

Career Development Needs Assessment in Cancer Prevention and Control: Focus on Research in Minority and International Settings

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Abstract This study was conducted as a needs assessment to inform the development of an educational program designed to provide mentorship and skills supporting careers in cancer research, with a focus on domestic minority populations and international settings. The objectives were to determine: (1) the level of interest among trainees in careers in cancer research and (2) preferences and constraints constituted by potential components, features, and duration of the proposed extramural training program. The target populations were participants and directors of federal training programs in cancer research, specifically (1) trainees in the NCI—K01, K07, and K08 programs, as well as the Department of Defense (DoD) Breast and Prostate Control Programs and (2) PIs of NCI R25 training programs and federally designated Comprehensive Cancer Centers. We developed, piloted, and administered electronically a survey to elicit perspectives of trainees' career development needs and preferences. Response rates from each training group exceeded 65%,

with the exception of the K08 trainees (49%). The proportion of cancer research trainees who are interested in careers that include research on US minority groups was 70% of K01 trainees, 72% of K07 trainees, 45% of K08 trainees, and 75% of DoD trainees. A substantial percent of these trainees indicated their plans also include cancer research in international settings: 60% of K01s; 50% of K07s, 42% of K08s, and 87% of DoD trainees. Trainees identified substantial interest in a program that would provide the following: mentoring, manuscript writing skills, collaborative research in special populations, financial support, and focused modular courses. This study offers encouraging evidence of interest which focused in extramural education to augment skills facilitating cancer-related research in special populations.

Keywords Cancer education · Disparities · Special populations · Mentoring · Extramural training

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Introduction

The National Institutes of Health (NIH) has long recognized the need for career development programs for researchers in cancer prevention and control. Evidence of the impact of cancer career development programs in special populations includes the sustained research career aspirations of the trainees and scholarly collaborative projects resulting in peer-reviewed publications of the trainees and their mentors [1]. The increasing incidence and prevalence of chronic diseases [2], cancer in particular [3], and the growth of the multidisciplinary knowledge base available to draw upon, warrants additional training for the next generation of researchers.

Cancer disparities constitute a major research area in disease prevention and control. Differences in cancer incidence and mortality among ethnic and racial groups or between migrant and US populations [4, 5] call for research to identify risk factors and tailor prevention and control interventions. Examples of disparities include the higher incidence of breast cancer and its risk factors among US-born Hispanic women compared with foreign-born Hispanics [6]. Protective factors in the homelands of recent migrants to the USA are also anticipated in this risk difference [7]. Higher risk for prostate cancer among African Americans than Whites and possible higher risk for the disease among Africans with West African ancestry is another example of incidence disparity [8, 9]. Limited access to diagnostic facilities and possible therapeutic delay that minorities experience also contribute to gaps in prognosis and outcomes between populations [10]. Taken together, cancer research in special populations can provide opportunities for elucidating etiology, identifying cultural barriers to early detection, and setting the stage for tailored control and prevention.

Our interest in promoting research in special populations attests to an understanding that these populations may provide opportunities for insights into gene-environment interactions and greater potential for reducing disparities through prevention and control interventions [11]. It is worth noting that special populations can be defined epidemiologically by geographic, social, and economic characteristics. Examples include minority populations, high-risk populations, aged populations, immigrant populations, medically underserved, and cancer survivor populations, both domestically and internationally.

Examples of the benefits of minority and international studies that led to increased understanding of the epidemiology of cancer include the research on hepatitis B virus in Taiwan that revealed the causal link between hepatitis B viral infection and liver cancer [12, 13], Burkitt's lymphoma, and Epstein–Barr virus [14, 15] and the changing trend of breast cancer among Asian immigrants to the USA [16, 17].

Examples of achieved global cancer control include the integration of hepatitis B vaccine into national immunization programs in countries with limited resources [18, 19] as well as in the USA [20]. Interventions to reduce health disparities include programs for breast and prostate cancer early detection programs among ethnic minorities [21, 22] and cancer prevention among physically impaired populations [23, 24].

Recognizing the multidisciplinary nature of this research, the National Cancer Institute (NCI) and other cancer-focused agencies have instituted mechanisms for cancer training (www.cancer.gov/CCT). The justification for peer-reviewed program announcements (PAR) of the

NCI, as exemplified in the most recent K07 Program Announcement 09-078, specified the following topics as relevant disciplines and research areas (<http://grants.nih.gov/grants/guide/pa-files/PAR-09-078.html>). We advocate that each of these can be effectively studied in special populations:

- Human cancer genetics, genetic predisposition to cancer, and detection of precursor lesions
- Patient-oriented research focused on cancer prevention
- Behavioral research and behavioral intervention trials in cancer prevention
- Cancer epidemiology (biochemical, genetic, and molecular epidemiologic studies) and cancer epidemiology-related biostatistics
- Human nutrition, behavioral and social sciences, health promotion, health services, and health policy research and medical decision analysis, survivorship, and quality of life as they relate to cancer

NCI has proscribed training programs that include mentoring, formal education plans, and research projects. These mechanisms include the K01, K07, K08, R25, and Department of Defense (DoD) cancer research programs. The “K” mechanisms focus on career development, and the R25 mechanism, on the development of cancer curriculum. In 1992, the DoD inaugurated its programs supporting cancer research, with an emphasis on supporting innovative approaches by researchers at the beginning of their careers. These educational methods have been devised to promote careers as independent researchers. Although there are currently practitioners leading and conducting such research, their numbers do not meet current or projected needs.

