PERSONNEL SUPPORT AWARDS PROGRAM EVALUATION

FINDINGS REPORT

Prepared By: Rudy Valentim
Manager of Evaluation, Canadian Cancer Society Research Institute

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1.0 INTRODUCTION

The Canadian Cancer Society Research Institute (CCSRI) conceptualized and implemented a summative evaluation[1] of its Personnel Support Awards (training awards) program. The intent was to assess the outcomes, impacts and benefits of training awards administered through the NCIC from 1994 – 2007.

Training awards were offered in two general areas of cancer research: biomedical and behavioural/psychosocial/cancer control (BPCC). The Canadian Cancer Society (Society) funded all of the BPCC awards and a small number of biomedical awards which involved the study of embryonic stem cells. The bulk of the biomedical awards were funded by the Terry Fox Foundation (TFF).

Survey methodology was employed and questionnaires were administered to successful applicants and unsuccessful applicants from 1994 – 2007 as well as post-doctoral and clinical research fellows named on research grants (competition funded trainees) from 2004 – 2007. The surveys were designed to measure perceived program value, career trajectories, and performance.

This report provides an outline of the intent and methodological design of the evaluation, a summary of results and a discussion of the findings.

[1] A summative evaluation assesses the outcomes, impacts and benefits of a program.

Key Findings

- The majority of respondents, regardless of having received a training award or not, are currently working as cancer researchers.
- Successful applicants have moved into the role of independent researcher at a faster rate than unsuccessful applicants without a training award.
- Successful applicants have a higher publication count (total number of publications) than both unsuccessful applicants without a training award and competition funded trainees.
- There are no significant differences between respondents' patent record, influence on clinical guidelines, receipt and type of research funding, level of job satisfaction, and perceived contribution to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer.
- Respondents appreciate the value of training awards as a mechanism by which to encourage trainees to pursue a career in cancer research and to build cancer research capacity, but are less certain about the value of funding training awards if it comes at the expense of research grants.

2.0 PURPOSE OF THE EVALUATION

The objective of the program evaluation was to assess the long-term outcomes, impacts and benefits of the Personnel Support Awards administered through the NCIC[2] from 1994 – 2007. Its goals were to inform CCSRI decisions regarding future program design and provide key stakeholders with messages related to program outcomes and impacts.

The following key questions guided the evaluation:

- What were the consequences of holding a NCIC training award on the subsequent careers of trainees?
- How does the career trajectory and performance of NCIC training award recipients compare to non-recipients?
- At what level of training (post PhD research fellowship, post MD research fellowship, and research studentship) are training awards having the greatest impact?

[2] The data points of the evaluation are historical, and as such NCIC will be referenced throughout.

3.0 PROGRAM DESCRIPTION

The primary goals of the training awards program were to develop highly qualified cancer researchers and to develop tomorrow's leaders in cancer research in Canada. To support these goals, program resources had been strategically focussed on the early years of cancer research training.

Training awards provided salary or stipend support for cancer researchers and trainees via a number of different mechanisms:

- Post PhD Research Fellowships
- Post MD Research Fellowships
- Research Studentships
- Research Scientist Awards (out of the scope of this evaluation)
- Travel Awards for Senior Level PhD Students (out of the scope of this evaluation)

They were available in two broad categories: biomedical research and BPCC research. Three distinct panels reviewed the applications including the Biomedical Research Personnel Awards Panel, the Behavioural/ Psychosocial/Cancer Control Research Personnel Awards Panel and the Clinical Research Personnel Panel.

The Society training awards budget was typically $1 million annually, and the TFF budget in turn was approximately $2.5 million annually. The minimum value of all fellowships was $40,000, rising for each year of postdoctoral experience to a maximum of $47,500 per annum. The value of all studentships was $22,500 per annum. In the 2008/2009 grant year the funding amount for the training awards program was $3,980,136. A total of 22 post PhD research fellowships, 5 post MD research fellowships and 19 research studentships were awarded. The training awards program is currently suspended.

4.0 METHODOLOGY AND DESIGN

Survey Methodology

Surveys are routinely used in evaluation due to their versatility and the fact that they allow an evaluator to gather data on virtually any issue. In an evaluation context, surveys are a systematic way of collecting primary data on a program and its results from persons associated with the program. When properly conducted, a survey offers an efficient and proper means of getting information on almost any group of interest. However, as a data collection method, surveys do have several drawbacks including: non-response; possible misinterpretation of questions by respondents; inability to deal with context; and it requires statistical knowledge, sampling and other specialized skills to process and interpret results.

Study Limitations and Lessons Learned

The key limitation of this study is that it fails to account for the impact other factors such as trainees' labs or supervisors have had on their career trajectory and performance. A multitude of factors can affect the outcome of a researcher's career trajectory and performance, but this evaluation is only taking into account the effect training awards have had.

A variety of lessons associated with survey methodology were learned by the study team while conducting this evaluation. They include the better framing of questions to avoid respondent misinterpretation, the inclusion of more response options for certain questions, better matching for equivalency and more focused analyses better aimed at answering evaluation questions.

Study Design

Self-administered surveys were distributed electronically to the program group (successful applicants) and comparison groups (unsuccessful applicants and competition funded trainees) with the aim of measuring and comparing their career trajectories, career performance and perceived program value. Surveys were developed in-house, alpha tested (internally) and pilot tested (externally) before being distributed amongst the groups. The internal alpha test (Society staff) and external pilot test (randomly selected successful and unsuccessful applicants) allowed the survey to be tested for readability,

grammar, proper framing of questions, software-related bugs, etc. Validity tests conducted included: Face (casual review of how good and item or a group of items appear) and Content (formal expert review of how good an item or series of items appears).

A standardized distribution and reminder schedule was created to ensure the highest response rate possible. In order to guard against group differences comparison groups were matched for equivalency post-survey. Matching criteria employed were dependant on the particular analysis being conducted and generally included group size, research area (biomedical, BPCC), award level (post PhD research fellowship, post MD research fellowship, research studentship), and year of application.

A structured survey analysis protocol was employed. Data were cleaned and a summary of survey results were generated using Microsoft Excel and QuestionPro survey software. Subsequent study team meetings were then held to review the summarized results and determine how data should be further organized / synthesized to help respond initial evaluation questions. Finally, statistical tests including chi-square tests and fisher exact tests were carried out to confirm key findings.

The following indicators were measured as part of the evaluation:

- Current Career in cancer research
- Career field (e.g. academia, clinical, government, pharmaceutical, etc.)
- Receipt of research funding
- Contributions to the research literature (publication count)
- Influence on clinical guidelines
- Patent record
- Job satisfaction

The program group included all successful applicants who were offered a NCIC training award from 1994 – 2007 and whose current email CCSRI had on file (n=370) at the following levels and research areas:

- Senior Research Fellowships (Biomedical)
- Post PhD Research Fellowships (Biomedical)
- Post PhD Research Fellowships (BPCC)
- Clinical or Post MD Research Fellowships (Biomedical)
- Clinical or Post MD Research Fellowships (BPCC)

- Research Studentships (Biomedical)
- Research Studentships (BPCC)

The first comparison group was composed of unsuccessful applicants who applied, but were not offered a NCIC training award from 1994 – 2007 and whose current email CCSRI had on file (n=707) at the following levels and research areas:

- Senior Research Fellowships (Biomedical)
- Post PhD Research Fellowships (Biomedical)
- Post PhD Research Fellowships (BPCC)
- Clinical or Post MD Research Fellowships (Biomedical)
- Clinical or Post MD Research Fellowships (BPCC)
- Research Studentships (Biomedical)
- Research Studentships (BPCC)

The second comparison group was composed of post-doctoral and clinical research fellows who were named on operating and program project grants (both biomedical and BPCC) from 2004 to 2007 and whose current email CCSRI had on file (n=151). In other words, competition funded trainees that were supported / trained through a NCIC research grant held by their supervisor.

