

Center Name:

Center for Cancer Disparities Research

Director:

Archana J. McEligot, PhD, Professor

College of Health and Human Development

Department of Health Science

Location:

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Year Established: 2006

Year of Last Review: 2015

Date Submitted: 3/15/18

2. Mission and Goals:

Mission: The mission of CCDR is to promote scholarship and creative activities to improve the cancer-related health and well-being of ethnic minorities and other underserved populations.

CCDR goals are to:

- Advance interdisciplinary, cancer-related research;
- Educate and Train students and faculty on preventative measures;
- Raise community awareness about cancer and cancer prevention;
- Raise public awareness about cancer through educational workshops and events.

University, Department/College Level Goal Alignment:

CCDR scholarly, educational and collaborative activities directly align with all four CSUF Strategic Plan Goals, as well as with the College of HHD, and Health Science goals of excellence in programs, student success and scholarship. In terms of the following CSUF Strategic Goals, CCDR goals align clearly with:

Goal 1: Develop and maintain a curricular and co-curricular environment that prepares students for participation in a global society and is responsive to workforce needs.

CCDR, via external funded activities, has developed several curricula and created co-curricula environments that prepare students to understand the multidisciplinary aspects, particularly dietary, nutrition, genetics, in-vitro and in-vivo factors associated with disease etiology, intertwining a data-driven focus to more comprehensively and uniquely understand and tackle preventative measures that influence cancer and co-morbid disease outcomes.

Goal 2: Improve student persistence, increase graduation rates University-wide, and narrow the achievement gap for underrepresented students.

A key goal for CCDR is to specifically train under-represented students, and mentor them through research processes from collecting data, analyzing to data presentation. But, ultimately, the goal is to provide mentorship for student success via fellowship and employment placement, and subsequently graduation and graduate school entrance.

Goal 4: Increase revenue through fundraising, entrepreneurial activities, grants, and contracts.

CCDR, and it's director, as well as member faculty continue to pursue external funding via NIH and other funding opportunities.

3. Activities: What activities took place in the most recent three-year period?

Research Activities:

Melanoma and Gender Disparities: In collaboration with UCI faculty, we investigated the role of epigenetics and gender disparities with melanoma. Three under-represented students, two undergraduates and one graduate student, collaborated with faculty on both in-vitro, as well as population-based design to more clearly understand melanoma etiology. In-vitro investigations involved collecting hair root samples (approximately 12 strands each) from males (n = 4) and

females (n = 2) aged 18 to 24. Two cell lines were established from the hair roots (one from a male and one from a female). Initial observations show the cells growing from the hair bulb region, forming spheroid structures in the neural crest stem cell (melanocytes precursor cells) media. Further characterizations are required for these stem-like cells. Population-based analyses included assessing UV exposure with melanoma via accessing world-wide data on melanoma and analyzing gender disparities, as well as UV influence on global gender disparity rates.

Melanoma in Young Adults. We also investigated gender-related melanoma risk factors, as well as other at-risk groups and risk factors among young adults. A total of 165 young adults enrolled at a major comprehensive university completed a self-reported skin cancer risk questionnaire, as well as fitness testing (n = 102 completed the testing). Females (~60% female, average age of 20) significantly scored higher on risk items, such as tanning characteristics and burning easily; for overall risk, females nearly had significantly higher scores than males. Females were also more likely to frequently sunbathe in the summer and make an effort to protect their skin while in the sun. Controlling for factors such as ethnicity, age, family history, and fitness show similar associations though not as significant. Study findings identify unique factors and behaviors among young females and help elucidate factors that may be related to gender disparities in melanoma rates among young adults.

Diet, DNA Repair and Breast Cancer Risk. A long-standing research area via CCDR is the examination of diet, a known cancer protective factor, and its role in breast cancer etiology. In addition to dietary intakes, genetics and genetic polymorphisms also influence carcinogenesis. Multiple investigations in this broad area of diet, nutrigenetics and cancer risk have been conducted, but specifically, we studied the influence of interactions between circulating serum folate levels and five tagging SNPs in the XRCC3 DNA repair gene, on overall survival after breast cancer diagnosis. Participants were post-menopausal women diagnosed with breast cancer (n = 479) between 1994 – 1995. The Illumina BeadLab 1000 SNP genotyping system was used for genotyping. Serum folate was measured by isotope-dilution LC/MS/MS. In the separate Cox proportional multivariate hazards models [controlled for disease stage, age at diagnosis, body mass index (BMI), parity, ER/PR status, alcohol use, vitamin use and energy intake], we found that the rs861531 XRCC3 loci was significantly (p = 0.03; HR: 1.64, CI: 1.1 – 2.5) associated with a 65% increased risk of dying. Compared to the models with the dietary biomarker and the XRCC3 loci alone, the hazards ratio for the model with both the dietary biomarker (p = 0.09; HR: 0.53, CI: 0.25 – 1.1) and the rs861531 loci (p = 0.03; HR: 1.65, CI: 1.1 – 2.6) were not substantially influenced. These data suggest that circulating folate levels and XRCC3 polymorphic variant rs861531 have independent effects on overall survival after breast cancer diagnosis, with increased folate concentrations improving overall survival, while the recessive allele for rs861531 reducing overall survival after breast cancer diagnosis.

