

Center for Biomedical Research
Annual Report 2013-2014
Bradley J. Roth, Director, CBR
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Introduction

2013-2014 was a busy year for the Center for Biomedical Research. This annual report highlights our many successes and challenges. A special thanks goes to Chair of the Department of Biological Sciences Arik Dvir, who was interim director of the CBR in the winter 2014 semester while I was on sabbatical.

One highlight of the last year was the new external awards from the National Institutes of Health and the National Science Foundation. The goal of the CBR is to provide the infrastructure and support needed to obtain such grants. The successes of the last few years suggest that this goal is being met. You can read more about these success stories at the end of this annual report.

Budget

The budget indicates how the CBR supports biomedical research. Below I list the ways that CBR money (including the Research Excellence Fund) was spent.

| | |
|---|-----------|
| • REF awards | 133,700 |
| • Graduate student stipends | 81,698 |
| • Graduate student tuition | 41,990 |
| • Shared resources | 25,275 |
| • Confocal microscope | 25,000 |
| • Director stipend | 21,063 |
| • SUPER | 18,000 |
| • Gases/biosafety cabinet | 3407 |
| • Evolution of Morality conference | 2000 |
| • Travel to Sigma Xi Student Conference | 693 |
| • WISE@OU lunches | 514 |
| • CBR Festival | 418 |
| • Miscellaneous | 41 |
| | \$353,799 |

The source of these funds is the \$288,244 Research Excellence Fund plus the \$57,275 CBR operating account (total of \$345,519). Expenses were 2% more than income because we had some unspent carry-over from last year.

Graduate Student Support

The Center for Biomedical Research supported several graduate students this year from the Research Excellence Fund. The REF paid \$41,990 in tuition costs, and the Office of Research Administration covered the remaining tuition through the Graduate Research Assistant Tuition (GReAT) program (thanks to Vice Provost for Research Dorothy Nelson, and her Business Manager Jean Miao, for this support). The amount paid for stipends for the students was \$81,698, so that the total cost for graduate student support was \$123,688, or 35% of the total budget. The Research Excellence Fund provides support for up to two graduate students in the Medical Physics, the Health and Environmental Chemistry, and the Biological and Biomedical Sciences PhD programs.

Medical Physics graduate student Nicholas Charteris works with CBR member Evgeniy Khain, developing mathematical models of cancer cell migration. They published an article titled Modeling Chemotaxis of Adhesive Cells: Stochastic Lattice Approach and Continuum Description (New Journal of Physics, Volume 16, Article 025002, 2014). Medical Physics student David Kahn works with CBR member Yang Xia, studying the properties of cartilage. He was coauthor on a paper about the Topographical Variations of the Strain-Dependent Zonal Properties of Tibial Articular Cartilage by Microscopic MRI (Connective Tissue Research, Volume 55, Pages 205-216, 2014).

Health and Environmental Chemistry graduate student Jia Li performs research in the laboratory of CBR member Ferman Chavez. They published an article in Inorganic Chemistry titled Highest Recorded N-O Stretching Frequency for 6-Coordinate {Fe-NO}(7) Complexes: An Iron Nitrosyl Model for His(3) Active Sites (Volume 53, Pages 5414-5416, 2014). Li was also a coauthor on a paper in Inorganica Chimica Acta (Volume 405, Pages 295-301, 2013). Chemistry student Shi Chen works with Associate Professor Nesson Kerrigan. They published a paper about Phosphine-Catalyzed Asymmetric Synthesis of beta-Lactones from Disubstituted Ketenes and Aldehydes in the Journal of Organic Chemistry (Volume 79, Pages 4920-4929, 2014).

Graduate student Xiangrong Geng is in the Biological and Biomedical Sciences PhD program, working with CBR member Zijuan Liu (winter 2014 only). The Research Excellence Fund also supported, in whole or in part, students in the biology MS program for the winter semester, including Jonathan Bartkus, Sophia Chaudhry, Moumita Choudhury, Austin Fobar, Anoumid Vaziri, and Stephanie Verbeek.

