KARIN GRUNEBAUM
cancer research foundation

November, 2015 • Volume 12

Founded in 1958

From the Chair

Dear Friends of the Karin Grunebaum Cancer Research Foundation –

In this year's cover letter, I would like to first bring to your attention the enclosed letter from three of our long-time Trustees who are jointly reaching out to our many former Fellows for donations to the Foundation. Since the Foundation was founded in 1958, we have been privileged to award stipends for cancer research and related travel to 130 medical students and faculty members at Harvard Medical School, Boston University School of Medicine and Massachusetts General Hospital. Now, it's our turn to ask those fortunate recipients to please "pay forward" to ensure funding for the next generation of researchers.

If you look at the Foundation's website (www.grunebaumfoundation.org), under the category Focus on Research, you will find a listing of the current and former Fellows who have achieved great recognition in the field of cancer research – whether in the classroom, the laboratory, medical practice or the pharmaceutical industry. The authors of the enclosed letter personify those achievements, being the respective first and second Fellowship awardees from Harvard Medical School and the current holder of the Karin Grunebaum Chair in Cancer Research at Boston University School of Medicine. Each of these accomplished gentlemen recognize how much the Foundation's grants have helped so many researchers achieve milestones in cancer research, and the need to be able to continue that ability into the future.

Each of these accomplished gentlemen recognize how much the Foundation's grants have helped so many researchers achieve milestones in cancer research, and the need to be able to continue that ability into the future.

For example, current Fellow, **Neil Ganem, Ph. D.** has added to the achievements of prior Fellows by being named a 2015 Searle Scholar at Boston University School of Medicine. He is the first person from BU to receive the Searle award, and one of only 15 winners nationwide in 2015. The award is given to assistant professors judged to be among the country's most promising young researchers in the chemical and biological sciences. Our congratulations go out to him!

This year the Foundation was privileged to add **Adam Lerner, M.D.** to its illustrious list of medical Trustees. Dr. Lerner is currently a Professor in the Departments of Medicine and Pathology at Boston University School of Medicine,

(continued on page 4)

From the Fellows

Boston University School of Medicine

Neil Ganem, Ph. D. '14
Howard Hughes Medical Institute,Department of Pediatric Oncology
Dana-Farber Cancer Institute, Children's Hospitaland Department of Cell Biology, Harvard Medical School

My laboratory uses a combination of high-resolution microscopy, cell biology, genome-wide screening, bioinformatics, and animal models to understand the causes and consequences of chromosome instability in human cancer. Chromosome instability, broadly defined as the persistent acquisition of both numerical and structural chromosome aberrations, is a hallmark of solid tumors cells and is known to facilitate both tumor progression as well as relapse following targeted therapeutic treatments. Somewhat paradoxically, chromosome instability is known to be extremely detrimental to the viability of non-transformed cells, indicating that cancer cells must adapt to overcome this defect in order to survive and grow. My lab is focused on identifying the specific adaptive mechanisms that enable cancer cells to withstand such ongoing chromosome instability. A long-term goal is to identify pathways that can be targeted by novel chemotherapeutics in order to specifically target chromosomally unstable cells while sparing the normal cells from which they originated.

Research Update:
Identifying the tumor suppressor mechanism that limits the proliferation of oncogenic tetraploid cells

Tetraploid cells, which are a common byproduct of cell division failure, are chromosomally unstable and have the capacity to facilitate tumorigenesis. Recent estimates suggest that ~40% of human tumors have undergone a genome-doubling event during their development, suggesting that tetraploidy plays significant roles in both the development and/or progression of human malignancies. Countering this oncogenic effect of tetraploidy is a p53-dependent tumor suppression mechanism that limits the proliferation of tetraploid cells by promoting a durable G1 cell cycle arrest and cellular senescence. However, unlike other pathways that activate p53 and promote G1 arrest in response to stress, such as the DNA damage response, the cellular defects and corresponding signaling mechanisms that trigger the G1 arrest in tetraploid cells are poorly understood.