Big Data and Data Science. The advent of big data and data science has tremendously augmented the scope of research, particularly cancer research via new technologies, modern statistics, and open-access databases. Therefore, via the broader umbrella of the Big Data, Discovery and Diversity through Research Education, Advancement and Partnerships (BD3-REAP), we have explored preventive cancer risk factors, particularly dietary intakes via large

open-source datasets, specifically the National Health and Nutrition Examination Survey (NHANES). Dietary intakes including dietary folate, circulating folate concentrations, as well as other macro/micronutrients related to cancer risk are currently being examined via traditional and modern statistical techniques.

Student Engagement:

A majority of student training and curricula development activities for CCDR are currently under the broader umbrella of externally funded projects, particularly, BD3-REAP. The BD3-REAP program completed activities/objectives towards meeting the following objective: underrepresented student engagement, outreach and research education experience. For recruitment, we developed brochures, fliers and outreached to students via e-mail, telephone, one-on-one interactions, inter-department correspondence and in-person class visitations in the Health Science (HESC), Mathematics (MATH) and Biology (BIO) departments.

As part of our student engagement activities for BD3-REAP, we outreached and presented to a total of 13 CSUF freshman and sophomore classes [4 Health Science (144), 6 Math (n = 120), 3 Biology (n = 124)] with 58%, 25% and 18%, respectively, completing interest forms. We followed-up via e-mail with interested students and a total of 25 completed an application consisting of academic performance, a narrative on Big Data science interest, as well as a personal statement. BD3-REAP faculty rank ordered the 25 applicants, selecting the top 15 underrepresented students to interview and based on the in-person interviews and assessments, six students (referred to as BD3 Scholars) were selected to enter the program.

Research rotation activities for BD3 Student-Scholars included Rotation 1 with Dr. Cuajungco from Biology: For the initial rotations, Dr. Cuajungco hosted six BD3-REAP scholars in his research laboratory in order for the cohort to be familiar with the process of how Big Data in the field of genomics are created. Rotation 2 Activities: Dr. McEligot's rotation consisted of becoming more familiar with epidemiologic data types, specifically dietary data via the large on-going open-source NHANES. Students were introduced to NHANES study design, data collection procedures, the various data types and variables, and the potential correlation with disease risk. Rotation 3 Activities: Interweaved with these two research areas, Dr. Behseta has tried to convey the ideas behind sound statistical approaches for BDs analyses. As such, Dr. Behseta has helped them with R programming, and has guided them initially and preliminarily on statistical modeling of their data analytical projects.

Community Engagement:

Dr. McEligot has been advisor to the student club/organization Colleges Against Cancer, which has participated in engaging the student and local community on cancer awareness via several fund-raising activities in partnership with the American Cancer Society (ACS). One of the major programs via CCS and ACS collaboration is Relay for Life. In 2017, CCS was successful in organizing at least 25 teams to participate in Relay for Life and had raised at least \$5,000 for ACS programs, including awareness and research.

4. Organizational Structure and Governance:

The primary organizational structure includes the director, as well as its participating members, and affiliated faculty via the externally funded programs. Although CCDR does not have a specific designated advisory board (due to budgetary constraints), the externally funded programs and activities do engage advisory board members to solicit input on program activities,

specifically research and student engagement. The BD3-REAP Advisory Board consists of 11 BD3-REAP members from three departments at CSUF, and the following Advisory Board members: Dr. Katherine Powers Ph.D., Director of Graduate Studies- CSUF; Dr. Valerie Poynor Ph.D., Mathematics- CSUF; Dr. Trina M. Norden- Krichmar Ph.D., Epidemiology- UCI; Dr. Dominique Duncan Ph.D., Neurology- USC and Brenda Gutierrez, MPH Student- CSUF. BD3-REAP program overview, student research experiences, student selection, curricula, student career pathways and faculty training were presented and discussed.