5.0 PRESENTATION OF RESULTS

This section outlines and summarizes a series of comparative analyses that were conducted in order to get a clear understanding of the outcomes, impacts and benefits associated with having received a NCIC training award. To begin, demographic data related to the program group (successful applicants) and two comparison groups (unsuccessful applicants and competition funded trainees) is presented. This is followed by a summary of four separate comparative analyses including:

A. A subgroup of respondents who received a NCIC training award (successful applicants) versus those who applied for a NCIC training award, but were unsuccessful (unsuccessful applicants). The groups were matched for equivalency based on group size, year of application and type of training award applied.
B. A subgroup of respondents who received a NCIC training award (successful applicants) versus those who applied for a NCIC training award, but were unsuccessful and also failed to obtain a training award from another organization (unsuccessful applicants without a training award). The groups were matched for equivalency based on group size, year of application and type of training award applied.
C. A subgroup of respondents who received a NCIC post MD research fellowship (successful clinical applicants) versus those who applied for a NCIC post MD research fellowship, but were unsuccessful and also failed to obtain a training award from another organization (unsuccessful clinical applicants).
D. A subgroup of respondents who received a NCIC post PhD or post MD research fellowship (successful applicants) versus those who never received a post PhD or post MD research fellowship and were trained and/or supported through a NCIC research grant held by their supervisor (competition funded trainees). The groups were matched for equivalency based year of application and training award received / training level (i.e. post PhD and post MD).

Figure 1 provides a visual representation of the four comparative analyses presented in this section of the report.

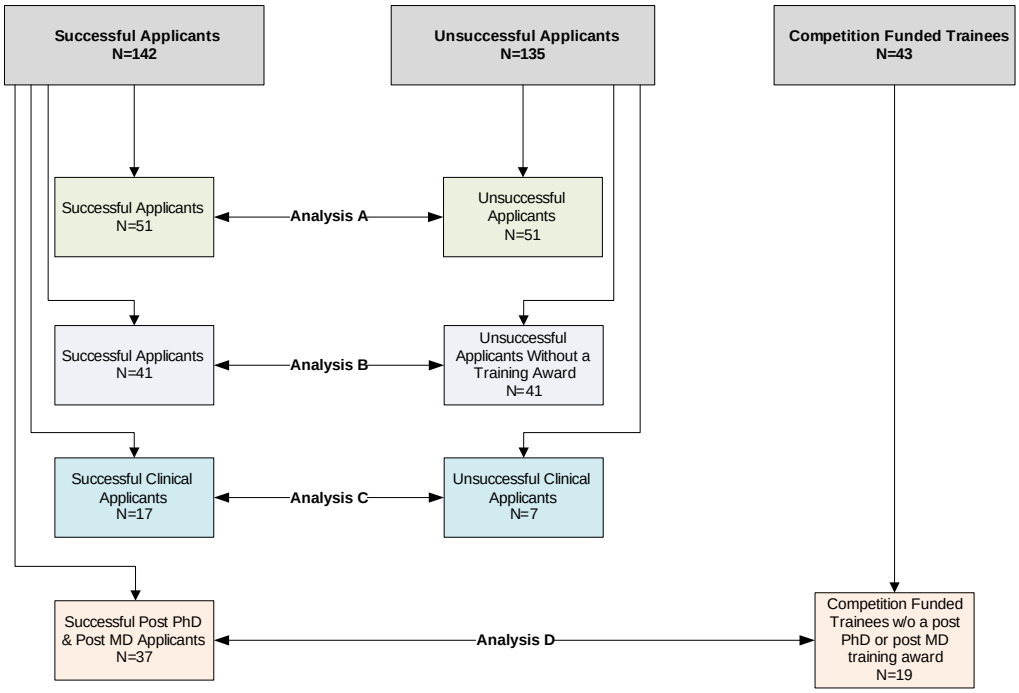


Figure 1. Visual representation of four comparative analyses conducted as part of the Personnel Support Awards program evaluation. The figure should be read from the top to bottom and from left to right. At the top are the program group (successful applicants) and comparison groups (unsuccessful applicants and competition funded trainees). Each analysis includes a subgroup of respondents matched for equivalency.

Responses related to the career trajectory, career performance and perceived program value of respondents are organized and compared according to the following outcome measures: current career in cancer research, career field, receipt of research funding, contributions to the research literature, influence on clinical guidelines, patent record, and job satisfaction. Note that bolded and starred responses represent statistically significant findings.

Demographics[3]

Note that respondents could have received multiple training awards from the NCIC and / or another organization at different levels / time. However, training awards could not be held concurrently.

Successful Applicants (n=142)

- 142 out of 247 successful applicants responded representing a 57% response rate

- 72 (45%) successful applicants were offered a post PhD research fellowship; 70 (44%) were offered a research studentship; 17 (11%) were offered a post MD research fellowship
- 141 (99%) successful applicants accepted the NCIC training award they were offered

- 100 (70%) successful applicants were offered a training award from another organization; 42 (30%) were not offered a training award from another organization
- 56 (56%) successful applicants accepted a training award offered by another organization; 44 (44%) did not accept the training offered by another organization

Unsuccessful Applicants (n=135)

- 135 out of 466 unsuccessful applicants responded representing a 29% response rate

- 78 (55%) unsuccessful applicants applied for a post PhD research fellowship; 54 (38%) applied for a research studentship; 11 (7%) applied for a post MD research fellowship

- 94 (70%) unsuccessful applicants were offered a training award from another organization; 41 (30%) were not offered a training award from another organization

[3] Note that this data represents responses from all respondents.

- 93 (99%) unsuccessful applicants accepted a training award offered by another organization; 1 (1%) did not accept the training award offered by another organization

Competition Funded Trainees

- 43 out of 106 competition funded trainees responded representing a 41% response rate

- 28 (64%) competition funded trainees were offered a training award from another organization; 16 (36%) were not offered a training award from another organization
- 21 (58%) competition funded trainees were offered a post PhD research fellowship from another organization; 11 (31%) were offered a research studentship; 4 (11%) were offered a post MD research fellowship

A.

SUCCESSFUL APPLICANTS (n= 51)
VERSUS UNSUCCESSFUL APPLICANTS (n=51)

- Career Trajectory -

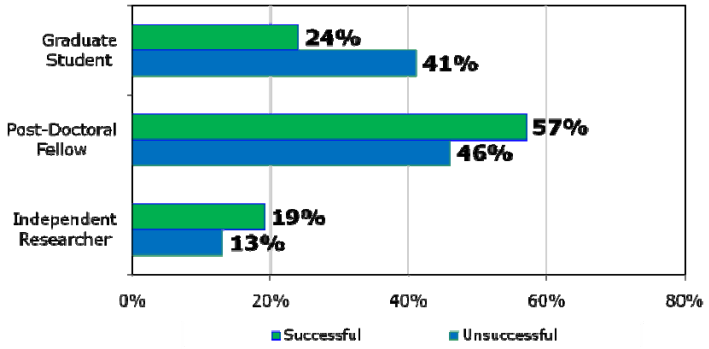
Career in Cancer Research

- 42 (82%) successful applicants are currently working as a cancer researcher; 9 (18%) are not currently working as a cancer researcher
- 46 (90%) unsuccessful applicants are currently working as a cancer researcher; 5 (10%) are not currently working as a cancer researcher

Currently working as a cancer researcher?

