, Director of Administration, Chair of the Scientific Review Committee and the Vice Chancellor for Clinical Research. The CRC meets monthly to promote clinical research investigations, evaluate opportunities for developing innovative clinical studies and potential collaborations to promote clinical/translational research, identify resources required to facilitate clinical research, and review standard operating procedures of clinical research at Affiliate sites.

**Internal Advisory Board**
The Internal Advisory Board (IAB) is composed of the FPBCC Director, Deans of the Colleges of Medicine, Nursing, Pharmacy, Dentistry, and Public Health, Vice Chancellor for Research, Associate Vice Chancellor for Clinical Research, and Department Chairs (Internal Medicine; Surgery; Biochemistry and Molecular Biology; Genetics, Cell Biology, and Anatomy; Pharmaceutical Sciences; Epidemiology; and Biostatistics). The IAB meets annually to review the FPBCC strategic plan, assist in faculty recruitment, review shared facilities and developmental projects.

**External Advisory Board**
The External Advisory Board (EAB) of the FPBCC is appointed by the Director and consists of nationally recognized leaders in clinical, basic and population science research, Cancer Center administration, and patient advocacy. As shown in Table I, the EAB has 14 members that are nationally recognized leaders in clinical, translational, basic and population science and administration in NCI designated Cancer Centers and patient advocacy. Eight new members have been added to the EAB since the last review to provide additional expertise as the Research Programs have evolved (James Abbruzzese, MD, Associate Director Clinical Research, Duke Cancer Institute; Eric Frearon, MD, PhD, Deputy Director, University of Michigan Comprehensive Cancer Center, Stan Gerson, MD, Director, Case Comprehensive Cancer Center; Linda Malkus, Ph.D., Deputy Director, City of Hope Cancer Center, Dr. James Wilson, Director of the Simmons Cancer Center at U. T. Southwestern, Dr. Doug Yee, Director of the Masonic Cancer Center at the University of Minnesota; Ernie Hawks, MD, MPH, Vice President of Cancer Prevention and Population Science at MD Anderson Cancer Center; and Robert Gerlach, Associate Director of Administration at the Norris Cancer Center. Dr. Ernie Hawks was specifically added to the EAB to provide guidance in the development of cancer control, prevention and population science research in the FPBCC. Of note, twelve EAB members hold leadership positions at NCI Comprehensive Cancer Centers.

| Table 1: Fred & Pamela Buffett Cancer Center External Advisory Board | |
|---|---|
| **Name** | **Institution** |
| James Abbruzzese, MD | Associate Director Clinical Research<br>Duke Cancer Institute |
| Eric Frearon, MD, PhD | Deputy Director<br>University of Michigan Cancer Center |
| Robert Diasio, MD | Director<br>Mayo Clinic Cancer Center |
| I. David Goldman, MD | Director<br>Albert Einstein Cancer Center |
| Stanley Hamilton, MD | Head, Pathology/Lab Med.<br>MD Anderson Cancer Center |
| Mark Israel, MD | Director<br>Norris Cotton Cancer Center/ Dartmouth |
| Stan Gerson, MD | Director<br>Case Comprehensive Cancer Center |
| Paula Kim | Chief Executive Officer<br>Translating Research Across Communities |
| Linda Malkus, PhD | Deputy Director,<br>City of Hope Comprehensive Cancer Center |
| James Mulé, PhD | Executive Vice President Applied Research<br>Moffitt Cancer Center |
| James Wilson, MD | Director<br>Simmons Cancer Center/ U.T. Southwestern |
| Doug Yee, MD | Director Masonic Cancer Center<br>University of Minnesota |
| Ernie Hawk, MD, MPH | V.P. Cancer Prevention & Population Science<br>MD Anderson Cancer Center |
| Richard Gerlach, M.P.A | Associate Director Administration<br>Norris Cotton Cancer Center/ Dartmouth |

The EAB meets at least annually to evaluate the Buffett Cancer Center's goals and objectives, as well as to review Cancer Center programs, shared resources, administrative operations, and outreach programs. At each meeting the EAB reviews and evaluates the strategic plan for Cancer Center program development, shared resource enhancements, and recruitment goals. Following each meeting, the EAB submits a report to the Buffett Cancer Center Director and the Chancellor of UNMC, which is distributed to the Senior Leadership Council and shared with the IAB and the Executive Committee to insure effective implementation of the recommendations. The EAB is available throughout the year for discussion of issues that arise in the interim.

**Community Advisory Board**

The Cancer Center has two community advisory boards to advise and assist the Cancer Center on development, fundraising, and community relations. The Community Advisory Board shown in Table 2, is composed of business leaders and major philanthropic supporters from the local community and across the state. The Community Advisory Board meets semi-annually to review progress in the Buffett Cancer Center and provide advice on community/ state-wide relationships. The Community Advisory Board provides valuable perspective to the Director on long-range planning with respect to philanthropic support and was involved in the successful fundraising campaign for the new $323 M FPBCC complex.