We advocate for special populations. Education and research training in special populations provide compelling dimensions for multidisciplinary training addressing the core mission of career development programs in cancer prevention and control. In this article, we report on the depth of interest in acquiring skills required to research the needs of special populations, elicited from trainees committed to careers in cancer prevention and controls. The purpose of the study was to determine, from the perspective of both cancer research trainees and program directors the following:

1. The level of interest among trainees in careers in cancer research, cancer research with minority populations in the USA, and cancer research with international populations
2. Preferences and constraints regarding components, features, and duration of possible future cancer research training in special populations

Methods

Study Population Grant recipients from the pool of participants in federal training programs in cancer research and cancer health disparities research constituted the target population of this research study. This included trainees in the NCI—K01, K07, and K08 programs, as well as the DoD Breast and Prostate Control Programs. The rationale for this study population reflects an understanding that these trainees are at a point in their career trajectory in which their interest in a career in cancer research is defined; further, NIH peer review of their training and research plans indicates they demonstrate credible promise of developing skills, experience, and connections for careers as independent researchers. Complementing the perspective of trainees, our study population also drew on the directors of other cancer programs relevant to education, constituted by the NCI-funded R25 curricular training programs and federally designated Comprehensive Cancer Centers. Our surveys of directors sought to elicit their perspective of their trainees' career development needs and preferences.

Databases of trainees with name, institution, project title, description, duration of award, funding amount, and project numbers were publicly available through the NCI and DoD web sites as of November 2010. Missing information, including e-mail address and further project details, was obtained through publicly available institutional web sites of awardees.

Survey Instrument We designed a survey to gauge interest in an extramural training program designed to supplement the trainee's existing programs and better prepare them for work in cancer control and prevention research in special populations in domestic and international settings. The five-question survey consisted of four structured questions, with Likert scale response options ranging from "Strongly Disagree" to "Strongly Agree" and one open-ended question. The survey inquired about career plans, perceived training content needs, and preferred program duration. The open-ended question elicited reflections on other skills, program features, or barriers the trainees might wish our program to address. The wording of surveys sent directly to K01, K07, K08, and DoD trainees were identical; each asked trainees to rate their level of interest in defined program features. In contrast, for R25 and Comprehensive Cancer Center grants, which are awarded to fund training programs rather than individual grantees, our survey asked the principal investigators to characterize the career plans and training interests of their trainees. We pilot-tested the survey and received feedback from R25 T programs and K07 awardees on style, order, and wording of questions.

Surveys were administered electronically through SurveyMonkey. This commercial program is recognized as having the capability of preserving respondents' confidentiality. We manually entered publicly available e-mail addresses from institutional web sites of potential participants into a database. Additionally, individuals who were out of the office were noted so we could ensure they were contacted again, or remove them from the list if they would not be available during our study period. Our SurveyMonkey responses identified incorrect or disabled e-mail addresses, as well as participants whose automatic reply message indicated that they would not be available during the 1-month survey study period. This eliminated the following number of individuals: K01, five participants; K07, four participants; K08, six participants; DoD, three participants; and R25T, eight participants. Surveys were sent a total of four times, 1 week apart, usually on Mondays.

Data Analysis This exploratory study of trainee preferences reports descriptive statistics for structured response questions and theme analysis of narrative summaries of responses to the open-ended question about trainee preferences and comments. We also analyzed differences in cancer-related special populations career intention from institutions with more resources in special populations research compared with those with fewer resources. These data were intended to inform decisions about the perceived need, content, and features of a career development training program intended to augment training resources for individuals awarded participation in federally funded NCI—K, NCI R25, and DoD cancer research programs.

Results

Table 1 displays our initial sample size estimates, based on the publicly available NIH databases, our corrected sample sizes, and response rates for each participant group. Response rates from all but one of the trainee groups exceeded 65%; the K08 trainees had a lower response rate (49%). We first report the results of surveys based on direct report from trainees (i.e., K01, K07, K08, and DoD training participants), followed by the R25 and Comprehensive Cancer Center Principle Investigators' characterization of their trainees' needs and interests.