My lab recently discovered that the Hippo tumor suppressor pathway is specifically activated in tetraploid cells, both *in vitro* and *in vivo*, and that this is sufficient to prevent their proliferation (**Ganem et al., 2014*; Cell***). Notably, analysis of a broad spectrum of human cancers reveals that high-ploidy tumors frequently adapt to overcome Hippo signaling, suggesting that inactivation or bypass of this pathway may be a prerequisite for the development of such tumors. However, the mechanisms by which cancers cells functionally overcome Hippo pathway activation in order to sustain proliferation remain unknown. To address this question, my lab has developed and completed genome-wide RNAi and miRNA screens to comprehensively identify genes that activate Hippo signaling. This approach has yielded numerous candidate genes, including *SPINT2,* which we have already validated as a novel Hippo pathway activator. Importantly, *SPINT2* is epigenetically silenced in a broad range of human cancers, suggesting it may be a relevant tumor suppressor gene. In the coming year, one focus of my lab will be to define the mechanisms through which SPINT2 activates the Hippo pathway.

A second focus of my lab related to this project will be to determine if reactivation of Hippo signaling is specifically lethal to near-tetraploid cancer cells while having limited effects on normal diploid cells (*ploidy-specific lethality)*. We recently developed a high-throughput assay to screen for small molecules that activate the Hippo pathway. Encouragingly, our preliminary screening has already identified one chemical compound that potently activates the Hippo pathway. In the coming year, we will examine whether this compound is specifically toxic to cancer cells that have adapted to inactivate the Hippo pathway.

Publications in the Last Year

Ganem NJ*, Cornils H, Chiu SY, O'Rourke KP, Yimlamai D, Thery M, Camargo FD, and Pellman D. 2014. Cytokinesis failure triggers Hippo pathway activation. *Cell*. 158(4):833-848. **Co-corresponding author.*

- Highlighted in Cell, "Hippo Pathway Key to Ploidy Checkpoint" Minireview, 158(4):695-696; Nature Reviews Cancer, "Hippo Signaling Arrests Tetraploid Cell Growth", Research Highlight; Science Signaling, "Hippo Arrests Tetraploid Cells", Editor's Choice, Cancer; and Cancer Discovery, "Tetraploidy Activates the Hippo Tumor Suppressor Pathway", Cancer Discovery News.

Lim S, and **Ganem NJ.** 2014. Tetraploidy and tumor development. *Oncotarget*. 5(22):10959-60.

Flynn RL, Cox KE, Jeitany M, Wakimoto H, Bryll AR, **Ganem NJ**, Bersani F, Pineda JR, Suvà ML, Benes C, Haber DA, Boussin FD, Zou L. 2015. Alternative lengthening of telomeres renders cancer cells hypersensitive to ATR inhibitors. *Science*. 347:273-277.

(continued on next page)

Boston University *(continued from previous page)*

Mustaly HM and **Ganem NJ.** (2015) Mitosis: Chromosome Segregation and Stability. *eLS. John Wiley & Sons, Ltd*: Chichester. DOI: 10.1002/9780470015902.a0005774.

Russo A, Pacchierotti F, Cimini D, **Ganem NJ**, Genesca A, Natarajan AT, Pavanello S, Valle G, Degrassi F. 2015. Genomic Instability: Crossing pathways at the origin of structural and numerical chromosome changes. *Environ Mol Mutagen.* [Epub ahead of print].

Shenk EM, and **Ganem NJ**. 2015. Generation and purification of tetraploid cells. *Methods Mol Biol.* In press.

New Funding in the Last Year

Searle Scholar Award (PI: Ganem) The Causes and Consequences of Aneuploidy

Smith Family Award for Excellence in Biomedical Research (PI: Ganem) Maintenance of Genome Stability by the Hippo Tumor Suppressor Pathway

The Skin Cancer Foundation (PI: Ganem) The Todd Nagel Memorial Award Defining Novel Mechanisms of Genome Instability in Melanoma

Melanoma Research Alliance (PI: Ganem) The Jackie King Young Investigator Award Defining Novel Mechanisms of Genome Instability in Melanoma

The Sarcoma Foundation of America (PI: Ganem) The Alex Burdo Research Award Therapeutically Targeting the Hippo Pathway in Osteosarcoma

Karin Grunebaum Cancer Research Foundation

New Lab Members

Sanghee Lim: MD/PhD student Amanda Bolgioni: PhD student Jasmine Vakhshoorzadeh: Masters student Victoria Kacprzak: Research Technician

Plans for Travel

I plan on using the Grunebaum travel funds to attend the American Society for Cell Biology annual meeting in San Diego, CA in December. At least two students will present posters at the meeting.