The other FPBCC community board, the Advocates of the Fred & Pamela Buffett Cancer Center, serves as a fundraising arm for the Buffett Cancer Center. The Advocates are community and business leaders from across the state and are involved in several major fundraising events for the FPBCC including the Ambassador of Hope Gala.

| **Table 2. Fred & Pamela Buffett Cancer Center Community Advisory Board** | |
|---|---|
| Duane Acklie | Founder, Crete Carrier Corporation |
| Herb Albers | Owner, Albers Cattle Co., Inc., Albers Feedlot Inc. |
| Steve Bloch | Lawyer; Likes, Myerson, Hatch |
| Lynne Boyer | Founder, John K. and Lynne D. Boyer Foundation |
| Susie Buffett | Chairman, Sherwood Foundation |
| John Gottshalk | Former CEO and Publisher, Omaha World-Herald |
| David Karnes | President and CEO, Fairmont Group<br>Chairman, Federal Government Practice Group at Kutak Rock |
| Bob Krohn, Chair | Former Chairman/CEO, PSI Group, Inc. |
| Dan Neary | Former CEO/Current Chairman of the Board, Mutual of Omaha |
| Diane Nelson | Community Cancer Center Supporter and Spouse of Former U.S. Senator Ben Nelson |
| Jay Noddle | President and CEO, Noddle Companies |
| Kae Pavlik | Member, Cattlemen's Ball of Nebraska Advisory Board |
| Gary Werner | Vice Chairman, Werner Enterprises |
| Gail Yanney, MD, Vice Chair | Co-Chair, UNMC "Unlimited Possibilities" campaign |
| Lyn Ziegenbein | Executive Director Emerita, Peter Kiewit Foundation |

## Section 9.0

## Inter-Institutional Collaboration

**9.0 INTER-INSTITUTIONAL COLLABORATION (UNMC, UNL, UNO, and Creighton University)**

Affiliate Cancer Center Memberships: Cancer researchers with appointments outside of the University of Nebraska can be granted Affiliate Membership to the Fred & Pamela Buffett Cancer Center upon request. Applicants must demonstrate an interest in cancer research and/or education and a willingness to participate in collaborative clinical, translational or basic research and/or educational programs of the Fred & Pamela Buffett Cancer Center. Currently the Fred & Pamela Buffett Cancer Center has four affiliate members from Creighton University and we are actively recruiting more.

Breast Cancer Research Project: Supported by funding from the Fred & Pamela Buffett Cancer Center **San-Ming Wang, M.D.**, an Associate Professor in the Department of Genetics, Cell Biology and Anatomy continues to collaborate with **Dr. Henry Lynch** of Creighton University on a study to investigate if there are unknown germline predisposition genes in *BRCA*-negative familial breast cancer. Using the latest exome sequencing method, they analyzed the entire protein coding region in the genomes of eight individual members in a *BRCA1*, *BRCA2, p53 and PTEN*-negative breast cancer family, of whom five were breast cancer and three were unaffected individuals.

Center for Cellular Signaling: This National Institute of Health funded project established a Center for Cellular Signaling that augments and strengthens the research capacity within the Dental Schools in Nebraska. The Center includes scientists from three research universities in Nebraska: University of Nebraska Medical Center, University of Nebraska - Lincoln, and Creighton University. The objectives of the Center are 1) to expand the current focus on cellular signaling, with a concentration on its role in tumorigenesis; 2) to increase the research profile of Nebraska's dental schools, with the ultimate goal of being included in the top dental schools in the country in NIH funding; and, most importantly, 3) to contribute to the development of promising young faculty, so that they will become prominent members of the scientific community as evidenced by significant NIH funding, publication of important manuscripts, service on review panels and invitations to speak across the country.

Pancreatic Cancer Collaborative Registry (PCCR): Based at the Eppley Institute, the mission of the PCCR is to unite centers with expertise in pancreatic cancer research. The registry is set to facilitate the uniform collection of critical information and biological samples to develop prevention and treatment strategies against this devastating disease. There are currently 10 centers involved in the registry, including: UNMC, Creighton University, New York Medical College, Johns Hopkins Hospital, University of Washington, Evanston Northwestern University Healthcare, University of Pittsburgh, Mayo Clinic, University of Alabama Birmingham, and the National Cancer Institute.

Dr. Henry Lynch, M.D., professor and chairman of Preventive Medicine and Public Health, professor of Medicine, and director of the Hereditary Cancer Institute at Creighton University Medical Center participates in this collaboration by collecting blood samples and specific genetic profile information of family members of a pancreatic cancer patient where there is a history of pancreatic cancer, as well as those families in which there has been no prior pancreatic cancer. Dr. Lynch and his team meet with and interview all family members and all of this information is provided to UNMC's Simon Sherman, Ph.D., director of the Bioinformatics Shared Resources at UNMC. Dr. Lynch's extensive collection of familial pancreatic cancer data involving 48,700 familial cancer syndrome cases of which, 590 are pancreatic cancer cases (his collective work over the past three decades) has been incorporated into the PCCR, and he continues to provide leadership in promoting and expanding pancreatic cancer research with the use of the developed tools.

Hematological Malignancies Collaboration: An additional collaboration between the Fred & Pamela Buffett Cancer Center and the Creighton University Cancer Center includes the Center for Lymphoma and Leukemia Research at UNMC in which Dr. Lynch provides his expertise on hereditary cancer research for a research project that is studying families with increased incidence of hematological malignancies.

