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Strengthening Cancer Biology Research, Prevention, and Control while Reducing Cancer Disparities: Student Perceptions of a Collaborative Master's Degree Program in Cancer Biology, Preventions, and Control

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Abstract

This article provides the findings of a survey of previous and current students in the UDC/GU-LCCC master's degree program. This master's degree program, Cancer Biology, Prevention, and Control is administered and taught jointly by faculty of a Minority Serving Institution, the University of the District of Columbia, and the Lombardi Comprehensive Cancer Center to incorporate the strengths of a community-based school with a research intensive medical center. The program was initiated in 2008 through agreements with both University administrations and funding from the National Cancer Institute. The master's degree program is 36 credits with a focus on coursework in biostatistics, epidemiology, tumor biology, cancer prevention, medical ethics, and cancer outreach program design. For two semesters during the second year, students work full-time with a faculty person on a laboratory or outreach project that is a requirement for graduation. Students are supported and encouraged to transition to a doctoral degree after they obtain the master's and many of them are currently in doctorate programs. Since the inception of the program, 45 students have initiated the course of study, 28 have completed the program, and 13 are currently enrolled in the program. The survey was designed to track the students in their current activities, as well as determine which courses, program enhancements, and research experiences were the least and most useful, and to discern students' perceptions of knowledge acquired on various aspects of Cancer Biology Prevention, and Control Master's Program. Thirty of the 35 individuals to whom email requests were sent responded to the survey, for a response rate of 85.7 %. The results of this study will inform the strengthening of the Cancer Biology program by the Education Advisory Committee. They can also be used in the development of comparable collaborative master's degree programs designed to address the significant disparities in

prevalence of cancer, low screening awareness, and access to and outcomes of cancer prevention and treatment services. This, in turn, will contribute to the elimination of the dearth of underrepresented minority scientists who address these disparities. By far, the students were satisfied with the program and believe that it has had significant impact on their ability to contribute to cancer prevention and control. They provided both general and specific recommendations to strengthen the program.

Keywords

Cancer biology research; Cancer control; Cancer prevention; Underrepresented minorities; Master's degree program

Background

The partnership between the Georgetown University Lombardi Comprehensive Cancer Center (GU-LCCC), a Comprehensive Cancer Center (CCC), and the University of the District of Columbia (UDC), a minority serving institution (MSI), was initiated in 2000 to focus on the urgent need to address the significant disparities in the prevalence of cancer, low screening awareness, and access to and outcomes of cancer prevention and treatment services. A paramount priority of the partnership is the elimination of the dearth of underrepresented minority scientists, which is considered a factor in health disparities. The UDC/LCCC partnership created several mechanisms to address this problem, including offering research opportunities for UDC students in laboratories at LCCC, providing cancer education to several community-based organizations, and generating undergraduate cancer courses for UDC students. With funding from a planning grant from the National Cancer Institute, the partnership initially focused on cancer research education at the undergraduate level, developing and offering two new courses—Tumor Biology, and Cancer Outreach.

In 2004, the partnership initiated a master's degree program entitled "Cancer Biology, Prevention, and Control" in order to expand the representation of underrepresented minorities among researchers as well as those engaged in cancer biology, prevention, and treatment. The program, partially supported by NIGMS Grant #5R25GM075360-07, was designed to take advantage of the particular value-added of both GU-LCCC and UDC, and in doing so, ensures that graduates of the master's degree program have gained knowledge and skills in both cancer biology and outreach [1]. The two schools are part of the Washington and Baltimore University Consortium Agreement, which permits students at one university to take classes at another at a cost reduction.

This master's program is a 2-year, 36-credit program through which students with a previous bachelor's degree in biology or another science take classes both at UDC and GU-LCCC and complete research internships at the GU-LCCC. In addition to the academic coursework, the program includes lectures and forums at which nationally and internationally renowned scientists lecture; the opportunity for students to participate in research with noted scientists at GU-LCCC and UDC; and student participation in cancer-related workshops and other events that abound in the Washington DC area. The program also offers support services to students, including mentoring and tutoring. The master's degree is awarded through the

UDC Department of Biology, Chemistry, and Physics. Demographically, the students in the program reflect the broader student body of UDC, who, in turn, is reflective of the predominately African–American population of Washington, D.C.