Results: Trainee Responses

Figure 1 summarizes the percent of respondents who "agreed" or "strongly agreed" with statements characteriz-

Table 1 Trainee data sources and response rates

Funding mechanism	Funding institution	Grant title	Initial sample estimate	Corrected sample size	Response rate (%)
Source for direct contact with trainees					
K01	NCI	Mentored Career Development Award to Promote Diversity in Cancer Research	81	76	65.8
K07	NCI	Mentored Cancer Prevention, Control, Behavioral and Population Science Career Development Award	104	100	67.0
K08	NCI	Mentored Clinical Scientist Development Award	78	72	48.6
DoD BCRP/PCRP	CDMRP-DoD	Department of Defense Training Fellowships for Breast and Prostate Cancer Research	42	35	68.6
Source for contact with directors of other cancer education centers					
R25T	NCI	Interdisciplinary Cancer Training and Career Development	80	77	75.3
Comprehensive cancer centers	NCI	Federally designated Comprehensive Cancer Centers	67	66	25.8

As indicated in the text of the manuscript narrative, respondents with invalid e-mail addresses or whose automated response messages indicated that they would not be available during the 1-month study period were excluded from follow-up mailings

ing their career plans. Almost all (94–100%) respondents from each trainee group (i.e., DoD, K01, K07, and K08) affirmed their intention of preparing for a career in cancer research. About 70% of respondents from all but the K08 trainee group identified an interest in research in US minority populations. A substantial percent of trainees in all but the K08 group indicated their plans also include cancer research in international settings. As indicated in Fig. 1, interest in research on US minority populations and in international settings was present among K08 respondents, but the percentage of interested K08 trainees was lower than that of other groups. In contrast, the DoD group included highest percentages of interest in both international and domestic special populations

research. The full distribution of responses from the aggregated set of trainees (i.e., combined across DoD, K01, K07, and K08 programs), across all item response categories, is summarized in Table 2.

Among trainees who indicated no future planning for research in minority or international setting, over half (53%) were from institutions without minority or international programs. On the other hand, intention of pursuing special population research was reported by 29% of survey respondents from institutions with international programs and only 18% of respondents from institutions with minority programs.

Figure 2 summarizes the preferences of trainees for features of an extramural training program that would meet

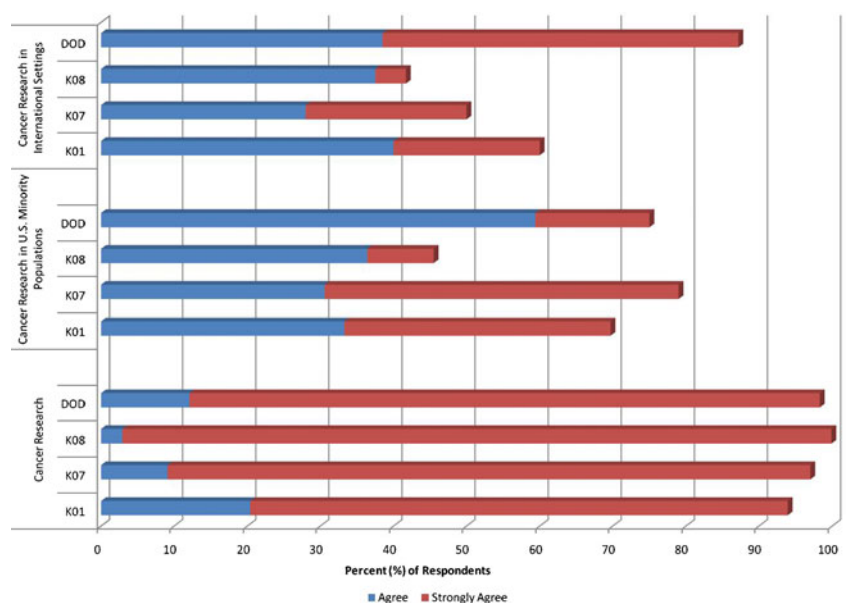
Fig. 1 Future career plans reported by the study participants

Table 2 Distribution of survey responses from career development award junior faculty

Question	SA	A	D	SD
1. I am planning a career that will include				
Cancer research	177 (85.1%)	24 (11.6%)	0	6 (2.9%)
Cancer research in US minority groups and populations	49 (32.9%)	57 (38.2%)	31 (20.8%)	12 (8.0%)
Cancer research in international populations	37 (26.0%)	50 (35.2%)	35 (24.6%)	21 (14.7%)
2. Please indicate your interest in participating in a brief (1–4 week) extramural focused training program that includes				
Grant writing and budgeting	73 (35.1%)	101 (45.6%)	24 (11.5%)	10 (4.8%)
Presentation skills in various formats, such as podium presentations and PowerPoint presentations	39 (18.9%)	87 (42.2%)	62 (30.1%)	18 (8.8%)
Manuscript writing	65 (31.4%)	76 (36.7%)	52 (25.1%)	14 (6.8%)
Conducting collaborative research	71 (34.1%)	94 (55.2%)	35 (16.8%)	8 (3.9%)
Modular courses on specific cancer prevention and control topics	46 (22.3%)	104 (50.5%)	48 (23.3%)	11 (5.3%)
Mentoring and being mentored	56 (26.8%)	101 (48.3%)	41 (23.3%)	8 (3.9%)
Career planning	78 (37.3%)	94 (45.0%)	32 (15.3%)	5 (2.4%)
3. Thinking back to the time when you were preparing your (K01) application, a brief training program like the one we are planning would have complemented and augmented the required career development of your application if it included				
Structured education and experiential training in US minority group and populations research	41 (23.7%)	57 (32.9%)	58 (33.5%)	17 (9.8%)
Structured education and experiential training in international cancer research	28 (16.0%)	62 (35.4%)	65 (37.1%)	20 (11.4%)
Financial support for participants	80 (42.8%)	76 (40.6%)	25 (13.4%)	6 (3.3%)
4. Considering your training plan, it would have been feasible for you to be away from your home institution to participate in our brief proposed program for				
1 week	96 (47.8%)	90 (44.8%)	9 (4.5%)	6 (3.0%)
2 weeks	26 (13.7%)	74 (38.9%)	57 (30.0%)	33 (17.4%)
3 weeks	7 (3.7%)	28 (14.8%)	87 (46.0%)	67 (35.4%)
4 weeks	10 (5.2%)	14 (7.3%)	75 (39.3%)	92 (48.2%)