Kicks for a Cure: Money raised by Kicks for a Cure annual soccer exhibition fundraiser will be used to promote cancer research at the Fred & Pamela Buffett Cancer Center and the Creighton University Cancer Center. To date, monies raised from this collaborative effort since its beginning ten years ago have been used to support women's cancer research at UNMC, including the breast cancer research project described above.

Midwest Student Biomedical Research Forum: The Midwest Student Biomedical Research Forum (MSBRF) aims to support and nurture student research in the health sciences. This event is designed to give students an opportunity to present their original research in either an oral or poster meeting format.

## Section 10.0

## Cancer Center Members List

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Abromowitch, Minnie | Non-Aligned | Associate Member | BS, MD | Professor | Pediatrics Hematology/Oncology | College of Medicine |
| Adamec, Jiri | CGMRP | Associate Member | PhD | Assoc Professor | Department of Biochemistry | UNL |
| Aizenberg Ansari, Michele | MBEP | Associate Member | MD | Assoc Professor | Surgery-Neurosurgery | College of Medicine |
| Alnouti, Yazen | CPCP | Associate Member | PhD | Assoc Professor | COP Pharmaceutical Science | College of Pharmacy |
| Angeletti, Peter | CGMRP | Associate Member | PhD | Associate Professor | School of Biological Sciences | UNL |
| Anthony, Renaisa | CPCP | Associate Member | BS, MD, MPH | Asst Director | COPH Health Disparities | College of Public Health |
| Are, Chandrakanth | GICP | Member | MBBS | Professor | Surgical Oncology | College of Medicine |
| Are, Madhuri | CPCP | Associate Member | MD | Assoc Professor | Anesthesiology | College of Medicine |
| Armitage, James | CGMRP | Member | BS, MD | Professor | Int Med Oncology/Hematology | College of Medicine |
| Baccaglini, Lorena | CPCP | Associate Member | DDS, PhD | Assoc Professor | COPH Epidemiology | College of Public Health |
| Band, Hamid | MBEP | Member | MD, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Band, Vimla | MBEP | Member | PhD | Chairperson | Genetics Cell Biology & Anatomy | College of Medicine |
| Baranowska-Kortylewi, Janina | MBEP | Associate Member | MS, PhD | Professor | Radiation Oncology | College of Medicine |
| Bashford, Gregory | MBEP | Associate Member | PhD | Assoc Professor | Biological Systems Engineering | UNL |
| Batra, Surinder | GICP | Member | MS, PhD | Chairperson | Biochem and Molecular Biology | College of Medicine |
| Beck, Jill | Non-Aligned | Associate Member | MD | Asst Professor | Pediatrics Hematology/Oncology | College of Medicine |
| Becker, Donald | MBEP | Associate Member | PhD | Professor | Biological Systems Engineering | UNL |
| Becker, Donald | MBEP | Associate Member | PhD | Professor | Biochemistry | UNL |
| Berger, Ann | CPCP | Member | BSN, MSN, PhD | Professor | CON-Omaha Division | College of Nursing |
| Berim, Lyudmyla | CGMRP | Associate Member | MD | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| Berkowitz, David | MBEP | Associate Member | PhD | Professor | Chemistry | UNL |
| Bessho, Tadayoshi | MBEP | Associate Member | PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Bevins, Rick | CPCP | Member | PhD | Professor | Psychology | UNL |
| Bhakat, Kishor | MBEP | Member | PhD | Assoc Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Bhatt, Vijaya | CGMRP | Associate Member | MD | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| Bierman, Philip | Non-Aligned | Associate Member | BA, MD | Professor | Int Med Oncology/Hematology | College of Medicine |

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Black, Adrian | GICP | Associate Member | PhD | Asst Professor | Eppley Inst Faculty | Eppley Institute |
| Black, Jennifer | GICP | Member | BS, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Bociek, Robert | Non-Aligned | Associate Member | MD | Assoc Professor | Int Med Oncology/Hematology | College of Medicine |
| Bonnema, Rachel | MBEP | Associate Member | MD | Assoc Professor | Int Med General Medicine | College of Medicine |
| Borgstahl, Gloria | MBEP | Member | PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Boska, Michael | CGMRP | Associate Member | BS, PhD | Professor | Radiology | College of Medicine |
| Brattain, Michael | CGMRP | Member | BS, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Bridge, Julia | MBEP | Associate Member | BS, MD | Professor | Pathology/Microbiology | College of Medicine |
| Britigan, Denise | CPCP | Associate Member | MA, PhD | Asst Professor | COPH Hlth Pr, Soc & Behv Health | College of Public Health |
| Bronich, Tatiana | CGMRP | Member | MS, PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Brown, Deborah | CGMRP | Associate Member | PhD | Assoc Professor | School of Biological Sciences | UNL |
| Buch, Shilpa | Non-Aligned | Associate Member | PhD | Professor | Pharmacology/Exp Neuroscience | College of Medicine |
| Buckley, Shannon | CGMRP | Member | PhD | Asst Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Buehler, Bruce | CGMRP | Associate Member | BS, MD | Professor | MMI Genetic Medicine | Munroe-Meyer Institute |
| Caplan, Steven | CGMRP | Member | PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Casale, George | CGMRP | Associate Member | AB, PhD | Assoc Professor | Surgery-General Surgery | College of Medicine |
| Cavalieri, Ercole | MBEP | Associate Member | DS, DSC | Professor | Eppley Inst Faculty | Eppley Institute |
| Cerny, Ronnie | CGMRP | Associate Member | PhD | Res Assoc Professor | Chemistry | UNL |
| Chaney, William | CGMRP | Associate Member | BS, PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Chaperon, Claudia | CPCP | Associate Member | BS, BSN, MSN, PhD | Assoc Professor | CON-Omaha Division | College of Nursing |
| Chen, Baojiang | CPCP | Associate Member | PhD | Asst Professor | COPH Biostatistics | College of Public Health |
| Cheng, Pi-Wan | MBEP | Associate Member | MS, PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Chowdhury, Sanjib | GICP | Associate Member | BS, MS, PhD | Asst Professor | Surgical Oncology | College of Medicine |
| Clarke, Jennifer | MBEP | Associate Member | PhD | Assoc Professor | Food Science and Technology | UNL |
| Clemens, Dahn | Non-Aligned | Associate Member | BA, MS, PhD | Assoc Professor | Int Med GI | College of Medicine |
| Coccia, Peter | Non-Aligned | Associate Member | AB, MD | Professor | Pediatrics Hematology/Oncology | College of Medicine |
| Cohen, Marlene | CPCP | Associate Member | MS, PhD | Professor | CON-Omaha Division | College of Nursing |
| Cohen, Samuel | MBEP | Associate Member | BS, MD, PhD | Professor | Pathology/Microbiology | College of Medicine |
| Conda Sheridan, Martin | CGMRP | Associate Member | PhD | Asst Professor | COP Pharmaceutical Science | College of Pharmacy |