The goal of the master’s degree program is to educate students as master-level cancer researchers who have the capacity to conduct research in cancer biology, prevention, and control, or to further advance their education by pursuing doctoral studies. The specific objectives of the master’s program include (a) to enroll and graduate approximately five students per year, where year 1 is dedicated to coursework and year 2 is research oriented and (b) to obtain funding for this degree program through grant support. The graduates of the master’s program are best suited for translating basic science knowledge into cancer prevention and control practices [1]. There are not many programs in cancer or tumor biology that also focus on cancer outreach. We also have not been able to find a similar master’s level program in which both components are emphasized, and none that also focuses on both reducing cancer disparities and addressing the dearth of underrepresented minorities in cancer research, prevention, and treatment. This is a barrier to making comparisons with other master’s degree programs.

Since the inception of the program, 45 students have initiated the course of study, 30 have completed the program, and 13 are currently enrolled in the program. Administrators and faculty at both participating universities have expressed the viewpoint that the master’s program in Cancer Biology, Prevention, and Control between the UDC and the LCCC has been beneficial to both institutions. The program’s unique character is reflected in its philosophy “the best cancer prevention and control researchers are those with a sound understanding of cancer biology. It provides the rigor of cancer biology. It provides the rigor of cancer biology and the compassion and focus of cancer research” [1]. In order to discern the viewpoints of students, in April 2012, GU-LCCC and UDC initiated a survey of those who were currently enrolled or had completed the program. The research questions were: What is the perception of current and former students of the GU-LCCC master’s degree program with respect to its usefulness and objectives? What are the insights of current and former students of the GU-LCCC master’s degree program with respect to specific aspects of the program?

Methods

This cross-sectional survey used a mixed-method approach to discern the viewpoints of the students. The convenience sample selection process was used: only students who had been enrolled in the program and for whom an email address was available were included. The survey was based on the phenomenological approach; that is, the students were self-reporting their “lived experience” with the program [2]. The approach was adapted for purposes of the study to include open-ended and close-ended questions, but did not include objective assessments for example of knowledge. Rather, the respondents self-reported their knowledge prior to and after the program. The survey included 26 questions in four categories: (a) demographics, (b) participation in the program, (c) self-reported pre-and post-program knowledge, (d) perceptions of advantages of the program, and (e) other comments. The items were both close-ended and open-ended. The questionnaire was designed by the

Director of Program Evaluation Research and reviewed by the PI and Co-PI. It was uploaded to Survey Monkey, an online survey program that both facilitates completion by respondents and helps to ensure anonymity.

All graduates of, and second year current students enrolled in, the master's program for whom email addresses were available were sent an email at the end of the Spring 2012 semester requesting their participation in a survey regarding the Cancer Biology, Prevention, and Control master's degree program; the email included a link to the survey. Thirty of the 35 individuals to whom email requests were sent responded to the survey, for a response rate of 85.7 %. Of the respondents, 5 were current students, and 30 had graduated from the program. The current students had completed the first year of classes, and were at the beginning stages of their internship year. There have been no significant changes in the program in terms of course work or internship requirements throughout the program.

The Survey Monkey program provides the data in Excel, which the researchers used to further analyze the quantitative responses. Only descriptive statistics were used for these data. The open-ended responses were analyzed using the Glaser and Strauss method and specifically the editing style of analysis [3].

Results

Demographics

Fifty-seven percent (17) of the 30 respondents indicated their gender as female. Fifty-three percent of respondents are African American, 13 % are Hispanic/Latino, 3 % are Asian or Pacific Islander, and 3 are Caucasian. Eight (27 %) of respondents replied "other" to this question, specifying Black or African (four), Middle Eastern or North African (three) or multiple [1]. The respondents range in age from 24 to 52; the median age is 33 years.

Three students had graduated with their BS in 1985, the earliest year in which any of the respondents had completed his/her degree; the most recent year in which students completed their BSN was 2010; three respondents graduated that year. Fifty-seven percent (17) respondents indicated their undergraduate degree was in Biology, 10 % (2) Dentistry, 10 % (2) Veterinary or Animal Science, 7 % (2) Chemistry, and 17 % (3) various other sciences.