- Of the 42 successful applicants and 46 unsuccessful applicants working as a cancer researcher:
  - 24 (57%) successful applicants are working as a post-doctoral fellow; 10 (24%) are working as a graduate student; 8 (19%) are working as an independent researcher
  - 21 (46%) unsuccessful applicants are working as a post-doctoral fellow; 19 (41%) are working as a graduate student; 6 (13%) are working an independent researcher

In what capacity are you currently working as a cancer researcher?



- 27 (64%) successful applicants have greater than five years experience working as a cancer researcher in any capacity; 15 (36%) have less than five years experience working as a cancer researcher in any capacity
- 34 (74%) unsuccessful applicants have greater than five years experience working as a cancer researcher in any capacity; 12 (26%) have less than five years experience working as a cancer researcher in any capacity

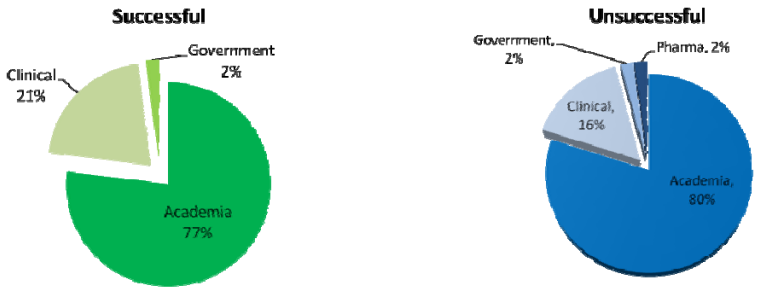
- 38 (90%) successful applicants have less than five years experience conducting cancer research as a principal investigator; 4 (10%) have greater than five years experience conducting cancer research as a principal investigator
- 46 (100%) unsuccessful applicants have less than five years experience conducting cancer research as a principal investigator

Career Field[4]

- 44 (77%) successful applicants are working in academia; 12 (21%) are working in a clinical environment; 1 (2%) are working in government
- 44 (80%) unsuccessful applicants are working in academia; 9 (16%) are working in a clinical environment; 1 (2%) are working in government; 1 (2%) are working in the pharmaceutical industry

[4] Note respondents could have selected more than one response option for this question

In what field are you currently working in?

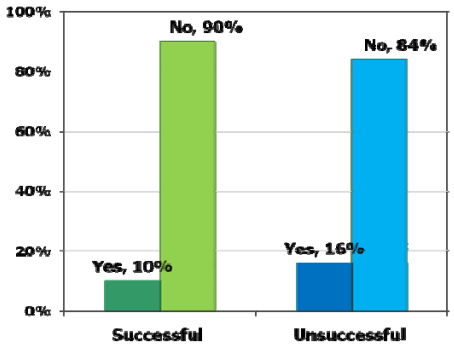


- Career Performance -

Receipt of Research Funding

- 46 (90%) successful applicants have not been named as an investigator on a cancer-related research grant that received funding; 5 (10%) have been named as an investigator on a cancer-related research grant that received funding
- 43 (84%) unsuccessful applicants have not been named as an investigator on a cancer-related research grant that received funding; 8 (16%) have been named as an investigator on a cancer-related research grant that received funding

Been an investigator on a cancer-related research grant that received funding?



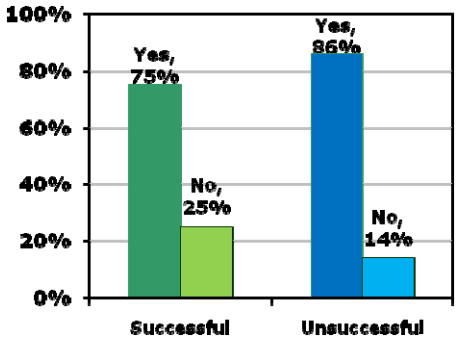
- Of the 5 successful applicants who have been named as an investigator on a cancer-related research grant that received funding, 4 (80%) received individual grants; 1 (20%) received both individual grants and team grants

- Of the 8 unsuccessful applicants who have been named as an investigator on a cancer-related research grant that received funding, 7 (88%) received individual grants; 1 (12%) received team grants

Contributions to the Research Literature

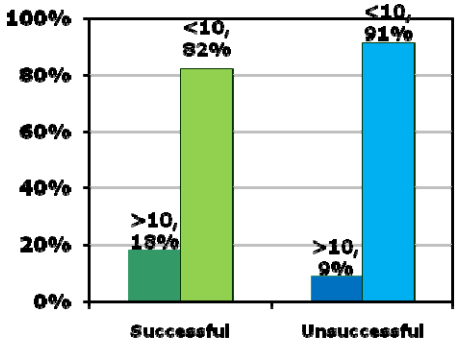
- 38 (75%) successful applicants have been an author or co-author of a publication in a cancer-related journal; 13 (25%) have not been an author or co-author of a publication in a cancer-related journal
- 44 (86%) unsuccessful applicants have been an author or co-author of a publication in a cancer-related journal; 7 (14%) have not been an author or co-author of a publication in a cancer-related journal

Been an author of a publication in a cancer-related journal?



- Of the 38 successful applicants who have been an author or co-author of a publication in a cancer-related journal, 31 (82%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 7 (18%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career
- Of the 44 unsuccessful applicants who have been an author or co-author of a publication in a cancer-related journal, 40 (91%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 4 (9%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career

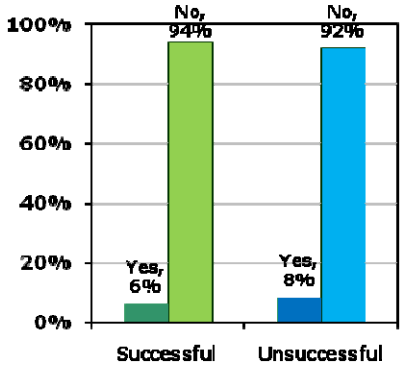
How many publications have you authored throughout your career?



Influence on Clinical Guidelines

- 48 (94%) successful applicants have not been an author or co-author of a paper that has been cited in clinical guidelines; 3 (6%) have been an author or co-author of a paper that has been cited in clinical guidelines
- 47 (92%) unsuccessful applicants have not been an author or co-author of a paper that has been cited in clinical guidelines; 4 (8%) have been an author or co-author of a paper that has been cited in clinical guidelines

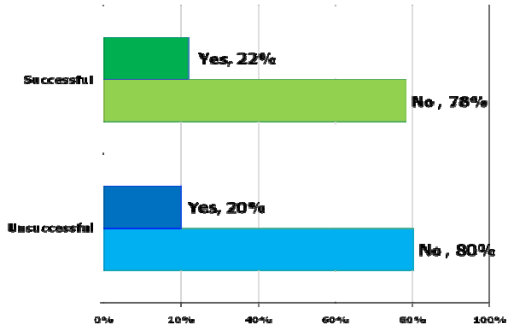
Have you been an author of a paper cited in clinical guidelines?



Patent record

- 40 (78%) successful applicants have not filed a patent related to their work in cancer research; 11 (22%) have filed a patent related to their work in cancer research
- 41 (80%) unsuccessful applicants have not filed a patent related to their work in cancer research; 10 (20%) have filed a patent related to their work in cancer research

Have you filed a patent related to your work in cancer research?