Rachel Flynn, Ph.D.

Assistant Professor, Pharmacology and Medicine

Boston University School of Medicine

Telomeres cap the ends of linear chromosomes and provide a molecular barrier for the human genome. Following each cell division, progressive telomere shortening erodes that barrier and compromises the stability of the genome. Critically short, or dysfunctional telomeres induce replicative senescence and/or cell death and ultimately, lead to cellular aging. Cancer cells, however, overcome the replicative senescence associated with critically short telomeres by exploiting mechanisms of telomere elongation. Reactivation of the enzyme telomerase, or activation of the Alternative Lengthening of Telomeres (ALT) pathway, account for cellular immortalization in approximately 95% of all human cancers. ALT activity has been detected across many types of human cancers however, it is most prevalent in osteosarcoma (60%), glioblastoma (44%), and a subset of pancreatic tumors (67%). These cancers are highly refractory to common therapeutic strategies and have poor overall survival. Currently, clinical trials are underway to test the efficacy of telomerase inhibitors in the treatment of cancer, however, there are no treatments for ALT positive cancers. Therapeutic development has been limited, in part, by an incomplete understanding of the molecular mechanisms regulating the ALT pathway. Recently, we demonstrated that the ataxia telangiectasia and Rad3-related (ATR) DNA damage response kinase was a critical regulator of the ALT pathway. Inhibition of ATR kinase activity not only decreased telomeric recombination, but also led to significant and selective lethality in ALT positive cancer cells. Our studies suggest that inhibiting ATR maybe an unexplored therapeutic approach for some of the most aggressive forms of human cancer.

Publications

Flynn R L, Cox KE, Jeitany M, Wakimoto H, Bryll AR, Ganem NJ, Bersani F, Pineda JR, Suvà ML, Benes CH, Haber DA, Boussin FD, Zou L. Alternative Lengthening of Telomeres Renders Cancer Cells Hypersensitive to ATR Inhibitors. Science. 2015 Jan 16;347(6219):273-7. PMCID: PMC4358324.

Letters from students of the Boston University Summer Student Research Program

Dear Mr. Wallach,

The support from the Karin Grunebaum Cancer Research Foundation helps Boston University School of Medicine prov¡de an exceptional education for talented students, regardless of their economic circumstances. Thanks to your generos¡ty and that of others, our students have access to valuable opportunities-learning from renowned faculty, conducting innovative research projects, and providing compassionate care for underserved populations.

We are pleased to enclose letters from Estela Chen and XixiXu, who have benefitted from the generosity of the Grunebaum Foundation. These scholars are among our rnost talented students, and we hope you are proud that your support has enhanced their medical education.

If your calendar allows, we would be happy to schedule a meeting with your students Please contact Victoria Hayne, Assistant Director of Donor Relations, at vhayne@bu.edu or 617-638-4968, if you would like to make arrangements for a meeting, or if you would like additional information regarding this fund.

Thank you for your philanthropic partnership with BU School of Medicine-and for making an impact on future generations of physicians and scientists.

Best regards,
Karen H. Antman, M.D.
Provost, Medical Campus
Dean, School of Medicine

Dear Mr. Wallach,

My name is Estela Chen, one of the Boston University medical students that received the Medical Student Summer Research Project (MSSRP) scholarship. I would like to thank you for making my scholarship possible. This opportunity

has enriched my research background, knowledge of melanoma, and cancer epigenetics. I wish to share with you a brief description of my project.

I spent the summer conducting melanoma research in Dr. Rhoda Alani's lab. The proposed project was designed to help us better understand the epigenetic events involved in melanoma cell growth and to potentially identify new therapeutic targets. P300 is a transcriptional co-activator with histone acetyltransferase activity, which has recently been shown to regulate the transcription of MITF, a master regulator of melanocytes and melanoma development. Chromatin immunoprecipitation (ChlP) assay was employed to investigate the actual mechanism by which P300 regulates the transcription of MITF. ChlP assays on the promoter region of MITF at the known site of CREB binding, suggested that P300 protein binds to MITF promoter region in melanoma cells.