Participation in the Program

When asked for the primary reason for deciding to apply for the UDC/LCCC Master's Program in Cancer Biology, respondents were given the option of selecting one or more of three options, or providing an "other" response. Most—70 % of the 30 respondents—indicated that the primary reason was "to be able to conduct cancer research." Thirty-three percent selected the option "to be able to provide direct cancer prevention or related services." Thirty percent indicated that they did so "to be able to plan public or private sector policies and/or programs related to cancer prevention and control." Three respondents selected "other;" the reasons that they specified were: providing public health education programs, helping them to get into medical school, and furthering their education in science.

Respondents were also asked to indicate why they chose the UDC/LCCC Master's Program in Cancer Biology. The two most common responses (nine respondents each) were: seeing the program description on the website and having an academic advisor recommend the program. Five respondents had read an advertisement in a newspaper, two learned about the program from a graduate, and one had read an advertisement in a scientific journal. Six respondents to this question selected the "other" response, mentioning a suggestion from a friend or family member, meeting a representative of the program at a conference, and receiving a brochure.

Current Status and Plans

Students were asked a number of questions designed to elicit their current status and plans for the future. At the time that they completed the survey, 83 % of the 29 who indicated whether or not they had graduated from the UDC/LCCC Master's Program in Cancer Biology had done so.

Sixty-one percent (17) of the 28 respondents who answered the question "Are you currently a student in a degree-granting program" were enrolled in a degree-granting program, of which eight were seeking a PhD, six a master's degree, one an M.D., and one did not specify. No student has completed his or her PhD program to date; two are scheduled for completion in 2013.

Of the 15 respondents who were not currently studying, 14 planned to pursue a PhD within the next 2 years and one respondent planned to pursue an MD/PhD. Twelve of the 13 respondents to the question, "If you are not currently studying, do you plan to enter a degree program in the next 2 years?" indicated that they are planning to enter a program for a terminal degree. Most of the respondents plan to enroll in a PhD; others plan to enroll in MD, DDS, or JD programs. The UDC/LCCC master's program has support from two R25 training grants from the National Institutes of Health: a "Bridges to the Doctorate" and another entitled "Cancer Academy." These grant programs assist students in the successful transition through this master's program, which may explain the students' focus on further education rather than job placement at this stage in their academic careers.

Sixty-seven percent of respondents reported that they were not employed at the time of the survey, although 61 % were enrolled in a master's or PhD program. Of those who were employed, three were working in laboratory science, two in research management, one in education, and four in other fields, including women's health, climate change, genetics research, retail management, and minority health/health disparities research.

Self-Reported Pre-and Post-Program Knowledge

Those surveyed were asked to answer questions about their knowledge prior to the program and at the time when they completed the survey. Table 1 displays the frequencies of respondents for self-reported prior and current knowledge on various facets of cancer prevention. Using the Wilcoxon Signed Rank test, all changes in knowledge were statistically significant at $p < 0.001$.

When asked about their cancer prevention knowledge prior to the program, 36.6 % indicated that they were either very knowledgeable or knowledgeable while 63.3 % self-rated as either minimally knowledgeable or not at all knowledgeable. At the time they completed the survey, 100 % of respondents self-rated as either very knowledgeable or knowledgeable. Just 10 % of respondents self-reported being very knowledgeable or knowledgeable about cancer epidemiology prior to the program, while 90.0 % said they were either minimally knowledgeable or not at all knowledgeable. At the time of completing the survey, 96.7 % said they were either very knowledgeable or knowledgeable and 3.3 % said they were either minimally knowledgeable or not at all knowledgeable.

Respondents self-reported being more knowledgeable about health disparities prior to the program (40.0 %) and about cancer detection and screening (36.7 %), but they also showed significant gains, with 100 self-reporting being either very knowledgeable or knowledgeable about health disparities and 96.7 self-reporting being either very knowledgeable or knowledgeable about cancer detection and screening.