Aggregated over all (K01, K07, K08, and DoD) NIH-Training Programs (response options ranged from Strongly Agree “SA” to Strongly Disagree “SD”)

their needs. In terms of skills trainees identified as important for a brief (1–4 weeks) extramural focused training program to include, career planning constituted a compelling extramural program feature for most trainees. Skills in conducting collaborative research also represented a desired program feature for most trainees. Obtaining skills in grant writing and budgeting elicited “agree” or “strongly agree” responses from a majority of trainees across trainee groups. Manuscript writing skills also constituted a desired training program for a majority of trainees. Preference for modular courses on specific cancer prevention and control topics was identified by a majority of trainees. Interest in participating in a program that included skills in mentoring and being mentored were highly rated by most trainees. In terms of enhancing their presentation skills, a majority of trainees “agreed” or “strongly agreed” this skill would be an important feature of an extramural program enhancing skills relevant to their career. DoD trainees consistently reported the highest levels of interest in potential program features. Although the program features elicited interest from K08 trainees, the percent of trainees reporting high

levels of interest was lower than that reported by other trainee groups. All trainee groups identified financial support as critical to their ability to participate in an extramural training program.

Structured education and experiential training in US minority group and population research were program features rated highly by the majority of K01 and K07 trainees. Preference for this training was present among K08 and DoD trainees, albeit among a smaller proportion of trainees. In comparison, structured education and experiential training in international cancer research was highly rated by a majority of DoDs, about half of the K01 and K07s, and about 25% of K08s.

In terms of program duration, the majority of trainees reported that a 1- to 2-week program would represent a feasible time away from their home institution.

The survey’s fifth and final question was open ended, asking respondents to identify other career development skills, program features, and barriers that the trainees wished the program could address (Table 3). The categories into which all responses could be included were: prefer-

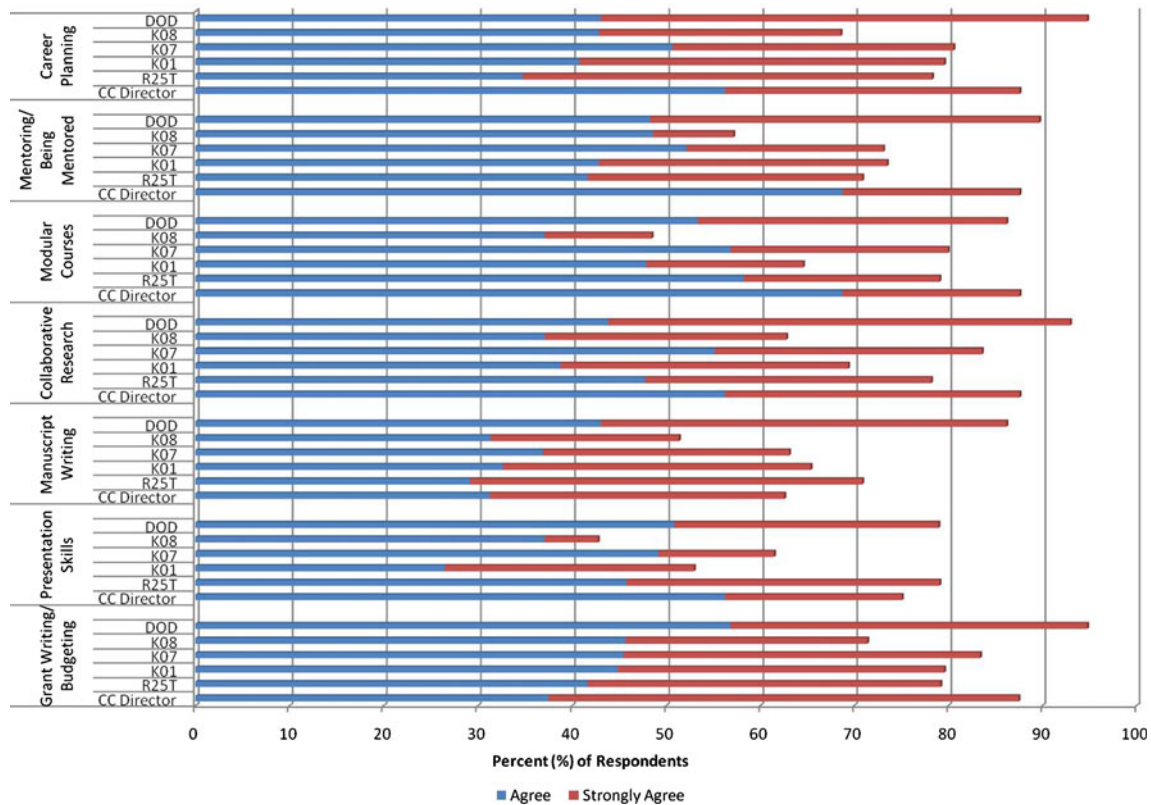


Fig. 2 Trainee and director preferences for content of extramural cancer research program training