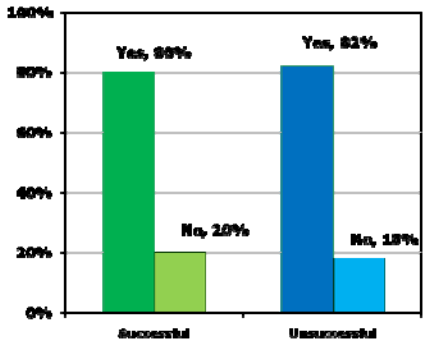
- Of the 11 successful applicants who have filed a patent related to their work in cancer research, 11 (100%) have not been directly involved in the successful commercialization of a product as a result of their work in cancer research
- Of the 10 unsuccessful applicants who have filed a patent related to their work in cancer research, 7 (70%) have not been directly involved in the successful commercialization of a product as a result of their work in cancer research; 3 (30%) have been directly involved in the successful commercialization of a product as a result of their work in cancer research

Job satisfaction

- 49 (96%) successful applicants are satisfied with their job; 1 (2%) are not satisfied; 1 (2%) no answer
- 46 (90%) unsuccessful applicants are satisfied with their job; 4 (8%) are not satisfied; 1 (2%) no answer

- 40 (78%) successful applicants feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 10 (20%) do not feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 1 (2%) no answer
- 42 (82%) unsuccessful applicants feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 9 (18%) do not feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer

Is your work contributing to the eradication of cancer and /or the enhancement of the quality of life of people living with cancer?



- Program Value[5] -

- 131 (92%) successful applicants agree that receiving a training award encourages trainees to pursue a career in cancer research; 6 (5%) neither agree or disagree; 5 (3%) disagree
- 126 (93%) unsuccessful applicants agree that receiving a training award encourages trainees to pursue a career in cancer research; 7 (5%) neither agree or disagree; 2 (2%) disagree

- 135 (95%) successful applicants agree that training awards are a good mechanism by which to build capacity in cancer research; 4 (3%) neither agree or disagree; (2%) disagree

[5] Note that this data represents responses from all successful applicants and unsuccessful applicants.

- 129 (96%) unsuccessful applicants agree that training awards are a good mechanism by which to build capacity in cancer research; 3 (2%) disagree; 3 (2%) neither agree or disagree

- 65 (46%) successful applicants agree given that cancer research funds are limited, the Society should fund training awards at the expense of research grants; 47 (33%) neither agree or disagree; 30 (21%) disagree
- 60 (44%) unsuccessful applicants agree given that cancer research funds are limited, the Society should fund training awards at the expense of research grants; 39 (29%) neither agree or disagree; 36 (27%) disagree

The Society should fund training awards at the expense of research grants?

Conclusion

Overall, there are no significant differences in relation to the career trajectory, career performance and perceived program value of successful applicants who received a NCIC training award and unsuccessful applicants who applied but failed to receive a NCIC training award. A similar number of successful applicants and unsuccessful applicants are currently working as cancer researchers. However, a slightly higher number of successful applicants are working as independent researchers than their unsuccessful counterparts despite having less experience working as a cancer researcher in any capacity. The majority of both successful and unsuccessful applicants are working in academia followed by clinical environment. Their respective career performance is similar as well. Their receipt and type of research funding, publication count, influence on clinical guidelines, patent record, level of job satisfaction, and perceived contribution to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer is comparable. Finally, respondents from both groups agree that training

awards encourage trainees to pursue a career in cancer research and that they are a good mechanism by which to build cancer research capacity, but are less sure if they should be funded at the expense of research grants.

Selected Comments Regarding Program Value:

"I think it mainly encourages trainees to stay in research, but not necessarily in cancer research"

"The decision to pursue a career in cancer research has more to do with the perceived availability of funding for principal investigators rather than trainee awards"

"An award from a prestigious organization legitimizes my research endeavours and motivates me to choose research avenues that are consistent with the goals of the funding organization"

"If I had received a fellowship from NCIC I would have taken my project in another direction to make a link with cancer research"

"This award was absolutely critical to my training and success as a clinical researcher"

"In my opinion, one of the best ways to ensure that there will be a strong, next generation of cancer researchers"

"I would suggest a limited number of competitive awards... possibly aimed at post-docs and even senior post-docs. There is no good funding mechanism to provide salaries for our most senior post-docs who represent our most highly trained personnel"

"Research grants also fund training"

"Most trainees are attracted to well funded projects rather than scholarship/fellowship awards. Fewer research grants results in fewer attractive research projects which in turn acts as a disincentive for trainees to enter the field"

"Why not integrate training awards into operating grants. Therefore, funded researchers will have money to pay student and post doc salaries and also pay for travel to a conference"

"Training awards should be a priority when faced with limited funds. The pay lines are a fraction of those of research grants and the payoff is at least equal"

B.

SUCCESSFUL APPLICANTS (n=41) VERSUS UNSUCCESSFUL APPLICANTS WITHOUT A TRAINING AWARD (n=41)

- Career Trajectory -

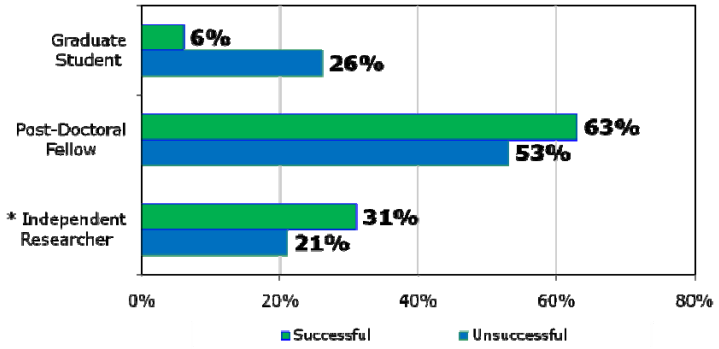
Career in Cancer Research

- 35 (85%) successful applicants are currently working as a cancer researcher; 6 (15%) are not currently working as a cancer researcher
- 34 (83%) unsuccessful applicants without a training award are currently working as a cancer researcher; 7 (17%) are not currently working as a cancer researcher

Currently working as a cancer researcher?

- Of the 35 successful applicants and 34 unsuccessful applicants without a training award working as a cancer researcher:
  - **22 (63%) successful applicants are working as a post-doctoral fellow; 11 (31%) are working as a independent researcher; 2 (6%) are working as a graduate student**
  - **18 (53%) unsuccessful applicants without a training award are working as a post-doctoral fellow; 9 (26%) are working as a graduate student; 7 (21%) are working as an independent researcher**

* In what capacity are you currently working as a cancer researcher?



- 27 (77%) successful applicants have greater than five years experience working as a cancer researcher in any capacity; 8 (23%) have less than five years experience working as a cancer researcher in any capacity
- 23 (68%) unsuccessful applicants without a training award have greater than five years experience working as a cancer researcher in any capacity; 11 (32%) have less than five years experience working as a cancer researcher in any capacity

- 29 (83%) successful applicants have less than five years conducting cancer research as a principal investigator; 6 (17%) have greater than five years experience conducting cancer research as a principal investigator;
- 32 (94%) unsuccessful applicants without a training award have less than five years experience conducting cancer research as a principal investigator; 2 (6%) have greater than five years conducting cancer research as a principal investigator

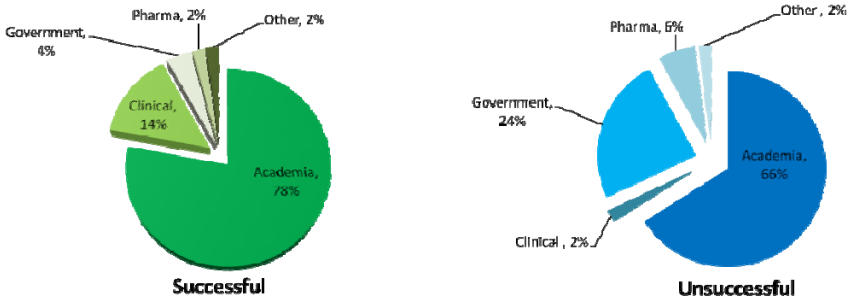
Career Field[6]

- 38 (78%) successful applicants are working in academia; 7 (14%) are working in a clinical environment; 2 (4%) are working in government; 1 (2%) is working in the pharmaceutical industry; 1 (2%) is working in other (technopreneurship)

[6] Note respondents could have selected more than one response option for this question.