This information has left us with more questions than answers. However, the data yielded is novel information for the scientific community, which was made possible by the support from the Karin Grunebaum Cancer Research Foundation.

Again, I would like to thank you and the foundation for supporting cancer science and medical student research efforts. I am most appreciative for your generosity.

Sincerely,
Estela Chen, BUSM Class of 2018

Dear Mr. Wallach,

I am writing to express my sincere gratitude to you for your generous donation to the Medical Student Summer Research Program at Boston University. I was very happy and appreciative to learn that I was selected as the Summer Research Fellow for the Karin Grunebaum Cancer Research Foundation. And thank you for inviting me to the luncheon this summer. It was a great pleasure to meet the board and other researchers.

I am currently a second-year medical student at Boston University School of Medicine. With your assistance, this summer I was able to pursue cancer research in Dr. Rhoda Alani's lab to study the cancer biology of melanoma with the most cutting-edge genome editing technology, the CRISPR-Cas9 system.

Having learned about this technology in multiple classes since graduate school, I am extremely excited to use it in my experiments to alter the expression of genes that we believe to be associated with melanoma metastasis. Through elucidating the regulation pathways of melanoma, the lab aims to identifi, more effective and specific therapeutic targets.

It has been a very productive summer for me. I have learned so much about research in melanoma and developed an interest in translational research in cancer biology. As I read the literature on melanoma research for my project, I was fascinated by the extent of the impact translational research can have on improving patient care. New drugs discovered and developed through laboratory research are able to extend the lifespan of many terminal patients with metastatic melanoma. It is my hope that in the future I could also be part of the cancer research community to make an impact on cancer therapy development.

Thank you again for your generous support! This scholarship has contributed significantly to my learning in translational cancer research. If my schedule allows in the future, I am hoping to take a year off to continue research. And I hope with this experience, I can further pursue my dream as a physician-scientist in the future.

Sincerely,
Xixi Xu

From the Chair *(continued from page 1)*

and also Associate Chief of their Hematology/Oncology Section. Since 2011 he has also been a National Institute of Health Reviewer for Centers of Biomedical Excellence. We heartily welcome him to the Karin Grunebaum Cancer Research Foundation family!

We continue to be blessed with the stellar performances of our Fellows and Trustees. We appreciate the time and effort they dedicate to their research and to the Foundation.

Many thanks to all of you….
Steven Wallach
Chairperson

Medical Professor Named Searle Scholar

Neil J. Ganem, an assistant professor of pharmacology and medicine at the School of Medicine, has won the prestigious Searle Scholar award for his research on genomic instability in cancer cells. His innovative work increases the understanding of cancer cell division, potentially leading to new avenues of treatment.

Ganem is the first person from BU to receive the Searle award, given to assistant professors judged to be among the country's most promising young researchers in the chemical and biological sciences, and one of only 15 winners nationwide in 2015. Ganem and the other winners will each receive $300,000 in flexible funding over three years.

"The Searle award validates our view that Dr. Ganem's research will continue to make great contributions to the area of cancer biology and, most important, to understanding the basic mechanisms of the disease," says David H. Farb, who is chair of the MED department of pharmacology and experimental therapeutics and who recruited Ganem to the school in 2013. "Every so often there's a person who has a unique approach to the problem. Neil is one such person."

A single cancer cell (shown in various colors) undergoing multipolar cell division. This type of abnormal cell division promotes chromosome missegregation and aneuploidy. Image courtesy of Neil Ganem

The Searle Scholars were chosen by a panel of senior scientists from a pool of 186 finalists nominated by 126 universities and research institutions. "We are delighted that Dr. Ganem has been named a Searle Scholar, one of the most prestigious and competitive new investigator awards," says Karen Antman, dean of MED and provost of the Medical Campus. "We thank the Searle Scholars Program for this award, which will further support Dr. Ganem's research on how cancer cells adapt to abnormal chromosomal content."

"I'm a bit shocked, but also very proud," says Ganem, who earned a PhD from Dartmouth College's Geisel School of Medicine and was a postdoctoral fellow at the Dana-Farber Cancer Institute/Harvard Medical School under David Pellman. "I know and admire the work of so many Searle Scholars. It is truly an honor to be a part of that group."