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Coulter, Donald | CGMRP | Associate Member | MD | Assoc Professor | Pediatrics Hematology/Oncology | College of Medicine |
| Cowan, Kenneth | MBEP | Member | BA, MD, PhD | Director | Eppley Inst Faculty | Eppley Institute |
| Cui, Juan | MBEP | Associate Member | PhD | Asst Professor | Computer Science and Engineering | UNL |
| Cupp, Andrea | CPCP | Associate Member | PhD | Professor | Animal Science | UNL |
| Cushman-Vokoun, Allison | GICP | Associate Member | BA, BS, MD, PhD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Datta, Kaustubh | MBEP | Member | PhD | Assoc Professor | Biochem and Molecular Biology | College of Medicine |
| Dave, Bhavana | Non-Aligned | Associate Member | PhD | Professor | MMI Cytogenetics | Munroe-Meyer Institute |
| Davis, John | CGMRP | Associate Member | PhD | Professor | Obstetrics/Gynecology | College of Medicine |
| Deegan, Rebecca | MBEP | Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| DeRosa, Nicole | MBEP | Associate Member | MD | Asst Professor | Surgical Oncology | College of Medicine |
| Dhawan, Punita | GICP | Member | PhD | Assoc Professor | Biochem and Molecular Biology | College of Medicine |
| Dixon, Robert | Non-Aligned | Associate Member | BS, MS, DVM | Director | Comparative Medicine | Vice Chancellor for Research |
| Dong, Jixin | CGMRP | Member | PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Eilers, June | CPCP | Associate Member | BSN, MSN, PhD | Research Assoc Professor | CON-Omaha Division | College of Nursing |
| Enke, Charles | MBEP | Associate Member | BS, MD | Chairperson | Radiation Oncology | College of Medicine |
| Foster, Jason | GICP | Associate Member | MD | Assoc Professor | Surgical Oncology | College of Medicine |
| Fox, Howard | Non-Aligned | Associate Member | MD, PhD | Professor | Pharmacology/Exp Neuroscience | College of Medicine |
| Freifeld, Alison | Non-Aligned | Associate Member | BA, MD | Professor | Int Med Infectious Diseases | College of Medicine |
| Froeschle, Mary | Non-Aligned | Associate Member | DDS, MBA | Assoc Professor | COD-Adult Restorative | College of Dentistry |
| Fu, Kai | CGMRP | Associate Member | MD | Professor | Pathology/Microbiology | College of Medicine |
| Fung, Eric | CGMRP | Associate Member | PhD, BSCJ | Professor | COD-Oral Biology | College of Dentistry |
| Ganti, Apar | CGMRP | Member | MD | Assoc Professor | Int Med Oncology/Hematology | College of Medicine |
| Garrison, Jered | CGMRP | Member | PhD | Assoc Professor | COP Pharmaceutical Science | College of Pharmacy |
| Gendelman, Howard | Non-Aligned | Associate Member | MD | Chairperson | Pharmacology/Exp Neuroscience | College of Medicine |
| Godfrey, Maurice | CPCP | Associate Member | BS, PhD | Professor | MMI Administration | Munroe-Meyer Institute |
| Goldner, Whitney | MBEP | Associate Member | BA, MD | Assoc Professor | Int Med DEM | College of Medicine |
| Gordon, Bruce | Non-Aligned | Associate Member | BA, MD | Professor | Pediatrics Hematology/Oncology | College of Medicine |
| Gould, Karen | MBEP | Member | BA, PhD | Assoc Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Green, Michael | CGMRP | Member | PhD | Asst Professor | Eppley Inst Faculty | Eppley Institute |