ences for additional knowledge and skills training; mentors; preferences for additional program activities; constraints to participation; challenges to program need; and affirmation for the need and features of the proposed extramural program.

Results: NCI-R25 and Federally Designated Comprehensive Cancer Center Program Director Responses

The distribution of responses from the aggregated set of directors (i.e., combining the R25 and Comprehensive Cancer Center participants) across all item response categories is summarized in Table 4. As indicated in Table 4, directors perceived that their programs included trainees interested in cancer research in US minority populations and trainees interested in international populations. Overall, program directors identified more of their trainees as likely interested in careers in the US minority groups than in international populations. The R25 directors predicted that, on average, 16.2 trainees would be interested in cancer research in US minority groups and populations, and 23.4 trainees would be interested in cancer research in international populations. Cancer center directors indicated that, on average, ten trainees would be interested in cancer research in US minority groups and populations, and nine

trainees would be interested in cancer research in international populations.

Our study survey posed the same question about desirable program features to both trainees and program directors. Table 4 also illustrates the full range of director responses to the ordinal rating of program features. Results indicate that the directors endorsed the utility of financial support, structured education and experiential training in US minority groups and in international cancer research. Almost all of the R25 directors “agreed” or “strongly agreed” with the following program features: financial support for participants, structured education and experiential training in US minority group and population research in US minority group and population research. Although just over 80% reported considerable interest in international cancer research, this rating was 10% lower than that for US minority groups. Almost all of cancer center directors rated financial support for participants as essential. A considerable majority supported structured education and experiential training in US minority group and population research over half rated highly interest in the program’s opportunity to provide structured education and experiential training in international cancer research.

In terms of the duration of the proposed extramural program, all R25 and cancer center directors considered

Table 3 Summary of trainee comments

Proposed program element	Sample quote (respondent training program of author identified in parentheses)
Additional program knowledge and skills	<p>“Time management–forget life balances–just time management to meet the demands of managing a project, publication, teaching, etc.” (K01)</p> <p>“Family schedules and considerations” (K07)</p> <p>“Time management; milestones for career and within grant” (K07)</p> <p>“Goal setting, i.e., setting realistic, measurable aims with testable hypotheses that can be done in realistic time frame” (K01)</p> <p>“Quantitative and translational workshops” (K01)</p> <p>“Understanding academic structure” (K01)</p> <p>“Understanding NIH structure” (K01)</p> <p>“Problems with MTA’s and grants and contracts issues, general cancer biology programs, understanding pharma industry” (K08)</p>
Mentors	<p>“Inclusion of qualified minority mentors” (K01)</p> <p>“For mentors, it is very important to facilitate networking for your mentees (K01)</p> <p>Career transitions</p> <p>“When the mentor–mentee relationship changes from a working to a nonworking status during the K07 award period, what strategies/options are available to the mentees in addressing these challenges” (K07)</p> <p>“This is all wonderful [but] might also want to include segments on navigating the K to R transition” (K07)</p>
Additional program activities	<p>“A mock study section panel that reviews the finished proposal” (K01)</p> <p>“Mock study sections” (K08)</p> <p>“Meeting with NIH program officers, understanding the context of the grant review” (K01)</p> <p>“Important to offer a refresher to for those about to enter the third year of their K and provide similar training about next steps” (K01)</p>
Constraints to program participation	<p>“Funding is an issue to be away from the job for more than 1 week” (K01)</p> <p>[In response to question about optimal program duration] “it would have been ok with my home institution for more than 1 week, but not ok with me” (K01)</p> <p>“While this type of education in general looks great on K career development plans, the major hold-up is that it is not feasible with the small amount of funds available with the K awards to pay for the tuition plus airfare plus food and several nights at a hotel. I do not think I could budget for more than 1 week, unless there was financial support” (K07)”</p>
Challenge program need	<p>“The proposed program has overlap with other programs that are offered by other organizations, including the NIH/NCI and ACSB. There programs are excellent [and] should be researched before implementing a new program that seems to offer the same training” (K01)</p> <p>“I am currently in the independent phase and so will be less applicable” (K01)</p> <p>“Despite being incredibly well intentioned, my honest opinion is that this will [not] be a productive use of time given the constraints on physician scientists” (K08)</p> <p>“Many K08 awardees conduct basic science research with a small translational component. Aside from career planning, it is unclear how your program addresses the needs of bench researchers (K08)</p>
Affirming proposed program	<p>“I could see that visiting another institution like UM would be useful to develop some new technical skills that could possible enhance my research project, as could very specific courses on molecular mechanisms and signaling pathways implicated in breast cancer. My project is interdisciplinary, and relies heavily on combining aspects of my skills with the strengths of others–I learn best from hands-on interactions. In addition, workshops that focus on career development, career choices and ways to find jobs outside of academic (given that only about 20% of Ph.D.s get the coveted tenure track positions would be helpful. Thanks!” (DoD)</p>

that it would be feasible for their trainees to be away from their home institution for 1 week, and most considered 2 weeks feasibility. These numbers drop dramatically with

increased program duration. About half of the R25 directors felt that a 3-week duration was feasible; about one third considered a 4-week duration as acceptable. Similarly,