Similarly, while nearly half (46.7 %) of respondents reported being either very knowledgeable or knowledgeable about molecular biology prior to the program, 96.7 % reported this level of knowledge after the program. Their knowledge gain with respect to cancer genetic was more significant, with just 13.8 % reporting that they were either very knowledgeable or knowledgeable prior to the program and 96.7 % indicating that they were either very knowledgeable or knowledgeable at the end of the program.

Preparation for Cancer Prevention and Control

Those surveyed were asked, on a four-point satisfaction scale, to indicate how well they thought the UDC/LCCC master's program prepared them for areas of cancer prevention and control. On all but one item, at least 80 % of respondents self-reported being either satisfied or very satisfied with the preparation provided by the UDC/LCCC Master's Program in Cancer Biology. For one item, "communicate effectively with patients and families," 76.7 % of respondents reported being either satisfied or very satisfied. One of the three areas that more than 10 % of the respondents rated as either somewhat or very dissatisfied related to research—"analyze clinical or research data." The other two related to cancer prevention—"design/plan a cancer prevention program" and "evaluate a cancer prevention program" (See Table 2).

Impact of Internship/Mentoring

Those surveyed were asked to what degree the internship year of the program assisted them in preparing for graduate school or for a job. Respondents were asked to choose between not at all prepared, minimally prepared, somewhat prepared, very well prepared, and not applicable. In terms of graduate school, 70 % said the program either very well prepared or somewhat prepared them, while 3.3 % indicated that the program either minimally prepared them or not at all prepared them. This question was not applicable for 26.7 % of the respondents. This can be explained by the fact that five responding students were still in the program and at least four students from past graduating classes were scheduled to begin graduate programs in the fall of 2012. Four graduates are currently applying to graduate

school and do not yet have further graduate experience. One is in medical school and one in dental school; therefore the relevance of the internship year is yet to be determined. In terms of a job, 28 responded to the question, of whom 61 % indicated that the program either very well prepared them or somewhat prepared them. No one responded either “minimally prepared” or “not at all prepared.” The question was not applicable to 39 % of respondents, for the same reason as indicated for the question related to graduate school.

Two respondents made open-ended comments with regard to the impact of the internship/mentoring aspect of the program. One mentioned that the internship year “was helpful in expanding my skill set at a basic level. I was able to be involved with my thesis project from start to finish: recruiting patients, explaining the translational research process, collecting their blood samples and processing them for use in all of the labs experiments or repository storage.” The other respondent suggested “There needs to be stronger coursework dedicated to the social science aspect of health behaviors and addressing social determinants of health.” This student also suggested that adding a course in design, monitoring, and evaluation of health behaviors would assist students in implementing and assessing prevention and control efforts.

The students’ internship projects were laboratory or outreach based, depending on the interests of the individual students, who were carefully matched with a senior faculty mentor. The projects included tobacco product mutagenicity and carcinogenicity, studies in the regulation of the SYK gene in breast cancer, a study on the quality of life among prostate cancer survivors, and an education intervention related to mouth cancer risks for a population of youth. The project titles and the year in which they were conducted are presented in Table 3.

Students were also asked if there was one lecture, course, or experience within the program that assisted them in choosing their current academic program or work. Of the 26 who responded, 62 % (16 respondents), said “yes” and 38 % (10 respondents) said “no”. Of those who indicated that there was one course, three mentioned Cancer Education, Outreach course, and Field Study, three mentioned Tumor Biology, two mentioned the internship year, and two mentioned Cancer Epidemiology. The remaining courses or individual lectures mentioned by one student were: Angiogenesis, the Viral Oncology lecture, Nutrition, and Behavioral Science Molecular Biology.

Respondents were also asked to what degree the internship year reinforced what they learned through their coursework. They could choose between did not reinforce at all, minimally reinforced, somewhat reinforced, completely reinforced, and not applicable. Of the 30 respondents, 63.3 % said it either completely reinforced or somewhat reinforced their coursework, while 10.0 % said it either minimally reinforced or did not reinforce their coursework at all. The other 26.7 % said it was not applicable to them. Five students provided comments, of which three commented that the internship experience was a critical component of the degree program. One commented that “the internship year allowed me to see some basic concepts from the coursework reinforced, but it really allowed me to see translational research in action and provided a ‘hands-on’ approach. It also afforded me the opportunity to attend other lectures and seminars offered at the university, so I was able to

see work and studies other labs were conducting.” Two suggested that there should be more emphasis on basic preparation (e.g., biostatistics, behavioral science, Institutional Review Board (IRB) protocols, and study design).