REF Research Awards

A competition for Research Excellence Fund awards was held in the winter. Funding decisions were made by an ad hoc committee led by Arik Dvir (Biological Sciences), consisting of myself, Art Bull (Chemistry), Yang Xia (Physics), and Shravan Chintala (Eye Research Institute). The following faculty were supported:

| | | |
|-------------------|-------------------|-----------|
| Andrew Goldberg | ERI | \$16,160 |
| Ferman Chavez | Chemistry | 14,600 |
| Nessan Kerrigan | Chemistry | 15,000 |
| Amy Banes-Berceli | Biological Sci | 12,500 |
| Fabia Battistuzzi | Biological Sci | 11,440 |
| Chhabi Govind | Biological Sci | 15,000 |
| Shailesh Lal | Biological Sci | 12,000 |
| Mi Hye Song | Biological Sci | 15,000 |
| Doug Wendell | Biological Sci | 16,000 |
| Sumi Dinda | School Health Sci | 6,000 |
| Total | | \$133,700 |

In addition, the CBR recommended to Dean Chamra of the School of Engineering and Computer Science that he fund CBR member Jing Tang's REF request, which was favorably reviewed by the committee, from engineering's REF funds, which Dean Chamra did. The REF Research Awards represent 38% of the CBR budget.

These REF funds serve a variety of purposes. In some cases, they are greatly needed bridge funding to an established investigator between grants. In other cases, they augment scarce startup funds for promising new investigators, or catalyze new projects of more experienced mid-career scientists. In every case, they are stimulating external grant proposals, particularly proposals to the National Institutes of Health.

Shared Resources

The CBR provided \$25,275 for a variety of shared resources to support biomedical research on campus. 1) The Eye Research Institute maintains an Ocular Structure & Imaging Facility that includes a transmission electron microscope vital to many projects on campus. The CBR provided \$5500 to help support the cost of the annual maintenance contract for this instrument. 2) The Bennett Magnetic Resonance Facility needed a software upgrade in order to perform magnetic resonance imaging ultra-short echo experiments. The CBR provided the Department of Physics \$9100 for this upgrade. 3) The Department of Biological Sciences required a gel/western blot scanner to support several research projects. The CBR provided \$10,675 to purchase this instrument. In each case, the purchase represented a significant investment in the infrastructure needed to carry out biomedical research at OU.

In addition, the CBR provided \$25,000 to support the purchase of a confocal microscope, to be used by a variety of investigators and to be under the supervision of Assistant Professor Mi Hye Song of the Department of Biological Sciences. The full price of approximately \$330,000 was divided among the Office of the Provost, the CBR, the Department of Biological Sciences, and the startup package to Song. This cutting-edge instrument will significantly enhance OU's ability to do live-imaging confocal microscopy.

Other Major Budget Items

The CBR provided \$18,000 to support the Eye Research Institute's Summer Undergraduate Program in Eye Research (SUPER). Students supported in 2013 include Noor Tarabishy, Engy Alwasha, Mindy Cao, Mirna Awrow, Mark English, Camryn DeLooff, Melanie Gary and Paul Zlojutro.

As in past years, the CBR supported the purchase of liquid nitrogen, carbon dioxide and other gasses, and recertification of biosafety cabinets in the Departments of Biological Sciences and Chemistry, totaling \$3407.

Over the last several years, the Department of Psychology has organized a series of conferences that have brought researchers from throughout the country to Oakland University. In 2012 the conference topic was the Evolution of Sexuality, and in 2013 it was the Evolution of Violence. On March 27, 2014 the Evolution of Morality Conference was held at Meadow Brook Hall. The conference showcased the MS and PhD programs in the Department of Psychology, as well as OU faculty. The CBR provided \$2000 to support this event.

Each year the Oakland University chapter of Sigma Xi sends one or two students to the Sigma Xi Student Research Conference. In the fall of 2013, five students applied for Sigma Xi support to attend the meeting on November 8-9 in Research Triangle Park, North Carolina. Rather than having to choose among these outstanding students, OU Sigma Xi chapter president and CBR member Shailesh Lal put together a coalition that provided funds for all five: Mirna Awrow, Anais Brown, Claudiu Harta, Tara Patrick, and Iva Sinamati. The CBR, part of the coalition, provided \$693 for Brown's travel.

The Women in Science and Engineering at Oakland University (WISE@OU) program, funded by an ADVANCE grant from the National Science Foundation and led by PI Kathy Moore, has been supporting the recruitment, retention, and career development of women and under-represented populations in the disciplines of science, technology, engineering and math (STEM). The CBR serves as a partner with WISE@OU (www.oakland.edu/advance), and provided \$514 for two luncheons in the fall of 2013, one welcoming new STEM faculty to campus, and one providing a chance for young faculty to talk with grants officer Bonnie Kwit.