Table 4 Distribution of survey responses from directors of cancer training programs

Question	Total	Average		
1. Please indicate the number of trainees who, in an average year, would be interested in a career that includes				
Cancer research	271	7.1		
Cancer research in US minority groups and populations	145	3.6		
Cancer research in international populations	48	1.3		
For the questions below, response options ranged from Strongly Agree "SA" to Strongly Disagree "SD"				
Question	SA	A	D	SD
2. As a program director, you would permit your trainees to participate in a brief extramural training program if it included:				
Financial support for participants	16 (40.0%)	21 (52.5%)	2 (5.0%)	1 (2.5%)
Structured education and experiential training in US minority groups and population cancer research	9 (23.1%)	26 (66.7%)	4 (10.2%)	0
Structured education and experiential training in international cancer research	6 (15.0%)	24 (60.0%)	10 (25.0%)	0
3. Considering your program, it would be feasible for your trainees to be away from your home institution to participate in our brief proposed program for				
1 week	22 (57.9%)	16 (42.1%)	0	0
2 weeks	12 (30.8%)	22 (56.4%)	5 (12.8%)	0
3 weeks	4 (10.8%)	8 (21.6%)	20 (54.1%)	5 (13.5%)
4 weeks	4 (10.5%)	6 (15.8%)	17 (44.7%)	11 (29.0%)
4. The following topics are being considered in our program planning. Your trainees would be interested in				
Grant writing and budgeting	17 (42.5%)	16 (40.0%)	5 (12.5%)	2 (5.0%)
Presentation skills in various formats, such as podium presentations and PowerPoint presentations	11 (27.5%)	20 (50.0%)	6 (15.0%)	3 (7.5%)
Manuscript writing	15 (37.5%)	12 (30.0%)	10 (25.0%)	14 (6.8%)
Conducting collaborative research	71 (34.1%)	94 (55.2%)	10 (25.9%)	3 (7.5%)
Modular courses on specific cancer prevention and control topics	8 (20.0%)	25 (62.5%)	6 (15.0%)	1 (2.5%)
Mentoring and being mentored	10 (25.0%)	21 (52.5%)	7 (17.5%)	2 (5.0%)
Career planning	15 (38.5%)	17 (43.6%)	6(15.4%)	1 (2.5%)

Aggregated over NIH-R25 ($n=24$) and NIH-Comprehensive Cancer Center ($n=17$) Training Programs

among cancer center directors, support for a 3- or 4-week program drops to about 25%.

The directors also rated the extent to which their trainees would be interested in specific topics in our proposed extramural program. As indicated in Table 4, the aggregated directors most often accorded their highest ratings to conducting collaborative research. More than 75% of directors also rated highly career planning, grantsmanship, and modular courses on cancer prevention and control topics. More directors than trainees rated provision of presentation skills as critical. The following list ranks topics receiving the highest proportion of favorable ratings to those receiving lower proportions of favorable ratings from R25 programs: grant writing and budgeting; modular courses on specific cancer prevention and control topics; career planning; conducting collaborative research; presentation skills; and writing manuscripts. The lowest rated program feature was mentoring and being mentored, but this still represented a highly rated feature among more than half of the directors. Among cancer center directors, the proposed extramural program components eliciting highest

rating were: modular courses, mentoring, career planning, grantsmanship, and collaboration, followed by presentation skills and manuscript writing (Fig. 2).

The highest portion of the comments from the R25 program directors (40%) affirmed the importance of the proposed program's components, but characterized these components as features their current programs offered. Exceptions that the program directors cited as unique contributions that the proposed extramural program could offer included structured and experiential training in international research. As had the trainees, the R25 program directors identified the need for financial support to trainees, particularly for housing during residential training. Program directors also cited the proposed program as a potential source for trainees to receive mentoring with "career planning, including 5-year written plan, job hunting and job opportunities." One program director explained "one other thing they've [trainees] asked for ... is how to prepare a research portfolio—demonstrating the outcomes of work other than through a CV. Something that helps them establish appropriate lifelong goals in cancer re-

search.” Another program director suggested the need to clarify whether the program would target behavioral or clinical researchers, noting: “I am not sure if the fellows you are targeting are behavioral or clinical researchers. I think all the experiences could have potential benefit, depending on the fellow.”