Another section of the survey inquired about the degree to which the mentoring received prepared the participants for their PhD program, on a 4-point scale (did not prepare at all, minimally prepared, somewhat prepared, very well prepared); they could also choose not applicable. Twenty-nine responded to this question, of whom 58.6 % said it either somewhat prepared them or very well prepared them and 10.3 % said it either minimally prepared them or did not prepare them at all. This question was not applicable for 31.0 % of the respondents. Six respondents provided comments, three commenting favorably on the mentoring and its utility in preparing them for their PhD. Two commented that the mentoring was useful, it could be improved; one commented, “There seemed to be assumptions by mentors that students had backgrounds and abilities to complete tasks that, in actuality, they were not previously properly trained to do.”

Satisfaction with the Program and Recommendations for Improvement

In order to elicit information that could contribute to strengthening the UDC/GU-LCCC master’s degree program, students were asked to report on their satisfaction with the program and to provide recommendations for improvement. Those surveyed were asked to list any skills or content areas of the UDC/LCCC master’s program they were finding or found particularly helpful. Twenty-one (70 %) of the respondents answered this question. Of these, many students commented on the holistic and interdisciplinary nature of the program, the practical experience and outreach skills gained, the program’s cancer courses, and the mentoring and guidance offered through the program as aspects with which they were very satisfied.

With respect to the holistic and interdisciplinary nature of the program, some students said they were satisfied with the program’s teaching and view of cancer holistically, others voiced satisfaction with the many different skills that they gained through the program. This skill set includes, according to one respondent, “data analysis skills, technical writing skills, personal management skills, and presentation and communication skills.” Some of the courses specifically mentioned positively by students were Molecular Biology of the Transformed Cell, Cancer Prevention, Control and Epidemiology, Tumor Biology, Cancer Prevention, Cancer Outreach, and Cancer Epidemiology. These courses also relate to the interdisciplinary nature of the program.

Students also appreciated the practical experience and outreach skills gained through the program. Specifically, students commented on experiences such as the lab and internship, the community outreach intervention project, and IRB protocol preparation, among others. When commenting on the community outreach intervention project, one student said, the “project certainly gave me confidence in working within diverse and unique communities and translating prevention methods and information to the public.” Students also reported being satisfied with the mentoring, tutoring, and general guidance offered through the program. One student mentioned being satisfied with the “close communication with directors and administrators.”

Students were also asked to list any skills or content areas that they believe should be included in the program. Seventeen of the respondents made recommendations; of these, most suggested additional courses and experiences that would promote practical research skills. These included, for example, data analysis and scientific and thesis writing courses, as well as additional hands-on laboratory experience, increased opportunities for students to present their research, and increased opportunities to shadow different laboratory scientists.

Several respondents suggested the inclusion of additional information and activities related to applying for and working toward a PhD. These suggestions included having an informal test for those seeking a PhD in order to “determine their readiness in terms of basic skills;” providing additional information regarding bridges to the doctorate program; and more advanced Molecular Biology classes. Another student suggested that the program arrange for a job fair. Additional or strengthened courses recommended by students included Biochemistry, Molecular Cancer, Cancer Prevention and Control, and Biostatistics.

Finally, the students were asked to add additional comments that they believe might be helpful to those trying to improve the program. While students commented on their satisfaction with the program, they also identified changes that they believe would improve the program. One such recommendation was to improve the communication between the collaborating universities, while another was to strengthen partnerships with local organizations. Students also suggested providing additional mentorship to those interested in PhDs and those seeking careers immediately after the master’s program. One student suggested regular scheduled meetings between the students and their mentors to discuss the students’ progress and next steps toward their goals. In addition to these main categories, another student suggested the need to have more feedback after students initially submit their research proposals. “If the project is presumed not sufficient, then it should be indicated so that the changes could be made earlier. The committee should meet with the student at least once throughout the course of the second year before submission of the final paper to assess progress.” The current protocol is to meet with students and faculty in the fall and early spring to review the research proposals and assess progress toward the goals. Strengthened undergraduate grounding in Molecular Biology and Biochemistry was seen by two students as important for student success in the program. Another mentioned that summer courses should be offered and that electives should be an option.