Ganem uses a combination of high-resolution microscopy, genome-wide RNA screening, and bioinformatics to study the consequences of genomic instability in human cancer. His lab seeks to understand the tumor suppression mechanisms that limit the proliferation of aneuploid cells—cells that have the wrong number of chromosomes and are found in virtually all tumors—and to identify the common genetic adaptations made by cancer cells to overcome these growth barriers.

A high-resolution image of a cancer cell undergoing mitosis. In this image, a single chromosome (shown in white) is highlighted. During normal cell division, chromosomes are equally partitioned to two cells by a cellular machine called the mitotic spindle (shown in green). The mitotic spindle captures chromosomes by binding to structures termed kinetochores (shown in red). In cancer cells, this chromosome capture mechanism is commonly defective. Image courtesy of Neil Ganem

He says he will use part of his Searle award to upgrade the $150,000 microscope that his lab uses for live cell imaging. As a postdoctoral fellow, Ganem's expertise in imaging helped him uncover a mechanism leading to chromosome missegregation and the generation of aneuploid cancer cells. This discovery was the cover article in Nature in July 2009, and has been widely cited since publication. During summer 2014, Ganem published a follow-up study in Cell describing how some cancer cells adapt to tolerate this abnormal number of chromosomes.

The Searle was Ganem's sixth foundation grant in five months, and it brings his private foundation funding to $936,000. "It's unparalleled," Farb says of the new professor's funding streak.

The other awards include: The Smith Family Foundation Award for Excellence in Biomedical Research ($300,000); the Skin Cancer Foundation's Todd Nagel Memorial Award ($25,000); the Melanoma Research Alliance's Jackie King Young Investigator Award ($225,000); the Karin Grunebaum Cancer Research Scholar Award ($36,000); and the Alexander Burdo Research Award ($50,000), given through the Sarcoma Foundation of America.

Ganem says that these awards, named for cancer patients or survivors, offer him inspiration and a sense of purpose. For instance, Jackie King was 19 when she discovered a mole on her back and was diagnosed with melanoma. She died in September 2014 at age 22. "Jackie was a remarkable young woman who fought courageously for three years," Ganem says. "She advocated tirelessly for the Sunscreen Innovation Act, which was passed by Congress in 2014, and she became an active member of the Melanoma Research Alliance. Her personal motto, "It's cancer's turn to be afraid," is a powerful and motivating message that I will never forget."

A version of this article originally appeared on the BU Research website.

Harvard Medical School

Frederick Wilson, MD, Ph.D., Instructor in Medicine, Harvard Medical School

Frederick Wilson is a new 2015 fellow with the Karin Grunebaum Cancer Research Foundation. He is a physician-scientist at Dana-Farber Cancer Institute whose research interests broadly include the study of resistance to targeted cancer therapies and the identification and characterization of genetic vulnerabilities in cancer. His efforts to date have focused on a functional genomic approach to understanding resistance to targeted therapies in non-small cell lung cancer.

A subset of non-small cell lung cancers harbor a genetic rearrangement involving a gene called *ALK*. These ALK-rearranged lung cancers are generally sensitive to oral therapies (such as crizotinib, ceritinib, and alectinib) which target the ALK rearrangement. Unfortunately, responses to these ALK inhibitors tend to be short-lived as cancers develop resistance to these treatments. An understanding of the mechanisms by which ALK-rearranged cancers develop resistance to ALK inhibitors could lead to the development of therapeutic strategies to improve the efficacy of ALK-directed therapies.