In response to the survey’s open-ended question, additional program topics that cancer center directors suggested included: managing a research team in study implementation; developing culturally sensitive intervention methods; implementing community-based participatory research; and how to be a consumer and provider of peer review comments. In comparison to the R25 program directors, only one cancer center director explicitly commented on the features of our proposed extramural program as already present in their program: “all these topics are covered in our multidisciplinary post doc program so not clear why we would encourage post docs to go elsewhere for the same materials.”

At the end of the survey form, we included our contact information for those respondents who wished to stay in contact about the proposed training program. Six individuals, representing four trainees and two program directors, sent direct e-mails. In addition to communicating their interest in the program, comments characterized the proposed program as “much needed.”

Discussion

Although the recognition of the need for faculty development programs is widespread, little empirical research from the perspective of trainees is available to guide the development of faculty development programs for well-defined populations. The National Institutes of Health and Department of Defense support career-training programs for cancer-related researchers. The National Institutes of Health also provide support for R25 curriculum development programs and federally designated Comprehensive Cancer Centers. Awardees of these sets of career development programs and training sites meet explicit shared criteria and peer-reviewed standards. These awardees also represent individuals with the ability and commitment to participate in focused training.

In this study, we recognized that the existence of these federally sponsored programs constituted sources from which we might ascertain preferences, directly from trainees and training program leaders, for a training program, for four to six trainees that would augment existing training resources, particularly in terms of program components that would promote research careers that could address disparities in domestic and international settings. As these individuals are already participants in programs that they

have developed or selected to meet training needs in cancer research, connecting with these individuals seemed a reasonable source to test the premise that a focused extramural training program, which would enhance skills key to cancer research careers in minority and international settings, would be valued.

A limitation of our study was the 48.6% response rate from the K08 trainees, which limits the extent to which the responses from this group can be considered representation. For all other target trainee populations, the response rate exceeded 65%. This encouraging level of participation provides evidence of the feasibility of this study’s approach to needs assessment, as current cancer research training program participants and directors were willing to provide their responses for empirical needs assessment of a proposed extramural training program.

Trainees affirmed that, independent of their interest in our proposed training program, they planned careers focusing on cancer prevention and control research. In terms of this study’s focus on special populations, at least 40% of trainees in each program reported such interest. In three (K01, K07, and DoD) of the four trainee respondent groups, the percent of trainees interested in careers addressing domestic minority populations exceeded 60%. A substantial portion of each of these three training groups also indicated their interest in study of international populations.

The trainee responses and comments provide insight into the features that would meet their training needs, as well as the constraints a potential extramural training program would face. The educational interest of the surveyed participants showed needs for mentorship, modular courses in interdisciplinary cancer research, grantsmanship, and writing skills. In terms of constraints, the comments of K08 trainees identified their perception that, as physician trainees, they face demands on their time challenging the feasibility of participating in an extramural training program of even a week’s duration. The K08s physician respondents include trainees interested in extramural training to augment their knowledge and skills, but the percent of trainees who perceived that they could take on additional training was consistently lower than those reported by other trainee groups. Their qualitative comments clarify the extent to which this trainee group perceives limits to the time and range of training topics they could pursue in an extramural training program. In contrast, the DoD trainees constituted a trainee program group consistently including high proportion of individuals whose responses indicated that they had both the interest and ability to pursue training in a program that could augment their existing training related to both domestic and international special populations. R25 training program directors affirmed the value of the training components but characterized their programs as already making those elements available.

In contrast, most trainees expressed interest in participating in a supplemental extramural program. From the perspective of both trainees and program directors, it was clear that financial support for the trainees would be necessary, as many K awardees do not have current financial support for such training, as it was not included in the budget or the educational plans of their existing awards. It was also clear that most K awardees perceived 2 weeks as the longest duration for their participation in an on-site educational component at other universities that can provide special population research training.

Multidisciplinary education and research training in special populations provide opportunities for enhanced careers for the rapid advances in the field of cancer research and the translation to cancer prevention and control. Increasing the cadre of researchers that is focused on special populations is crucial for capacity building and development of a critical mass of cancer prevention and control research in this field. The results of our study offers encouraging evidence of potential interest in augmenting existing training programs through focused extramural training emphasizing mentoring, collaboration, and focused and modular training. This study's results indicate that trainees perceive that these programmatic components are congruent with a program emphasizing multidisciplinary education and research training in special populations. Future programs, such as we proposed in our survey, with expertise and resources for research in special populations, should provide opportunities for selected postdoctoral fellows and junior faculty to maximize the outcome of cancer prevention and control in reducing cancer health disparities. Possible future training can focus on domains such as best approaches to access special populations, challenges for conducting research in special populations, biological specimens, risk assessment, and tailored prevention in special populations, as well as opportunities for success in cancer research in special populations.