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Greiner, Timothy | CGMRP | Associate Member | BA, MD, MS | Professor | Pathology/Microbiology | College of Medicine |
| Grem, Jean | GICP | Member | BS, MD | Professor | Int Med Oncology/Hematology | College of Medicine |
| Griep, Mark | CGMRP | Associate Member | PhD | Assoc Professor | Chemistry | UNL |
| Grunkemeyer, James | GICP | Associate Member | BA, PhD | Research Asst Professor | Eppley Inst Faculty | Eppley Institute |
| Guda, Chittibabu | CGMRP | Member | PhD | Assoc Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Gundabolu, Krishna | Cancer Genes and Molecular Regulation Program | Associate Member | MBBS | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| Gundabolu, Krishna | Non-Aligned | Associate Member | MBBS | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| Hagelstrom, Robert | Non-Aligned | Associate Member | MBA, PhD | Asst Professor | MMI Cytogenetics | Munroe-Meyer Institute |
| Hansen, Laura | MBEP | Affiliate Member | PhD | Professor | Biological Science | Creighton |
| Harper, James | Non-Aligned | Associate Member | BS, MD | Assoc Professor | Pediatrics Hematology/Oncology | College of Medicine |
| Haynatzki, Gleb | CPCP | Associate Member | PhD | Professor | COPH Biostatistics | College of Public Health |
| Helikar, Tomas | MBEP | Associate Member | BS | Research Associate | Pharmacology/Exp Neuroscience | College of Medicine |
| Hinrichs, Steven | MBEP | Associate Member | BS, MD | Chairperson | Pathology/Microbiology | College of Medicine |
| Hollingsworth, Michael | GICP | Member | BA, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Houfek, Julia | CPCP | Associate Member | BSN, MSN, PhD | Professor | CON-Omaha Division | College of Nursing |
| Howell, Gillian | GICP | Associate Member | PhD | Research Asst Professor | Eppley Inst Faculty | Eppley Institute |
| Hoyt, Danny | CPCP | Associate Member | PhD | Chairperson | Sociology | UNL |
| Huberty, Jennifer | CPCP | Associate Member | PhD | Associate Professor | Health, Physical Education & Recreation | UNO |
| Hyde, Ricia | MBEP | Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Iqbal, Javeed | CGMRP | Member | PhD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Islam, Km | CPCP | Member | MD, PhD | Assoc Professor | COPH Epidemiology | College of Public Health |
| Jain, Maneesh | MBEP | Associate Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Johnson, Donald | CGMRP | Associate Member | BA, PhD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Johnson, Keith | GICP | Member | BA, PhD, BSEd | Professor | COD-Oral Biology | College of Dentistry |

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Joshi, Shantaram | CGMRP | Associate Member | BSC, PhD, M.SC. | Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Karpf, Adam | MBEP | Member | BS, PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Kelly, David | CGMRP | Associate Member | BS, MA, PhD | Assistant Professor | Eppley Inst Faculty | Eppley Institute |
| Kessinger, Margaret | Non-Aligned | Associate Member | BA, MD | Professor | Int Med Oncology/Hematology | College of Medicine |
| Kidambi, Srivatsan | MBEP | Associate Member | PhD | Asst Professor | Chemical & Biomolecular Engineering | UNL |
| Kim, Jungyoon | CPCP | Associate Member | PhD | Asst Professor | COPH Health Services Res & Admin | College of Public Health |
| Kim, Yeong | MBEP | Associate Member | PhD | Asst Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Koth, Jana | CPCP | Associate Member | MPH | Asst Professor | Radiation Therapy Technology Div | College of Allied Health Profession |
| Lackner, Rudolph | MBEP | Associate Member | MD | Professor | Surgery-Cardiovascular&Thoracic Surg | College of Medicine |
| Lagrange, Chad | MBEP | Associate Member | MD | Assoc Professor | Surgery-Urologic Surgery | College of Medicine |
| Langenfeld, Sean | GICP | Associate Member | BA, MD | Asst Professor | Surgery-General Surgery | College of Medicine |
| Langnas, Alan | GICP | Associate Member | BA, DO | Professor | Surgery-Transplant | College of Medicine |
| Lawson, Terence | MBEP | Associate Member | BS, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Lazenby, Audrey | GICP | Member | BS, MD | Professor | Pathology/Microbiology | College of Medicine |
| Lele, Subodh | MBEP | Associate Member | MD | Professor | Pathology/Microbiology | College of Medicine |
| Levan, Tricia | MBEP | Associate Member | BS, PhD | Assoc Professor | COPH Epidemiology | College of Public Health |
| Lewis, Robert | CGMRP | Member | BS, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Li, David | CGMRP | Associate Member | MS, PhD | Assoc Professor | Ophthalmology and Visual Sciences | College of Medicine |
| Li, Rongshi | CGMRP | Member | PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Lin, Chi | GICP | Member | MD, PhD | Assoc Professor | Radiation Oncology | College of Medicine |
| Lin, Ming-Fong | MBEP | Member | MS, PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Liu, Xiang-De | MBEP | Associate Member | MD | Asst Professor | Int Med Pulmonary | College of Medicine |
| Lockridge, Oksana | MBEP | Associate Member | PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Loggie, Brian | Non-Aligned | Affiliate Member | MD | Professor | Surgery | Creighton |
| Lu, Runqing | MBEP | Member | PhD | Assoc Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Luca, Sorin | CGMRP | Associate Member | PhD | Asst Professor | COP Pharmaceutical Science | College of Pharmacy |
| Lunning, Matthew | CGMRP | Member | BA, DO, MD | Asst Professor | Int Med Oncology/Hematology | College of Medicine |