After a one-year hiatus, the CBR/Sigma Xi Research Festival was held on March 24, 2014 in Oakland Center, just before the Sigma Xi Annual Lecture by Dr. Diandra Leslie-Pelecky. Posters by outstanding OU undergraduate and graduate students doing biomedical research were shared with OU faculty and visitors. The CBR provided \$418 for food and advertisement costs associated with the festival. The top three posters received awards, which went to Cameron Atkinson (Biological and Biomedical Sciences PhD student), Ji Hyun Lee (Medical Physics PhD student), and Sophia Chaudhry (Biology MS student).

CBR Activities

The CBR takes part in many activities meant to support biomedical research at Oakland University. In October, Michael and Elizabeth Kenny visited OU to attend the OUAA 19th Annual Alumni Awards Banquet, where Michael Kenny received an

award. Before the banquet, the Kennys toured the laboratory of Assistant Professor Sanela Martic, and met with Martic's undergraduate student Hanna Trzeciakiewicz, the current holder of the Michael P. and Elizabeth A. Kenny Merit Scholarship for the Sciences, who studies Alzheimer's disease. I participated in their visit, along with Chemistry chairman Art Bull and College of Arts and Sciences dean Kevin Corcoran.

The News section of the CBR website (www.oakland.edu/cbr) highlights the accomplishments of OU biomedical researchers. The CBR also has a Facebook page ("Oakland University Center for Biomedical Research") where you can keep up with the latest events and announcements. I maintain these websites to increase the visibility of OU biomedical researchers and to highlight the accomplishments of OU faculty and students. This resource is useful for anyone wanting to learn what biomedical research activities occur at OU.

The requirements for membership in the CBR are 1) at least an average of one biomedical publication per year over the last three years, 2) either current external support for research or at least one biomedical grant proposal per year over the last three years, and 3) at least one year working at OU. The full list of members can be found at the CBR website. This year, two faculty members from the School of Engineering and Computer Science, Assistant Professors Jing Tang and Wenjin Zhou, were added as new members of the CBR.

I am continuing as a member of the leadership team for WISE@OU, which I consider to be an extension of the CBR director duties. WISE@OU had an active year, including several lunches for young STEM faculty, and four workshops co-hosted by the Center for Excellence in Teaching and Learning (CETL). A poster titled "Engaging New STEM Faculty: A Cohort Model" was presented by the WISE@OU leadership team at the Michigan Academy of Science, Arts & Letters Conference held at OU on February 28, 2014. Other activities of WISE@OU include presenting a workshop about preparing applications for a University Research Committee Faculty Fellowship, hosting a webinar about the NSF CAREER award for young faculty, assisting in the visit to OU of NSF program director Evelyn Goldfield, leading a joint WISE@OU/Sigma Xi discussion about interdisciplinary research at OU, and submitting a paper about Mentoring Early-Career STEM Faculty to the 2014 Annual Mentoring Conference to be held at the University of New Mexico in October.

On Nov. 15, OU's graduate student organization Grad Connection, led by George Corser, presented a panel discussion about How To Get Published. CBR member Michael Sevilla and I were the panel members. You can see a video of this event at <http://gradconnection.weebly.com/videos-and-photos.html>. I also served on a Grad Connection panel that talked about How To Write a Successful Grant Proposal on June 20.

I worked with Graeme Harper, Dean of the Honors College, assisting him in the preparation of an over two-million-dollar proposal to the Department of Education to fund mentoring activities to support women in the sciences and engineering. I also reviewed a couple of proposals as part of the CBR pre-peer review process.

Biomedical Research at Oakland University

News about achievements of OU biomedical researchers and events can be found in the News Archive of the CBR website. Some highlights include:

- Hypaitia Rauch, a recent graduate of the Master of Science in Biology program mentored by CBR member Shailesh Lal, was awarded Oakland University's 2013 Outstanding Thesis Award. Her thesis was titled Comprehensive Analysis and Evolutionary Conservation of Alternative Splicing Events of Plant Arginine/Serine-Rich (SR) Proteins.
- Distinguished Professor Michael Chopp, of the Department of Physics, won the 2014 Abraham White Scientific Achievement Award. Chopp performs his research at Henry Ford Hospital, and received the honor for his discovery of the role of thymosin beta4 in the treatment of brain injuries and neurodegenerative diseases.
- Biology major Iva Sinamati received an award for her presentation at the Sigma Xi Student Research Conference in Research Triangle Park, North Carolina. Sinamati works with Assistant Professor Fabia Battistuzzi, of the Department of Biological Sciences, on evolutionary biology.
- In August, the Oakland University William Beaumont School of Medicine opened an anatomy laboratory on the 3rd floor of Hannah Hall of Science.
- OU Systems Engineering graduate student Avinash Konkani was named Professional of Month in the August-2013 issue of TechNation Magazine.
- Undergraduates Nada Sitto and Lisa Shammass were awarded Early Career Forum Travel Awards from The Endocrine Society. They presented their research at ENDO-13, The Endocrine Society's 95th Annual Meeting and Expo in San Francisco.
- Graduate student Deepa Talreja, of the Biological and Biomedical Sciences PhD program, was awarded second prize in the Dr. Raniyah Ramadan Foundation Young Investigator Award in Microbiology competition. The award arises from an abstract Talreja submitted at the Association for Research in Vision and Ophthalmology (ARVO) 2013 annual meeting. Talreja works in the laboratory of Associate Professor Satish Walia.
- Oakland University undergraduate Alexandra Zetye received honorable mention in the 2014 Barry Goldwater Scholarship and Excellence in Education Program competition.

Particularly noteworthy were the successes of OU biomedical researchers who received external grants. One type of award that gets less notice is a subcontract, yet they represent a significant fraction of external awards to OU. Some examples of active subcontracts to do biomedical research are:

- CBR member Xiangqun Zeng has a subcontract to a NIH grant in collaboration with Andrew Mason from Michigan State University, to develop wearable sensors for environmental pollutant monitoring.

- CBR member Shailesh Lal has an ongoing project funded by NSF in collaboration with Volker Brendel of Indiana University to study the plant transcriptome.
- CBR member Brad Roth, of the Department of Physics, obtained a subcontract through Vanderbilt University for a grant from NIH to examine the optimal design of challenge-response experiments in cardiac electrophysiology.
- CBR member Mohammad Reza-Siadat, of the Department of Computer Science and Engineering, collaborates with Dr. Ananias Diokno of Beaumont Health Systems, who is PI on a NIH grant to develop a urinary continence index for prediction of urinary incontinence in older women.

Several OU researchers became Principal Investigators on new external awards this year.

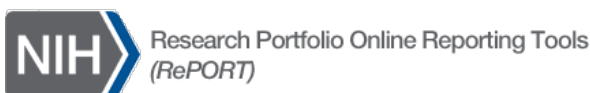
- CBR member Zijuan Liu received a supplement to her National Institutes of Health grant for \$11,147 to support a summer undergraduate student.
- Assistant Professor Mi Hye Song, of the Department of Biological Sciences, received a \$200,000 grant from the National Institutes of Health to support her research using the *C. elegans* embryo as an in-vivo model to study centrosome assembly.
- Professor Gopalan Srinivasan, of the Department of Physics, was awarded a three-year \$345,000 grant from the National Science Foundation to develop technologies to study magnetocardiography and magnetoencephalography.
- CBR member Libin Rong, of the Department of Mathematics and Statistics, was awarded a five-year, \$400,060 CAREER grant from the National Science Foundation, titled Virus Infection and Immune Responses: Modeling, Analysis and Implications.
- CBR member Gerard Madlambayan, of the Department of Biological Sciences, was awarded a grant from the National Institutes of Health to study how endothelial cell activation regulates acute myeloid leukemia growth and relapse. The three-year project started February 4, and has a total funding of \$429,874
- CBR member Dao Qi Zhang, of the Eye Research Institute, received an award from the National Institutes of Health to investigate the functional organization of the retinal dopaminergic network. The grant has a total funding of 1.8 million dollars.

Given that NIH and NSF funding continues to be extremely competitive, we celebrate these accomplishments of OU faculty, especially the large awards to CBR members Rong, Madlambayan, and Zhang. Rong and Zhang both received CBR funding recently. Our plan seems to be working: using REF funding through the CBR to catalyze external awards from NSF and NIH. The award to Libin Rong was a CAREER grant, one of the most prestigious types of grants awarded by the National Science Foundation.

Although our focus tends to be on new awards, OU continues to benefit from three long-term NIH-funded researchers--CBR members Frank Giblin (ERI), Michael Sevilla (Chemistry), and Yang Xia (Physics)--who supervise laboratories and publish prolifically. The success over the last several years of young faculty from the Department of Biological Sciences in obtaining NIH funding has been particularly impressive. Gerard Madlambayan joins Lan Jiang, Zijuan Liu, Chhabi Govind, Susmit Suvas, and Mi Hye Song as early-career faculty currently holding major NIH grants. The Department of Biological Sciences Chair, Arik Dvir, was instrumental in building the environment that allowed these young faculty to flourish. Also, I must thank him again for directing the CBR during my sabbatical: he ably supervised the REF awards and the CBR festival, among other duties.