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References

- Soliman AS, Mullan PB, Chamberlain RM (2010) Research training of students in minority and international settings: lessons learned from cancer epidemiology education in special populations. *J Cancer Educ* 25:263–269
- Centers for Disease Control and Prevention (2010) Surveillance for certain health behaviors among states and selected local areas—United States, 2008. *MMWR Surveill Summ* 59(10):1–221
- American Cancer Society (2010) *Cancer Facts and Figures*. American Cancer Society, Inc., Atlanta
- Pfeiffer RM, Mitani A, Matsuno RK, Anderson WF (2008) Racial differences in breast cancer trends in the United States (2000–2004). *J Natl Cancer Inst* 100(10):751–752
- Gomez SL, Clarke CA, Shema SJ, Chang ET, Keegan TH, Glaser SL (2010) Disparities in breast cancer survival among Asian women by ethnicity and immigrant status: a population-based study. *Am J Public Health* 100(5):861–869
- Keegan TH, John EM, Fish KM, Alfaro-Velcamp T, Clarke CA, Gomez SL (2010) Breast cancer incidence patterns among California Hispanic women: differences by nativity and residence in an enclave. *Cancer Epidemiol Biomarkers Prev* 19(5):1208–1218
- John EM, Phipps AI, Davis A, Koo J (2005) Migration history, acculturation, and breast cancer risk in Hispanic women. *Cancer Epidemiol Biomarkers Prev* 14(12):2905–2913
- Drake BF, Lathan CS, Okechukwu CA, Bennett GG (2008) Racial differences in prostate cancer screening by family history. *Ann Epidemiol* 18(7):579–583
- Giri VN, Eggleston B, Ruth K, Uzzo RG, Chen DY, Buyounouski M, Raysor S, Hooker S, Torres JB, Ramike T, Mastalski K, Kim TY, Kittles R (2009) Race, genetic West African ancestry, and prostate cancer prediction by prostate-specific antigen in prospectively screened high-risk men. *Cancer Prev Res* 2(3):244–250
- Ashing-Giwa KT, Padilla GV, Tejero JS, Kim J (2004) Breast cancer survivorship in a multiethnic sample: challenges in recruitment and measurement. *Cancer* 101(3):450–465
- Soliman AS (2007) Cancer Education and research in international settings: challenges and opportunities. *J Cancer Educ* 22:137–139
- Beasley RP, Huang L-Y, Lin C, Chien C (1981) Hepatocellular carcinoma and HBV: a prospective study of 22,707 men in Taiwan. *Lancet* 2:1129–1133
- Beasley RP (1988) Hepatitis B virus. The major etiology of hepatocellular carcinoma. *Cancer* 61:1942–1956
- Burkitt D, Wright D (1970) *Burkitt's lymphoma*, 1st edn. E and S Livingstone, Edinburgh, pp 1–251
- Burkitt DP (1983) The discovery of Burkitt's lymphoma. *Cancer* 51:1777–1786
- Ziegler RG, Hoover RN, Pike MC, Hildesheim A, Nomura AM, West DW, Wu-Williams AH, Kolonel LN, Horn-Ross PL, Rosenthal JF, Hyer MB (1993) Migration patterns and breast cancer risk in Asian-American women. *JNCI* 85(22):1819–1827
- Wu AH, Ziegler RG, Pike MC, Nomura AM, West DW, Kolonel LN, Horn-Ross PL, Rosenthal JF, Hoover RN (1996) Menstrual and reproductive factors and risk of breast cancer in Asian-Americans. *Br J Cancer* 73(5):680–686
- Beasley RP, Hwang LY, Lee GC et al (1983) Prevention of perinatally transmitted hepatitis B virus infections with hepatitis B virus infections with hepatitis B immune globulin and hepatitis B vaccine. *Lancet* 2:1099–1102
- Beasley RP, Hwang LY, Stevens CE et al (1983) Efficacy of hepatitis B immune globulin for prevention of perinatal transmission of the hepatitis B virus carrier state: final report of a randomized double-blind, placebo-controlled trial. *Hepatology* 3:135–141
- Center for Disease Control and Prevention (1991) Hepatitis B virus: a comprehensive strategy for eliminating transmission in the United States through universal childhood vaccination: recommendation of the Advisory Committee on Immunization Practice (ACIP). *MMWR Recomm Rep* 40(RR-13):1–25
- Rutledge W, Gibson R, Siegel E, Duke K, Jones R, Rucinski D, Nunn G, Torrence WA, Lewellen-Williams C, Stewart C, Blann K, Belleton L, Fincher L, Klimberg VS, Greene P, Thomas B, Erwin

- D, Henry-Tillman R (2006) Arkansas special populations access network perception versus reality—cancer screening in primary care clinics. *Cancer* 107(8 Suppl):2052–2060
22. Husaini BA, Reece MC, Emerson JS, Scales S, Hull PC, Levine RS (2008) A church-based program on prostate cancer screening for African American men: reducing health disparities. *Ethn Dis* 18(2 Suppl 2):S2-179–S2-184
23. Sadler GR, Gunsauls DC, Huang J, Padden C, Elion L, Galey T, Brauer B, Ko CM (2001) Bringing breast cancer education to deaf women. *J Cancer Educ* 16(4):225–228
24. Choe S, Lim RS, Clark K, Wang R, Branz P, Sadler GR (2009) The impact of cervical cancer education for deaf women using a video educational tool employing American sign language, open captioning, and graphics. *J Cancer Educ* 24(1):10–15