5. Resources and Sustainability:

The primary activities conducted via the center are primarily via externally funded programs and faculty/student-centered activities, but currently no funds are provided to the center via any of the external funds listed below:

Externally Funded Grants:

- 07/01/16 – 06/30/17 Principal Investigator. Big Data Discovery & Diversity through Research Education Advancement & Partnerships (BD3-REAP) SUPPLEMENT, NIH/NIMHHD. \$155,550
- 09/25/15 – 06/30/20 Principal Investigator. Big Data Discovery & Diversity through Research Education Advancement & Partnerships (BD3-REAP), NIH/NIMHHD. \$1,021,329
- 09/01/13 – 09/01/15 Principal Investigator. Molecular and Epigenetic Mechanisms of Gender Disparities in Early Onset Melanoma, UCI/ Allan Hubbell Research and Education Fund. \$50,000
- 08/15/11 – 08/14/14 Principal Investigator. Increasing Workforce Diversity: Training Hispanic Students to Address Childhood Obesity and Nutrition, USDA/NIFA. \$277,500

Faculty Affiliated with the Center:

Archana McEligot, Ph.D., Professor, Dept. of Health Science; **Laura Chandler, Dr.PH., MPH**, Assistant Professor, Dept. of Health Science; **Jasmeet Gill, Ph.D.**, Professor, Dept. of Health Science; **Michele Mouttapa, Ph.D.**, Professor, Dept. of Health Science; **Tu-Uyen Nguyen, Ph.D.**, MPH, Professor, Dept. of Asian American Studies; **Sora Park Tanjasiri, Dr.PH., MPH**, Professor, Dept. of Health Science; **Diana M. Tisnado, Ph.D., MPA**, Associate Professor, Dept. of Health Science; **Alice Lee, Ph.D.**, Assistant Professor, Dept. of Health Science.

Space and Other Resources:

Space in KHS 106D is partially available for CCDR activities, and graduate assistants assigned to Dr. McEligot have been available to assist with CCDR activities, including website development. No assigned time for the director has been provided, and/or any other types of funding for center activities; therefore, assigned time and/or other initial start-up sources of funding may promote sustainability and more robust, cancer-focused activities, including workshops, special seminary and collaborations with UCI and other institutions.

6. Highlights and Accomplishments:

The primary impact for CCDR is related to conducting research, but importantly providing educational and research opportunities to underrepresented students via its externally funded programs. Several student research experiences have culminated in research poster presentations, manuscript publications, and subsequent entry into graduate programs, fellowships and employment in the nutrition, cancer and/or public health fields, such as the California EIS Fellowship, Program Coordinator for ACS, acceptance to Columbia, UC Berkeley and UC Merced graduate programs and employment with the Sacramento Public Health – Health and Human Services Department.

Selected Presentations/Publications:

McEligot AJ, Gonzalez E, Chandler C. & Espinoza A. Comidas y Comunidades Saludables: Best Approaches for Training Diverse Students in Nutrition and Childhood Obesity. c, Santa Barbara, CA, February 2015

Haro Isidro M, McEligot AJ, Bell S, Chandler L, Gonzalez E, Tran, N, Pillazar L. Multidisciplinary training on obesity, policy and the built environment increases knowledge, community engagement, and partnerships. Agri-science Education for the 21st Century: Diversity, Access, and Success. Washington D.C., November 2014

Diaz M, Washington A, Garcia, A, Liu F, McEligot A. Establishing Gender Differentiated Cell Lines and Early Onset Melanoma. 17th Annual Chao Family Comprehensive Cancer Center Scientific Retreat, November 2014, Palm Springs, CA.

McEligot AJ, Gonzalez E, Chandler L, Bell S, Haro Isidro M, Tran N, Pillazar L & Kaiser L. Obesity and nutrition education, integrating structural factors, increases knowledge and applied learning FASEB J 29:910.3, Experimental Biology, Boston, MA, April 2015

Arce A, Liu-Smith, F, Farhat AM, Taylor T, Ziogas A, Wang Z, Yourk V, Liu J, Wu J, McEligot AJ, Anton-Culver H, and Meyskens FL. Gender Difference in the Association of Melanoma Etiology to UV Exposure. 2015 CSUF Student Creative Activities and Research Day, April 2015, Fullerton, CA

McEligot AJ, Steinberg F, Kaiser L, Chandler L, Pillazar P. Factors associated with pursuing nutrition careers and increased knowledge in diverse students. 2015 North American Colleges and Teachers of Agriculture Conference, June 2015, Atlanta, GA.

McEligot AJ, Ziogas A, Pfeiffer CM, Fazili Z, Anton-Culver H (2015). The association between circulating total folate and folate vitamers with overall survival after postmenopausal breast cancer diagnosis. *Nutr Cancer*, 67, 442-8

McEligot, A.J., Behseta, S., Cuajungco, M., Van Horn. J.D., Toga, A.W. (2015). Wrangling Big Data Through Diversity, Research Education and Partnerships. *California Journal of Health Promotion*, 10, vi-ix.

Liu-Smith F, Farhat AM, Arce A, Ziogas A, Taylor T, Wang Z, Yourk V, Liu J, Wu J, McEligot AJ, Anton-Culver H, Meyskens FL (2016). Sex differences in the association of cutaneous melanoma incidence rates and geographic ultraviolet light exposure. *J Am Acad Dermatol*, 76 (3), 499-505. doi: 10.1016.