Limitations of the Study

A limitation of this study was that, although there was a high response rate (85.7 %) and a high item response rate, not all respondents who answered the question items that called for explanatory information provided such information. Another limitation is the use of self-reported knowledge gain. The intent of this study was to elicit information regarding participant self-reports of experience with the UDC/GU-LCCC master’s degree program. The limitations of the use of self-reported knowledge gain in evaluation research have been noted, for example by Lam and Bengo [4]. However, as was described in the Methods section, the intent of this survey was to elicit the perceptions of the respondents concerning their experience with the program and recommendations for its improvement. It was not designed to yield objective data regarding knowledge gain.

Discussion

This is the first follow-up of past students that the partnership has conducted. Evaluations are performed annually on curricula and research progress, but include only current students. This study is very significant and useful to the Advisory committee and the program, as views from students who have obtained master's degrees and are currently working in professional positions, or enrolled in PhD or MD programs have provided retrospective analysis of aspects of the training. It is clear, based on the current findings, that the addition of a course currently offered at LCCC on research study design and manuscript preparation must be added to the Cancer Biology, Prevention, and Control curriculum.

The partnership is currently reviewing the students' recommendations and planning for appropriate ways to respond to them insofar as is feasible and appropriate, and has already initiated changes in the program that anticipated students' suggestions. For example, one student voiced interest in seeing separate tracks for those interested in public health and those interested in cancer health disparities. A new track at the LCCC in the Tumor Biology Department at Georgetown University was instituted in the fall 2012 semester. This will assist the UDC/LCCC program by providing more coursework in Health Disparities issues. In addition, a Health Disparities course has been established at UDC that draws expert speakers from the Washington, DC area. With regard to student suggestions related to strengthened collaborations with the community the major outreach course, Cancer Education and Field Study recently has been revised to have students partner with community organizations in planning and implementing their special cancer outreach project, a major course requirement. Further strengthening local partnerships with organizations that are involved with local public health, disease prevention, and other fields could help provide students with internships, funding, and research experience.

Strengthening and expanding partnerships to help PhD candidates would be aimed toward helping them with the admissions and funding processes. To that end, individual meetings with students and their laboratory mentors have been increased to assist in identifying graduate programs, assist in timely and successful applications and provide guidance on interviews. One government grant source "Bridges to the Doctorate" provides funding for students to take Graduate Record Exam review courses. Many of the more current students have taken advantage of this benefit and have raised their scores to become more competitive PhD program candidates. Job placement has been primarily through the GU-LCCC, as students have experience and familiarity with the ongoing programs and Principal Investigators. Several students voiced difficulty in identifying graduate programs and financial resources which would allow them to enter doctoral programs. Notably, UDC has recently designed a transition network, which involves representatives from selected universities meeting with the master's students to provide them with information about financial aid, fellowships, and faculty research interests at their institution, as well as advice on increasing their competitive advantage for admission to their university. UDC also plans to hold a gathering of Network members with the goal of providing a forum for students and university representatives.

Although comparisons of the UDC/GU-LCCC program with other master's degree programs would be optimal, we could identify none that has similar goals and breadth of program activities. For example, although graduate programs that offer the Professional Science Master's (PSM)—an alternative, not a stepping-stone, to a PhD—are increasing, the goal is distinct from the UDC/LCCC Master's Program in Cancer Biology. The UDC/GU-LCCC master's degree provides students underrepresented in research a bridge to a PhD program and the skills needed to work as a laboratory researcher. Indeed, as is presented in the results section of this article, 70 % of respondents stated that their primary reason for pursuing such a PhD was to conduct cancer research. The Alfred P. Sloan Foundation has helped to provide guidance and funding for PSM and the Keck Graduate Institute of Applied Life Sciences created the Master of Biosciences program in order to provide an advanced scientific degree aimed at working in industry as opposed to research [5]. The recent focus on preparing science, technology, engineering, and mathematics (STEM) students in order to maintain a competitive workforce, as evidenced by passage of the America COMPETES Act, has given these professional science degrees more traction [6]. However, the UDC/Georgetown Cancer Biology and Prevention Master's Program is geared towards research, and thus, many students go on to pursue PhDs, as is evidenced by data from the survey. Ultimately, these students will be employed in the STEM workforce, contributing to the COMPETES goal of a competitive workforce.