Dr. Wilson and colleagues recently published their findings from a large-scale functional genomic screen to identify genes capable of driving resistance to ALK inhibition in an ALK-dependent human lung cancer cell line (H3122). They introduced approximately 12,800 human genes into H3122 cells via lentiviral infection and assayed each gene for the ability to drive resistance to first- and second-generation ALK inhibitors including crizotinib and TAE684. 54 genes were identified that are each sufficient to rescue cell viability in the presence of an ALK inhibitor. These genes included members of previously recognized resistance pathways as well as novel resistance drivers. Among the latter were members of the P2Y purinergic receptor family of G-protein coupled receptors. P2Y receptors mediated resistance in part through a protein kinase C (PKC)-dependent mechanism. Moreover, PKC activation alone was sufficient to confer resistance to ALK inhibitors whereas combined ALK and PKC inhibition restored sensitivity. Dr. Wilson and colleagues observed enrichment of gene expression signatures associated with several resistance drivers (including P2Y receptors) in crizotinib-resistant ALK-rearranged lung tumors obtained from patients compared to treatment-naïve controls, supporting a role for identified resistance mechanisms in clinical resistance to ALK inhibition. This work was recently published in the scientific journal *Cancer Cell*

(http://www.cell.com/cancer-cell/fulltext/S1535-6108(15)00055-0

About the Newest Trustee

Adam Lerner, MD

I've studied the effect of pharmacologically manipulating a particular signaling pathway (Cyclic AMP) in malignant lymphoid cells to determine whether such drugs may be of benefit to patients with these illnesses. Most of my work has focused on the most common adult leukemia, chronic lymphocytic leukemia (CLL). This work has demonstrated that inhibiting the enzymes that normally break down cyclic AMP in CLL cells, we see as expected abnormally strong signaling by this intracellular signaling molecule. This in turn results in death of the leukemia cells and such effects are particularly dramatic if this class of drugs are combined with steroids, a class of drugs already known to have some activity in lymphoid malignancies like CLL but which are not a standard part of treatment for this leukemia. The class of enzymes that are normally most important in regulating cyclic AMP levels in CLL is called PDE4 (the fourth family of cyclic AMP phosphodiesterases that was discovered). Importantly, two different PDE4 inhibitors are now FDA approved drugs for other medical indications, raising the possibility that clinical trials could be designed to assess the effectiveness of PDE4 inhibitor therapy in CLL and other B cell lymphoid malignancies.

My second area of research concerns a protein which when over-expressed results in resistance of breast cancer cells to hormonal anti-estrogen therapies such as tamoxifen. The gene, variably called AND-34 or BCAR3, turns out to be a protein that binds to another well known protein, p130Cas, in epithelial cells (the sort of cells that breast cancers develop from) that regulates cell adhesion and motility. My lab was the first to discover the AND-34/BCAR3 gene (in mice) and the first to discover that this protein binds to p130Cas. Pour most recent work demonstrated that the presence of AND-34/BCAR3 in breast cancer cells turns on the activity of a very well known cancer related gene called Src. This activity may well underlie the ability of AND-34/BCAR3 to change formerly tamoxifen-sensitive breast cancers into tamoxifen-resistant breast cancers.

About the Karin Grunebaum Cancer Research Foundation

In June 1958, Karin Grunebaum, the 39 year-old mother of 4 and a loving wife, suddenly passed away from cancer only three months after giving birth to her youngest child. Because her pregnancy had masked the symptoms of the malignancy, the disease had already metastasized throughout her entire body by the time the cancer of unknown primary site was diagnosed. No one was able to determine the type of cancer which afflicted her. After Karin passed away, her husband, Fritz Grunebaum, established the Karin Grunebaum Cancer Research Foundation as a lasting memory to his beloved wife to help other families avoid this type of tragedy.

Accordingly, our Foundation is dedicated to the eradication of each and every type of cancer. When the Foundation was first established in the pre-computer days of 1958, it initially created a manual cancer registry at Salem Hospital in Massachusetts so that doctors and staff could review relevant medical information about other patients with similar cancers who had passed through that facility. Later, it was decided to "invest in people" instead of technology. In 1966, under Fritz's guidance, and with the help of Harvard Medical School, we started to fund cancer related research by 3rd year medical students at Harvard Medical School. At the beginning, we were only able to fund one researcher annually. But, by 1979, we were able to fund two researchers each year. Next, the Foundation established an annual Distinguished Speaker in Cancer Research Series, which was only discontinued when we started to fund two M.D./Ph.D cancer researchers at Boston University's School of Medicine every year in addition to the Harvard researchers.