- 34 (66%) unsuccessful applicants without a training award are working in academia; 12 (24%) are working in government; 3 (6%) are working in the pharmaceutical industry; 1 (2%) is working in a clinical environment; 1 (2%) is working in other (biotech)

In what field are you currently working in?

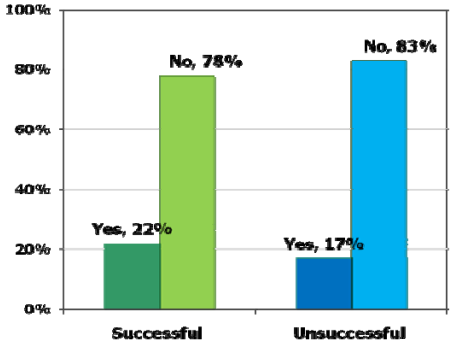


- Career Performance -

Receipt of Research Funding

- 32 (78%) successful applicants have not been named as an investigator on a cancer-related research grant that received funding; 9 (22%) have been named as an investigator on a cancer-related research grant that received funding
- 34 (83%) unsuccessful applicants without a training award have not been named as an investigator on a cancer-related research grant that received funding; 7 (17%) have been named as an investigator on a cancer-related research grant that received funding

Been an investigator on a cancer-related research grant that received funding?

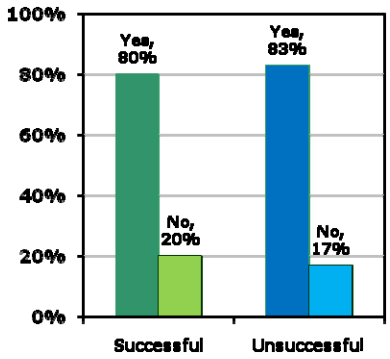


- Of the 9 successful applicants who have been named as an investigator on a cancer-related research grant that received funding, 7 (78%) received individual grants; 1 (11%) received both individual grants and team grants; 1 (11%) received team grants
- Of the 7 unsuccessful applicants without a training award who have been named as an investigator on a cancer-related research grant that received funding, 6 (86%) received individual grants; 1 (14%) received both individual grants and team grants

<u>Contributions to the Research Literature</u>

- 33 (80%) successful applicants have been an author or co-author of a publication in a cancer-related journal; 8 (20%) have not been an author or co-author of a publication in a cancer-related journal
- 34 (83%) unsuccessful applicants without a training award have been named an author or co-author of a publication in a cancer-related journal; 7 (17%) have not been named an author or co-author of a publication in a cancer-related journal

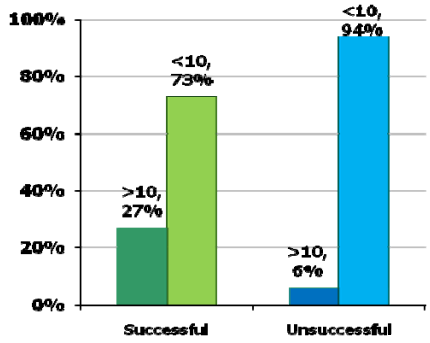
Been an author of a publication in a cancer-related journal?



- **Of the 33 successful applicants who have been an author or co-author of a publication in a cancer-related journal, 24 (73%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 9 (27%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career**

- **Of the 34 unsuccessful applicants without a training award who have been named an author or co-author of a publication in a cancer-related journal, 32 (94%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 2 (6%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career**

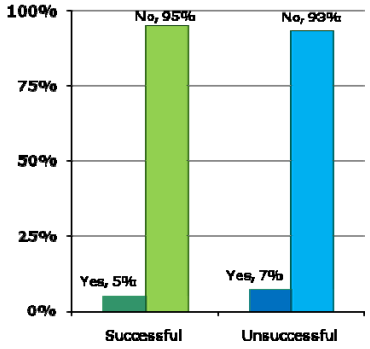
* How many publications have you authored throughout your career?



Influence on Clinical Guidelines

- 39 (95%) successful applicants have not been an author or co-author of a paper that has been cited in clinical guidelines; 2 (5%) have been an author or co-author of a paper that has been cited in clinical guidelines
- 38 (93%) unsuccessful applicants without a training award have not been an author or co-author of a paper that has been cited in clinical guidelines; 3 (7%) have been an author or co-author of a paper that has been cited in clinical guidelines

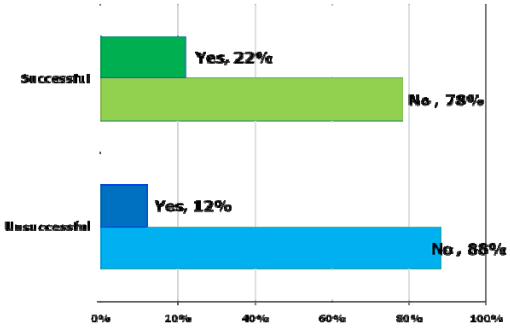
Have you been an author of a paper cited in clinical guidelines?



Patent record

- 32 (78%) successful applicants have not filed a patent related to their work in cancer research; 9 (22%) have filed a patent related to their work in cancer research
- 36 (88%) unsuccessful applicants without a training award have not filed a patent related to their work in cancer research; 5 (12%) have filed a patent related to their work in cancer research

Have you filed a patent related to your work in cancer research?



- Of the 9 successful applicants who have filed a patent related to their work in cancer research, 9 (100%) have not been directly involved in the successful commercialization of a product as a result of their work in cancer research
- Of the 5 unsuccessful applicants without a training award who have filed a patent related to their work in cancer research, 4 (80%) have not been directly involved in the successful commercialization of a

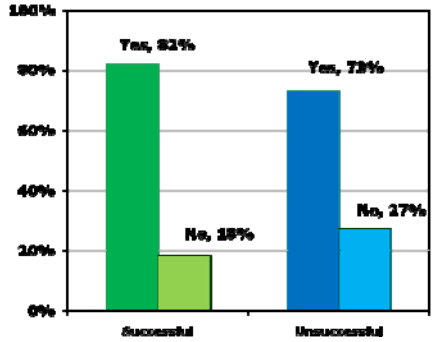
product as a result of their work in cancer research; 1 (20%) has been directly involved in the successful commercialization of a product as a result of their work in cancer research

Job satisfaction

- 36 (88%) successful applicants are satisfied with their job; 3 (7%) are not satisfied; 1 (5%) no answer
- 35 (85%) unsuccessful applicants without a training award are satisfied with their job; 3 (7%) are not satisfied; 2 (5%) no answer

- 32 (78%) successful applicants feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 7 (17%) do not feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 2 (5%) no answer
- 29 (71%) unsuccessful applicants without a training award feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 11 (27%) do not feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 1 (2%) no answer

Is your work contributing to the eradication of cancer and / or the enhancement of the quality of life of people living with cancer?



Conclusion

When comparing the career trajectory, career performance and perceived program value of successful applicants and unsuccessful applicants without a training award a couple of significant differences begin to emerge. First of all, a significantly higher proportion of successful applicants are working as independent researchers than unsuccessful applicants without a training award despite the fact that respondents from both groups share a similar level of experience working as a cancer researcher in any capacity. This suggests that receiving a training award can impact the quickness with which a trainee will advance into the role of an independent researcher. Secondly, successful applicants have a significantly higher publication count than unsuccessful applicants without a training award even though a similar number of respondents from both groups report having been an author or co-author of a publication in a cancer-related journal. This implies that the receipt of a training award can impact the scientific productivity (as measured by publication count) of trainees.