"The times they are a changing." The CBR continues to prosper under interim President Betty Youngblood, new Provost James Lentini, new Dean of the College of Arts and Sciences Kevin Corcoran, and new Associate Dean of CAS Anne Hitt. We look forward to a new president this year, as we continue to move biomedical research forward at Oakland University.

Brad Roth



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|--------------------------|---|-----|----------|------|--|---|-------------------------------|--------------|-------|----------|------------|---------------------|------------------|
| <input type="checkbox"/> | 2 | R01 | EY002027 | 35 | PROTEINS OF NORMAL AND CATARACTOUS LENSES | GIBLIN, FRANK JOSEPH | OAKLAND UNIVERSITY | 2012 | NEI | NEI | \$431,377 | (E) | |
| <input type="checkbox"/> | 5 | R01 | GM095514 | 03 | MECHANISMS OF RSC RECRUITMENT AND ITS ROLE IN TRANSCRIPTION | GOVIND, CHHABI KUMAR | OAKLAND UNIVERSITY | 2013 | NIGMS | NIGMS | \$266,472 | (E) | |
| <input type="checkbox"/> | 1 | R15 | GM100369 | 01A1 | THE DROSOPHILA EXPANSION GENE CONTROLS TRACHEAL TUBE DIAMETER | JIANG, LAN | OAKLAND UNIVERSITY | 2013 | NIGMS | NIGMS | \$324,338 | (E) | |
| <input type="checkbox"/> | 3 | R15 | ES022800 | 01S1 | ROLE OF SLC39A8 (ZIP8) IN SELENITE TRANSPORT | LIU, ZIJUAN | OAKLAND UNIVERSITY | 2014 | NIEHS | NIEHS | \$11,147 | (E) | |
| <input type="checkbox"/> | 1 | R15 | ES022800 | 01 | ROLE OF SLC39A8 (ZIP8) IN SELENITE TRANSPORT | LIU, ZIJUAN | OAKLAND UNIVERSITY | 2013 | NIEHS | NIEHS | \$422,803 | (E) | |
| <input type="checkbox"/> | 5 | U79 | SM060542 | 02 | GRIZZLIES RESPONSE: AWARENESS & SUICIDE PREVENTION (GRASP) AT OAKLAND UNIVERSITY | MACDONALD, MICHAEL | OAKLAND UNIVERSITY | 2013 | CMHS | | | | |
| <input type="checkbox"/> | 1 | R15 | CA182889 | 01 | ENDOTHELIAL CELL ACTIVATION REGULATES AML GROWTH AND RELAPSE | MADLAMBAYAN, GERARD JAMES | OAKLAND UNIVERSITY | 2014 | NCI | NCI | \$429,874 | (E) | |
| <input type="checkbox"/> | 5 | R01 | CA045424 | 27 | MECHANISMS FOR RADIATION DAMAGE TO DNA: LET EFFECTS | SEVILLA, MICHAEL DOUGLAS | OAKLAND UNIVERSITY | 2014 | NCI | NCI | \$197,562 | (E) | |
| <input type="checkbox"/> | 7 | R15 | GM101633 | 02 | REGULATION OF CENTROSOME ASSEMBLY BY PHOSPHORYLATION | SONG, MI HYE | OAKLAND UNIVERSITY | 2012 | NIGMS | NIGMS | \$211,682 | | |
| <input type="checkbox"/> | 5 | R01 | EY022417 | 02 | CORNEAL NEUROPEPTIDES AND HERPETIC STROMAL KERATITIS | SUVAS, SUSMIT | OAKLAND UNIVERSITY | 2014 | NEI | NEI | \$353,239 | (E) | |
| <input type="checkbox"/> | 5 | R01 | AR052353 | 05 | ADAPTABILITY OF ARTICULAR CARTILAGE TO EXTERNAL LOADING BY MICROSCOPIC IMAGING | XIA, YANG | OAKLAND UNIVERSITY | 2013 | NIAMS | NIAMS | \$422,505 | (E) | |
| <input type="checkbox"/> | 1 | R01 | EY022640 | 01A1 | FUNCTIONAL ORGANIZATION OF THE RETINAL DOPAMINERGIC NETWORK | ZHANG, DAO-QI | OAKLAND UNIVERSITY | 2014 | NEI | NEI | \$329,052 | (E) | |