In 2002, the Karin Grunebaum Chair in Cancer Research was established at the Boston University School of Medicine. This Chair, the first of its kind, is intended to be cross-disciplinary, so that cancers of whatever type can be properly studied and hopefully eradicated. In 2004, Dr. Douglas Faller, M.D., Ph.D., a Trustee of the Foundation and Head of the Boston University Cancer Center was selected to this Chair.

In 2005 the Foundation welcomed Massachusetts General Hospital to the Karin Grunebaum family of supported institutions – sponsoring clinical 2-year post-graduate surgical research Fellowships at the world-renowned pancreatic cancer laboratory of former Trustee Dr. Andrew Warshaw – the hospital's Surgeon-in-Chief.

In 2006 the Trustees decided that the fight against cancer could be more efficiently waged if the Foundation's funding was channeled to directly help cancer researchers who had already decided that cancer research was to be their life's work. Accordingly, the Foundation decided to annually sponsor projects by junior faculty members at Harvard Medical School and Boston University School of Medicine involved in clinical or translational cancer research, in addition to the ongoing sponsorship of a 2-year post-graduate surgical research Fellowships at Massachusetts General Hospital.

In 2011 the Trustees also started funding training programs for potential new cancer researchers at both Harvard Medical School and Boston University School of Medicine. At Harvard Medical School we annually sponsor the Fall Welcome Event, the Student data Club and the Seminar Speaker Lunch Series for medical students participating in the Biological and Biomedical Sciences Cancer Biology Area of Concentration. At Boston University, we sponsor the Karin Grunebaum Summer Research Fellowships which provides an opportunity for promising medical and college students to spend a summer working in the laboratory of a leading cancer scientist.

Today, after awarding over 85 fellowships in more than 50 years, we still award annual Fellowships to cancer researchers from Harvard Medical School and Boston University School of Medicine who are working towards a cure for this dreaded disease. Our Board of Trustees is unique in that it is comprised both of Karin's children and grand-children as well as world-renowned medical educators and cancer researchers, such as the Dean for Graduate Education at Harvard Medical School, the Dean and Provost of Boston University School of Medicine as well as former Fellows and other medical practioners who have distinguished themselves in the field of cancer research. And, as is our tradition since Fritz Grunebaum established the Foundation in 1958, the Trustees personally meet with each and every one of these outstanding Fellows to discuss their work and their hopes for the future of cancer eradication.

Today, after awarding over 85 fellowships in more than 50 years, we still award annual Fellowships to cancer researchers from Harvard Medical School and Boston University School of Medicine who are working towards a cure for this dreaded disease. Our Board of Trustees is unique in that it is comprised both of Karin's children and grand-children as well as world-renowned medical educators and cancer researchers, such as the Dean for Graduate Education at Harvard Medical School, the Dean and Provost of Boston University School of Medicine as well as former Fellows and other medical practioners who have distinguished themselves in the field of cancer research.

Your Support is Vital to our Mission

The KGCRF relies solely on private donations. In order to continue the fight we ask for your support and hope that you will give what you can.

Your tax-deductible contribution will directly help fund the cancer research effort, since all our Officers and Trustees are unpaid volunteers, and the Foundation has no paid employees.

I enclose my gift of:

❑ $50 ❑ $100

❑ $150 Other $ _____

Name: _____

Street Address: _____

City, State, Zip: _____

Country: _____

Telephone: _____

Email: _____

Please return to: KGCRF, 85 Sherman Street, # 8, Cambridge, MA 02140

You may also donate online at:

http://www.grunebaumfoundation.org/html/SupportContributions.asp

The Foundation's Mission and its chosen path to Mission Accomplishment.....

Because Karin Grunebaum died at age 39 from an unknown primary site malignancy, the overriding objective of the Karin Grunebaum Cancer Research Foundation is the eradication of all types of cancer. The Foundation's original Declaration of Trust, written in 1958, mandates that the Foundation's funds be exclusively used for "...aiding research in and study of the cause, treatment and cure of cancer."

The Foundation's Trustees firmly believe that the eradication of cancer will only occur through successful research accomplishments which are followed by successful practical/commercial application. Thus, the Foundation has chosen to invest its funds directly in dedicated cancer researchers in hope of helping them achieve significant accomplishments to eliminate all types of carcinomas and thereby eradicate each and every type of cancer.

KARIN GRUNEBAUM
cancer research foundation