Aside from these two significant differences, there are very few other differences between successful applicants and unsuccessful applicants without a training award. A similar number of respondents from both groups are currently working as cancer researchers and most are working in academia. Finally, respondents' receipt and type of research funding, influence on clinical guidelines, patent record, and job satisfaction is also comparable.

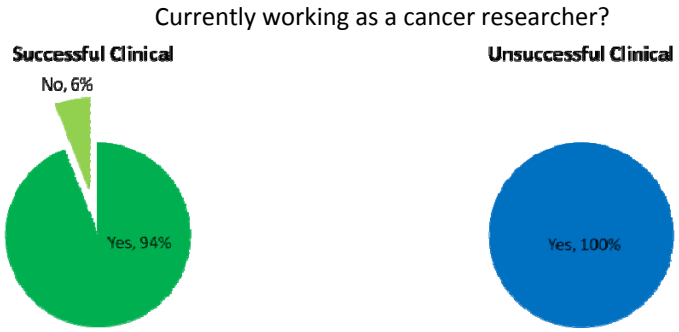
C.

SUCCESSFUL CLINICAL APPLICANTS (n=17) VERSUS UNSUCCESSFUL CLINICAL APPLICANTS WITHOUT A TRAINING AWARD (n=7)

- Career Trajectory -

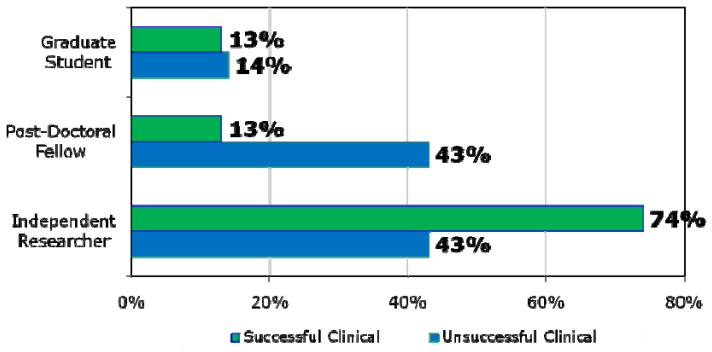
Career in Cancer Research

- 16 (94%) successful clinical applicants are currently working as a cancer researcher; 1 (6%) are not currently working as a cancer researcher
- 7 (100%) unsuccessful clinical applicants are currently working as a cancer researcher



- Of the 16 successful applicants and 7 unsuccessful clinical applicants working as a cancer researcher:
  - 12 (74%) successful clinical applicants are working as an independent researcher; 2 (13%) are working as a graduate student; 2 (13%) are working as a post-doctoral fellow
  - 3 (43%) unsuccessful clinical applicants are working as an independent researcher; 3 (43%) are working as a post-doctoral fellow; 1 (14%) are working as a graduate student

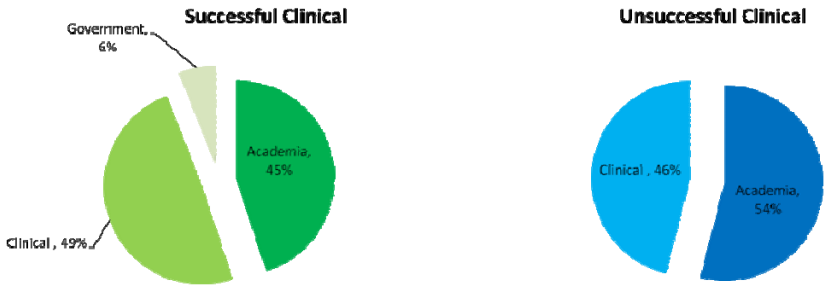
In what capacity are you currently working as a cancer researcher?



Career Field[7]

- 16 (49%) successful clinical applicants are working in a clinical environment; 15 (45%) are working in academia; 2 (6%) are working in government
- 7 (54%) unsuccessful clinical applicants are working in a academia; 6 (46%) are working in a clinical environment

In what field are you currently working in?



- Career Performance -

Receipt of Research Funding

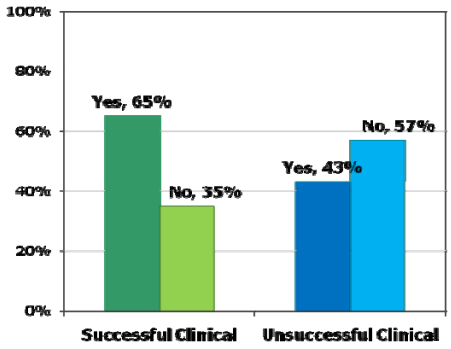
- 11 (65%) successful clinical applicants have been named as an investigator on a cancer-related research grant that received funding;

[7] Note respondents could have selected more than one response option for this question

6 (35%) have not been named as an investigator on a cancer-related research grant that received funding

- 4 (57%) unsuccessful clinical applicants have not been named as an investigator on a cancer-related research grant that received funding; 3 (43%) have been named as an investigator on a cancer-related research grant that received funding

Been an investigator on a cancer-related research grant that received funding?

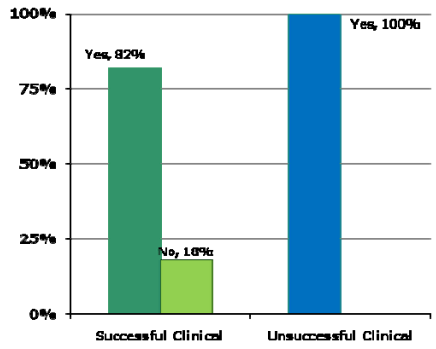


- Of the 11 successful clinical applicants who have been named as an investigator on a cancer-related research grant that received funding, 7 (64%) received individual grants; 3 (27%) received both individual grants and team grants; 1 (9%) received team grants
- Of the 3 unsuccessful clinical applicants who have been named as an investigator on a cancer-related research grant that received funding, 2 (67%) received individual grants; 1 (33%) received both individual grants and team grants

Contributions to the Research Literature

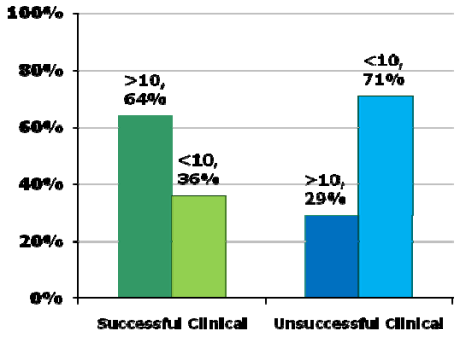
- 14 (82%) successful clinical applicants have been an author or co-author of a publication in a cancer-related journal; 3 (18%) have not been an author or co-author of a publication in a cancer-related journal
- 7 (100%) unsuccessful clinical applicants have been an author or co-author of a publication in a cancer-related journal

Been an author of a publication in a cancer-related journal?



- Of the 14 successful clinical applicants who have been an author or co-author of a publication in a cancer-related journal, 9 (64%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career; 5 (36%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career
- Of the 7 unsuccessful clinical applicants who have been an author or co-author of a publication in a cancer-related journal, 5 (71%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 2 (29%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career

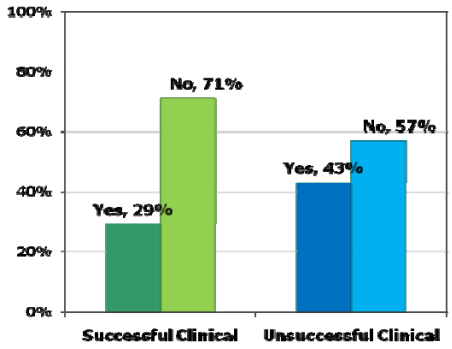
How many publications have you authored throughout your career?