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Luo, Xu | CGMRP | Associate Member | PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Ly, Quan | GICP | Member | MD | Assoc Professor | Surgical Oncology | College of Medicine |
| Lydiatt, Daniel | CPCP | Associate Member | BS, MD, MS, DDS | Professor | Otol-Head and Neck Surgery | College of Medicine |
| Lydiatt, William | CPCP | Associate Member | MD, MS | Professor | Otol-Head and Neck Surgery | College of Medicine |
| Lynch, Henry | MBEP | Affiliate Member | MD | Professor | Preventive Medicine | Creighton |
| Lyubchenko, Yuri | MBEP | Member | DS, PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| MacDonald, Richard | GICP | Member | BA, MS, PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Mahato, Ram | GICP | Member | PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Maness Harris, Lori | CGMRP | Associate Member | BS, MD | Assoc Professor | Int Med Oncology/Hematology | College of Medicine |
| Markin, Rodney | CGMRP | Associate Member | BS, MD, PhD | Assoc VC Bus Develop-Chief Technol Offcr | Business and Finance | Business and Finance |
| Marky, Luis | MBEP | Member | BS, MS, PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Marr, Alissa | CGMRP | Associate Member | MD | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| McChargue, Dennis | CPCP | Associate Member | PhD | Assoc Professor | Psychology | UNL |
| Mccomb, Rodney D. | MBEP | Associate Member | BS, MD | Professor | Pathology/Microbiology | College of Medicine |
| Mcgarry, Sean | CPCP | Associate Member | MD | Assoc Professor | Orthopaedic Surgery | College of Medicine |
| Mehta, Parmender | CGMRP | Member | PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Mercer, David | CPCP | Associate Member | MD | Chairperson | Surgery | College of Medicine |
| Meza, Jane | CPCP | Associate Member | BS, MS, PhD | Professor | COPH Biostatistics | College of Public Health |
| Mikuls, Ted | CPCP | Associate Member | BS, MD, MSPH | Professor | Int Med Rheumatology | College of Medicine |
| Militsakh, Oleg | CPCP | Associate Member | MD | Assoc Professor | Otol-Head and Neck Surgery | College of Medicine |
| Minhas, Veenu | CPCP | Associate Member | MPH, PhD | Asst Professor | COPH Epidemiology | College of Public Health |
| Mir, Shakeel | CGMRP | Associate Member | MS, PhD | Instructor | Biochem and Molecular Biology | College of Medicine |
| Mohs, Aaron | CGMRP | Member | PhD | Asst Professor | COP Pharmaceutical Science | College of Pharmacy |
| Mosley, R | CGMRP | Associate Member | BS, MS, PhD | Professor | Pharmacology/Exp Neuroscience | College of Medicine |
| Mott, Justin | GICP | Member | MD, PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Naramura, Mayumi | MBEP | Associate Member | MD | Asst Professor | Eppley Inst Faculty | Eppley Institute |

| Member | Program | Membership Type | Degree | Title | Department | College/Institution |
|---|---|---|---|---|---|---|
| Naslavsky, Naava | CGMRP | Associate Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Natarajan, Amarnath | CGMRP | Member | PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Nawshad, Ali | CGMRP | Associate Member | MS, PhD | Assoc Professor | COD-Oral Biology | College of Dentistry |
| Nayar, Preethy | CPCP | Associate Member | MD, MS, PhD | Assoc Professor | COPH Health Services Res & Admin | College of Public Health |
| Nelson, Audrey | CPCP | Associate Member | BSN, MSN, PhD | Assoc Professor | CON-Omaha Division | College of Nursing |
| Noble, John | CPCP | Associate Member | PhD | Assoc Professor | Health, Physical Education & Recreation | UNO |
| Oakley, Gregory | MBEP | Associate Member | PhD | Assoc Professor | COD-Oral Biology | College of Dentistry |
| Opavsky, Rene | CGMRP | Member | MS, PhD | Asst Professor | Eppley Inst Faculty | Eppley Institute |
| Othman, Shadia | MBEP | Associate Member | PhD | Asst Professor | Biological Systems Engineering | UNL |
| Ouellette, Michel | GICP | Associate Member | BS, PhD | Assoc Professor | Int Med GI | College of Medicine |
| Oupicky, David | CGMRP | Member | PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Padussis, James | GICP | Associate Member | MD | Asst Professor | Surgical Oncology | College of Medicine |
| Palanimuthu Ponnusam, Moorthy | MBEP | Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Parkhurst, Lawrence | MBEP | Member | PhD | Professor | Chemistry | UNL |
| Pavlov, Youri | MBEP | Associate Member | DSC, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Peng, Aimin | MBEP | Associate Member | PhD | Assoc Professor | COD-Oral Biology | College of Dentistry |
| Petrosyan, Armen | MBEP | Associate Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Pinard, Courtney | CPCP | Associate Member | PhD | Asst Professor | COPH Hlth Pr, Soc & Behv Health | College of Public Health |
| Pirruccello, Samuel | CGMRP | Associate Member | BA, MD | Professor | Pathology/Microbiology | College of Medicine |
| Powers, Robert | CGMRP | Member | PhD | Professor | Chemistry | UNL |
| Pullen, Carol | CPCP | Member | BSN, EdD, MSN | Professor | CON-Omaha Division | College of Nursing |
| Rachagani, Satyanarayana | GICP | Associate Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Radhakrishnan, Prakash | MBEP | Associate Member | PhD | Research Asst Professor | Eppley Inst Faculty | Eppley Institute |
| Rajan, Sandeep | Non-Aligned | Associate Member | MBBS | Assoc Professor | Int Med Oncology/Hematology | College of Medicine |
| Rajaram, Shireen | CPCP | Associate Member | PhD | Assoc Professor | COPH Hlth Pr, Soc & Behv | College of Public Health |
| Reed, Elizabeth | MBEP | Member | MD | Professor | Int Med Oncology/Hematology | College of Medicine |