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Table 1

Self-rating of knowledge prior to entering the program compared to at the time of the survey

Area	Knowledgeable prior	Knowledgeable now	<i>p</i> value*
Cancer prevention generally	36.6	100.0	<0.001
Cancer epidemiology	10.0	96.7	<0.000
Health discrepancies	40.0	100.0	<0.001
Cancer detection and screening	36.7	96.7	<0.001
Cancer genetics	13.8	96.7	<0.001
Molecular biology	46.7	96.7	<0.001

* Wilcoxon sign ranked test

Table 2

Student satisfaction with preparation provided by UDC/LCCC Master's Program in Cancer Biology in various areas of cancer prevention and control

Area of cancer prevention and control	Very satisfied or satisfied <i>n</i> (%)	Somewhat or very dissatisfied <i>n</i> (%)	NA <i>n</i> (%)
Design/plan a cancer prevention plan	26 (86.7)	4 (13.3)	0
Provide cancer education to patients, families, and groups	30 (100.0)	0	0
Evaluate a cancer prevention program	25 (83.3)	4 (13.3)	1 (3.3)
Recognize the role of genetics in cancer	30 (100.0)	0	0
Collaborate with other researchers or health professionals	28 (93.3)	2 (6.7)	0
Understand factors related to culturally competent care	29 (96.7)	0	1 (3.3)
Communicate effectively with patients and families	23 (76.7)	3 (10.0)	4 (13.3)
Design and implement cancer prevention research	28 (93.3)	2 (6.7)	0
Analyze clinical or research data	25 (83.3)	5 (16.7)	0
Recognize ethical dilemmas in research and practice	30(100.0)	0	0
Resolve ethical dilemmas in research and practice	29 (96.7)	1 (3.3)	0
Recognize the role of the environment in cancer	30 (100.0)	0	0

Table 3

UDC/LCCC master's program student internship projects (2008–2012)

Title of selected research projects
Detection of Anti Angiogenesis Targets in Pancreatic Cancer Cells
Association between Disclosure of Diagnosis and Treatment and Health-Related Quality of Life in Early Stage Prostate Cancer Survivors
Determination of Mutagenicity of Smokeless Tobacco Products sold in the United States
Development and Application of Polyclonal Antibodies for Cyclic DNA Adducts Derived from Lipid Peroxidation
Exploring the Influence of Breast Cancer Worry on Mammography Adherence in Low Income African American Women
Validation of the Luciferase Immunoprecipitation System (LIPS) for Quantification of Hepatocellular Carcinoma Autoantibodies
The Pharmacological Effect of Hermitamide-derived Voltage Gated Sodium Channel Blockers in p53 Negative Prostate Cancer Cells
Development and Application of Polyclonal Antibodies for Cyclic DNA Adducts Derived from Lipid Peroxidation
Effect of calcium in hormone resistant breast cancer; could it be a therapeutic target?
Identification of GLI3 and EWS FLI oncogenic transcription factor Inhibitors
Oral Cancer Prevention: Mechanisms and Benefits of the Tea Trial
Development and Application of Polyclonal Antibodies for Cyclic DNA Adducts Derived from Lipid Peroxidation
Exploring the Influence of Breast Cancer Worry on Mammography Adherence in Low Income African American Women
Validation of the Luciferase Immunoprecipitation System (LIPS) for Quantification of Hepatocellular Carcinoma Autoantibodies
Establishing optimal culture conditions for the assessment of mammary progenitor cells on glass and plastic surfaces
Risk of squamous cell carcinoma in urban youth: an education intervention.