Influence on Clinical Guidelines

- 12 (71%) successful clinical applicants have not been an author or co-author of a paper that has been cited in clinical guidelines; 5 (29%) have been an author or co-author of a paper that has been cited in clinical guidelines
- 4 (57%) unsuccessful clinical applicants have not been an author or co-author of a paper that has been cited in clinical guidelines; 3 (43%) have been an author or co-author of a paper that has been cited in clinical guidelines

Have you been an author of a paper cited in clinical guidelines?



Conclusion

The majority of respondents from both groups are currently working as cancer researchers in a clinical environment and / or academia. However, a higher percentage of successful clinical applicants are working as independent researchers than unsuccessful clinical applicants without a training award. In regards to career performance, a higher proportion of successful clinical applicants have been named an investigator on a cancer-related research grant that received funding than unsuccessful clinical applicants without a training award. The type of funding received is similar with the majority having received individual grants. The majority of respondents from both groups also report having been an author or co-author of a publication-related journal throughout their career. That being said, successful clinical applicants have a higher publication count than unsuccessful clinical applicants without a training award. Finally, a slightly higher percentage of

unsuccessful clinical applicants without a training award have authored a paper cited in clinical guidelines than successful clinical applicants.

Please note that due to the small sample size statistical tests were not conducted to verify the statistical significance of differences encountered in this analysis.

D.

SUCCESSFUL APPLICANTS (n=37)
VERSUS COMPETITION FUNDED TRAINEES (n=19)

- Career Trajectory -

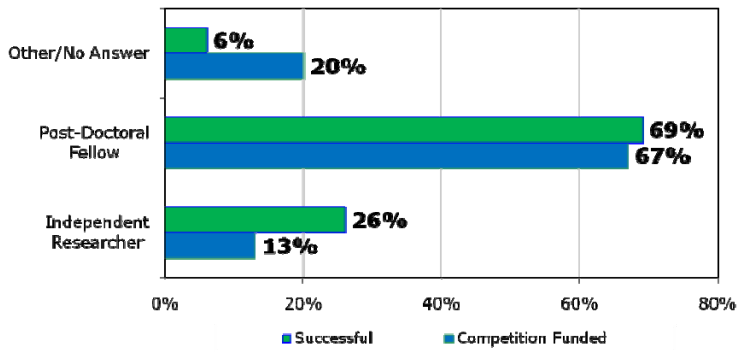
Career in Cancer Research

- 35 (95%) successful applicants are currently working as a cancer researcher; 2 (5%) are not currently working as a cancer researcher
- 15 (79%) competition funded trainees are currently working as cancer researcher; 4 (21%) are not currently working as a cancer researcher

Currently working as a cancer researcher?

- Of the 35 successful applicants and 15 competition funded trainees working as a cancer researcher:
  - 24 (69%) successful applicants are working as a post-doctoral fellow; 9 (26%) are working as an independent researcher; 2 (6%) are working as other (research associate)
  - 10 (67%) competition funded trainees are working as a post-doctoral fellow; 2 (13%) are working as an independent researcher; 2 (13%) no answer; 1 (7%) are working as other (junior scientist)

In what capacity are you currently working as a cancer researcher?



- 20 (57%) successful applicants have greater than five years experience working as a cancer researcher in any capacity; 15 (43%) have less than five years experience working as a cancer researcher in any capacity
- 9 (60%) competition funded trainees have greater than five years experience working as a cancer researcher in any capacity; 6 (40%) have less than five years experience working as a cancer researcher in any capacity

- 32 (91%) successful applicants have less than five years experience conducting cancer research as a principal investigator; 3 (9%) have greater than 5 years experience conducting cancer research as a principal investigator
- 15 (100%) competition funded trainees have less than five years experience conducting cancer research as a principal investigator

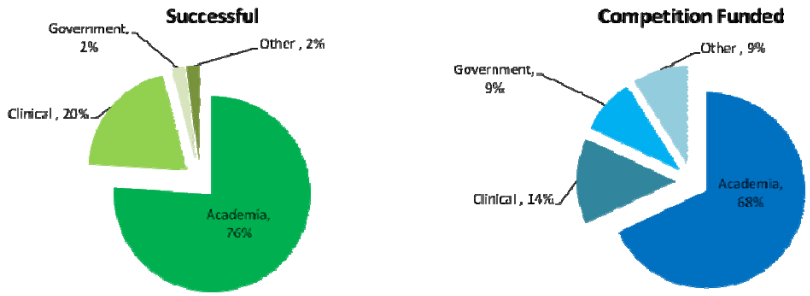
Career Field[8]

- 34 (76%) successful applicants are working in academia; 9 (20%) are working in a clinical environment; 1 (2%) are working in government; 1 (2%) are working in other (administrator)

[8] Note respondents could have selected more than one response option for this question

- 15 (68%) competition funded trainees are working in academia; 3 (14%) are working in a clinical environment; 2 (9%) are working in government; 2 (9%) are working in other (hospital, charity)

In what field are you currently working in?

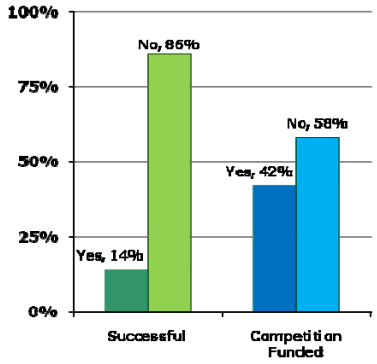


- Career Performance -

Receipt of Research Funding

- 32 (86%) successful applicants have not been named as an investigator on a cancer-related research grant that received funding; 5 (14%) have been named as an investigator on a cancer-related research grant that received funding
- 11 (58%) competition funded trainees have not been named as an investigator on a cancer-related research grant that received funding; 8 (42%) have been named as an investigator on a cancer-related research grant that received funding

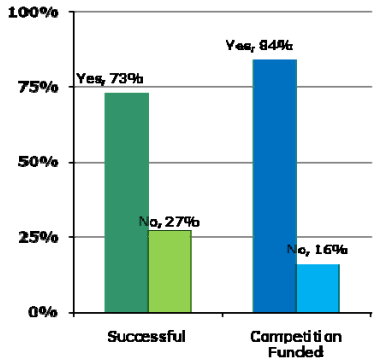
Been an investigator on a cancer-related research grant that received funding?



Contributions to the Research Literature

- 27 (73%) successful applicants have been an author or co-author of a publication in a cancer-related journal; 10 (27%) have not been an author or co-author of a publication in a cancer-related journal
- 16 (84%) competition funded trainees have been an author or co-author of a publication in a cancer-related journal; 3 (16%) have not been named an author or co-author of a publication in a cancer-related journal

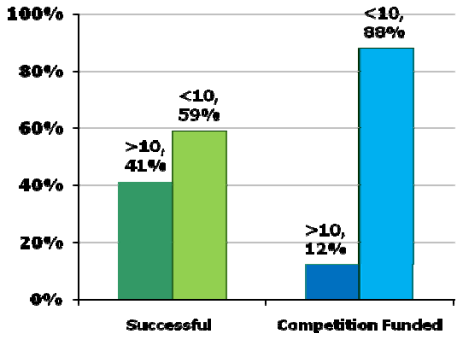
Been an author of a publication in a cancer-related journal?