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|---|---|---|---|---|---|---|
| Remmenga, Steven | MBEP | Associate Member | BS, MD | Professor | Obstetrics/Gynecology | College of Medicine |
| Rennard, Stephen | MBEP | Associate Member | AB, MD | Professor | Int Med Pulmonary | College of Medicine |
| Rizzino, A | CGMRP | Associate Member | BS, MA, PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Rochling, Fedja | CPCP | Associate Member | MBBCH | Assoc Professor | Int Med GI | College of Medicine |
| Rodabaugh, Kerry | MBEP | Associate Member | BS, MD | Professor | Obstetrics/Gynecology | College of Medicine |
| Rogan, Eleanor | MBEP | Associate Member | BA, PhD | Professor | COPH Environ, Agri & Occ Health | College of Public Health |
| Rolf, Karen | CPCP | Associate Member | PhD | Assoc Professor | Social Work | UNO |
| Romberger, Debra | MBEP | Associate Member | BS, MD | Chairperson | Int Med Administration | College of Medicine |
| Roy, Shyamal | MBEP | Associate Member | MSC, PhD | Professor | Obstetrics/Gynecology | College of Medicine |
| Sanmann, Jennifer | Non-Aligned | Associate Member | BS, PhD | Asst Professor | MMI Cytogenetics | Munroe-Meyer Institute |
| Sarvetnick, Nora | MBEP | Member | PhD | Professor | Surgery-Transplant | College of Medicine |
| Schumacher, Karen | CPCP | Member | PhD | Professor | CON-Omaha Division | College of Nursing |
| Schwarz, James | GICP | Member | MD | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| Sharp, John | MBEP | Associate Member | BS, MS, PhD | Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Shcherbakova, Polina | MBEP | Member | PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Sheinin, Yuri | GICP | Member | MD, PhD | Asst Professor | Pathology/Microbiology | College of Medicine |
| Sherman, Simon | GICP | Member | PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Shonka, Nicole | MBEP | Associate Member | MD | Asst Professor | Int Med Oncology/Hematology | College of Medicine |
| Siahpush, Mohammad | CPCP | Member | PhD | Professor | COPH Hlth Pr, Soc & Behv Health | College of Public Health |
| Silva-Lopez, Edibaldo | MBEP | Associate Member | MD, PhD | Professor | Surgical Oncology | College of Medicine |
| Simpson, Melanie | CGMRP | Member | PhD | Assoc Professor | Biochemistry | UNL |
| Singh, Amar | GICP | Member | PhD | Assoc Professor | Biochem and Molecular Biology | College of Medicine |
| Singh, Pankaj | GICP | Member | BS, MSC, PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Singh, Rakesh | CGMRP | Member | PhD | Professor | Pathology/Microbiology | College of Medicine |
| Smith, Russell | CPCP | Associate Member | MD | Professor | Otol-Head and Neck Surgery | College of Medicine |
| Solheim, Joyce | GICP | Member | BS, MA, PhD | Professor | Eppley Inst Faculty | Eppley Institute |

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|---|---|---|---|---|---|---|
| Soliman, Amr | CPCP | Member | MD, MPH, PhD | Professor | COPH Epidemiology | College of Public Health |
| Sorgen, Paul | CGMRP | Member | PhD | Professor | Biochem and Molecular Biology | College of Medicine |
| Stains, Clifford | CGMRP | Associate Member | PhD | Asst Professor | Chemistry | UNL |
| Su, Dejun | CPCP | Associate Member | PhD | Assoc Professor | COPH Hlth Pr, Soc & Behv Health | College of Public Health |
| Su, Kaihong | CGMRP | Associate Member | PhD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Swore-Fletcher, Barbara | CPCP | Associate Member | PhD | Asst Professor | CON-Omaha Division | College of Nursing |
| Tahirov, Tahir | MBEP | Member | PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Talmadge, James | CGMRP | Associate Member | BS, MS, PhD | Professor | Pathology/Microbiology | College of Medicine |
| Talmon, Geoffrey | GICP | Member | MD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Tapprich, William | CGMRP | Associate Member | PhD | Professor | Biology | UNO |
| Teoh-Fitzgerald, Melissa | MBEP | Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Thayer, Sarah | GICP | Member | MD | Professor | Surgical Oncology | College of Medicine |
| Thompson, Austin | CPCP | Associate Member | BS, MD | Assoc Professor | Int Med Pulmonary | College of Medicine |
| Thompson, Robert | MBEP | Associate Member | BS, MD, MS | Assoc Professor | Radiation Oncology | College of Medicine |
| Toews, Myron | Non-Aligned | Associate Member | BS, MS, PhD | Professor | Pharmacology/Exp Neuroscience | College of Medicine |
| Trujillo, Kelly | MBEP | Member | PhD | Asst Professor | Biochem and Molecular Biology | College of Medicine |
| Tu, Yaping | MBEP | Affiliate Member | PhD | Professor | Pharmacology | Creighton |
| Umstadter, Donald | CGMRP | Associate Member | PhD | Professor | Physics and Astronomy | UNL |
| Vennerstrom, Jonathan | CGMRP | Member | BS, PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Vetro, Joseph | CGMRP | Associate Member | PhD | Asst Professor | COP Pharmaceutical Science | College of Pharmacy |
| Vijoen, Hendrik | CGMRP | Associate Member | PhD | Professor | Chemical & Biomolecular Engineering | UNL |
| Vinogradov, Serguei | CGMRP | Associate Member | MS, PhD | Research Professor | COP Pharmaceutical Science | College of Pharmacy |
| Von Essen, Susanna | CPCP | Associate Member | BA, MD, MPH | Professor | Int Med Pulmonary | College of Medicine |
| Vose, Julie | CGMRP | Member | BS, MD | Professor | Int Med Oncology/Hematology | College of Medicine |
| Wagner, Kay-Uwe | MBEP | Member | PhD | Professor | Eppley Inst Faculty | Eppley Institute |
| Wahl, Andrew | MBEP | Associate Member | MD | Assoc Professor | Radiation Oncology | College of Medicine |
| Wahl, James | CGMRP | Member | BS, PhD | Assoc Professor | COD-Oral Biology | College of Dentistry |

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|---|---|---|---|---|---|---|
| Waltman, Nancy | CPCP | Member | BSN, MSN, PhD | Professor | CON-Lincoln Division | College of Nursing |
| Wang, Cheng | CGMRP | Member | PhD | Asst Professor | Obstetrics/Gynecology | UNL |
| Wang, Cheng | MBEP | Associate Member | PhD | Asst Professor | Obstetrics/Gynecology | College of Medicine |
| Wang, Dong | CGMRP | Member | PhD | Professor | COP Pharmaceutical Science | College of Pharmacy |
| Wang, Guangshun | CGMRP | Associate Member | PhD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Wang, Hongmei | CPCP | Associate Member | MS, PhD | Asst Professor | COPH Health Services Res & Admin | College of Public Health |
| Wang, Jing | GICP | Member | BS, PhD | Assoc Professor | Eppley Inst Faculty | Eppley Institute |
| Wang, San Ming | MBEP | Member | MD | Assoc Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Ward, Wendy | MBEP | Associate Member | MD | Professor | Surgery-Transplant | College of Medicine |
| Warkentin, Phyllis | Non-Aligned | Associate Member | BA, MD | Professor | Pathology/Microbiology | College of Medicine |
| Watanabe-Galloway, Shinobu | CPCP | Associate Member | PhD | Assoc Professor | COPH Epidemiology | College of Public Health |
| West, William | MBEP | Associate Member | BS, MD | Assoc Professor | Pathology/Microbiology | College of Medicine |
| Wisecarver, James | Non-Aligned | Associate Member | BA, MD, PhD | Professor | Pathology/Microbiology | College of Medicine |
| Wood, Charles | CGMRP | Associate Member | PhD | Professor | Biological Science | UNL |
| Woods, Nicholas | MBEP | Member | BA, PhD | Asst Professor | Eppley Inst Faculty | Eppley Institute |
| Wyatt, Todd | CPCP | Associate Member | BS, PhD | Professor | COPH Environ, Agri & Occ Health | College of Public Health |
| Xiao, Peng | CPCP | Associate Member | PhD | Asst Professor | Genetics Cell Biology & Anatomy | College of Medicine |
| Yan, Ying | MBEP | Associate Member | BS, PhD | Assoc Professor | Radiation Oncology | College of Medicine |
| Yee, Gary | Non-Aligned | Associate Member | BS, PharmD | Professor | COP Pharmacy Practice | College of Pharmacy |
| Young, Lufei | CPCP | Associate Member | BSN, PhD | Asst Professor | CON-Lincoln Division | College of Nursing |
| Zempleni, Janos | MBEP | Associate Member | PhD | Professor | Nutrition & Health Sciences | UNL |
| Zhang, Chi | MBEP | Associate Member | MD, PhD | Asst Professor | Radiation Oncology | College of Medicine |
| Zhang, Luwen | CGMRP | Associate Member | PhD | Professor | Biological Science | UNL |
| Zhen, Weining | Non-Aligned | Associate Member | MD | Professor | Radiation Oncology | College of Medicine |
| Zhong, Haizhen | CGMRP | Associate Member | PhD | Assoc Professor | Chemistry | UNO |
| Zhou, Sumin | MBEP | Associate Member | PhD | Professor | Radiation Oncology | College of Medicine |