- **Of the 27 successful applicants who have been an author or co-author of a publication in a cancer-related journal, 16 (59%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 11 (41%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career**

- **Of the 16 competition funded trainees who have been an author or co-author of a publication in a cancer-related journal, 14 (88%) have authored or co-authored less than ten publications in a cancer-related journal throughout their career; 2 (12%) have authored or co-authored greater than ten publications in a cancer-related journal throughout their career**

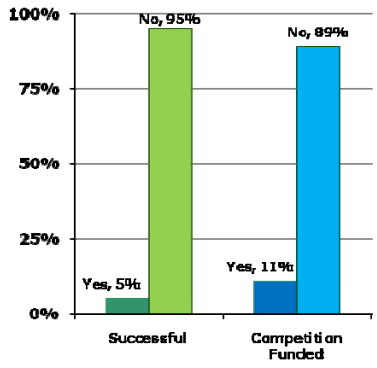
* How many publications have you authored throughout your career?



Influence on Clinical Guidelines

- 35 (95%) successful applicants have not been an author or co-author of a paper that has been cited in clinical guidelines; 2 (5%) have been an author or co-author of a paper that has been cited in clinical guidelines
- 17 (89%) competition funded trainees have not been an author or co-author of a paper that has been cited in clinical guidelines; 2 (11%) have been an author or co-author of a paper that has been cited in clinical guidelines

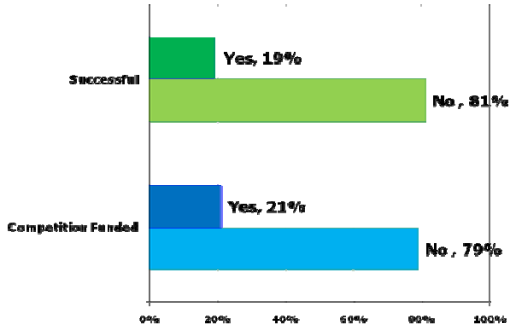
Have you been an author of a paper cited in clinical guidelines?



Patent record

- 30 (81%) successful applicants have not filed a patent related to their work in cancer research; 7 (19%) have filed a patent related to their work in cancer research
- 15 (79%) competition funded trainees have not filed a patent related to their work in cancer research; 4 (21%) have filed a patent related to their work in cancer research

Have you filed a patent related to your work in cancer research?



- Of the 7 successful applicants who have filed a patent related to their work in cancer research, 7 (100%) have not been directly involved in the successful commercialization of a product as a result of their work in cancer research
- Of the 4 competition funded trainees who have filed a patent related to their work in cancer research, 3 (80%) have not been directly

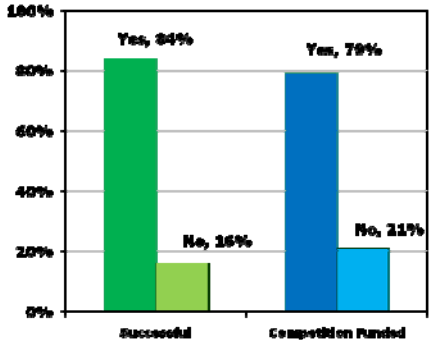
involved in the successful commercialization of a product as a result of their work in cancer research; 1 (20%) have been directly involved in the successful commercialization of a product as a result of their work in cancer research

Job satisfaction

- 33 (90%) successful applicants are satisfied with their job; 4 (10%) are not satisfied
- 16 (84%) competition funded trainees are satisfied with their job; 3 (16%) are not satisfied

- 31 (84%) successful applicants feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 6 (16%) do not feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer
- 15 (79%) competition funded trainees feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer; 4 (21%) do not feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer

Is your work contributing to the eradication of cancer and / or the enhancement of the quality of life of people living with cancer?



- Program Value -

- 35 (95%) successful applicants agree that receiving a training award encourages trainees to pursue a career in cancer research; 2 (5%) disagree
- 17 (89%) competition funded trainees agree that receiving a training award encourages trainees to pursue a career in cancer research; 2 (11%) neither agree or disagree

- 36 (97%) successful applicants agree that training awards are a good mechanism by which to build capacity in cancer research; 1 (3%) disagree
- 18 (95%) competition funded trainees agree that training awards are a good mechanism by which to build capacity in cancer research; 1 (5%) neither agree or disagree

- 18 (49%) successful applicants agree given that cancer research funds are limited, the Society should fund training awards at the expense of research grants; 13 (35%) neither agree or disagree; 6 (16%) disagree
- 12 (63%) competition funded trainees agree given that cancer research funds are limited, the Society should fund training awards at the expense of research grants; 5 (26%) neither agree or disagree; 2 (11%) disagree

The Society should fund training awards at the expense of research grants?

Conclusion

A slightly higher percentage of successful applicants are currently working as cancer researchers than competition funded trainees. Respondents from both groups report a similar level of experience working as cancer researcher in any capacity, however, a higher proportion of successful applicants are working as independent researchers than competition funded trainees. The majority of respondents are working in academia followed by clinical environment. Interestingly, a higher percentage of competition funded trainees have been named an investigator on cancer-related research grant that received funding than successful applicants. A similar number of respondents report having been an author or co-author of a publication in a cancer-related journal, but successful applicants have a significantly higher publication count than competition funded trainees. Respondents' influence on clinical guidelines, patent record, and job satisfaction is similar. Finally, successful applicants and competition funded trainees perceived program value is comparable with the majority of respondents from both groups agreeing that receiving a training award encourages trainees to pursue a career in cancer research and is a good mechanism by which to build capacity in cancer research. That being said, respondents from both groups are in less agreement about funding training awards at the expense of research grants. Less than half of successful applicants agree that training awards should be funded at the expense of research grants, whereas well over half of competition funded trainees agree with funding training awards at the expense of research grants. The most interesting point about this scenario is that the group of respondents that never received a post PhD or post MD training award is more in favour of funding training awards at the expense of research grants than the group of respondents who received a post PhD or post MD training awards.

Selected Comments Regarding Program Value:

"Research training awards may encourage trainees in the short term but many other factors contribute to the longer term decision to pursue a career in cancer research. Frequent conversations include the opportunity costs for pursuing an extensive training period, the low availability of new investigator positions and highly competitive grant environment facing new investigators"

"In many cases it (training award) is essential to facilitate a career"

"A research award is also a critical asset to a research career development and advancement"

"…research trainees capable of receiving awards will choose a lab and project in labs that possess adequate research infrastructure and operating funds. Training awards will allow good labs to grow and be more productive"

"I think that funding individuals directly lessens the burden of having to pay for a post doc off of a grant. This allows PIs to direct their limited funds more directly to research"

"Both are interconnected and closely rely on each other for best efficiency and results. The right balance considering both is required"

6.0 CONCLUSIONS AND DISCUSSION

This section provides a discussion of findings related to all four comparative analyses. Overall, a large percentage of respondents were offered a training award from another organization. This indicates that NCIC did not have exclusive domain over applicants' funding and that there was a large pool of training awards available to them at the time they applied for a training award. It is, however, important to note that all but one successful applicant accepted the NCIC award, which could be an indication of the prestige associated with having been offered a NCIC training award.

Some other general observations include:

- The majority of respondents had received or applied for a research studentship or post PhD research fellowship. This was expected since a larger number of post PhD research fellowships and research studentships were offered through the NCIC than post MD research fellowships.
- A larger number of respondents had applied for a training award in the biomedical category than the BPCC category. Again, this was expected as it reflects the fact that a higher number of training awards were awarded through the NCIC in the biomedical category than the BPCC category.
- There were a larger number of successful applicants than unsuccessful applicants who applied for a training award in the BPCC category. This correlates to the fact that there was a smaller pool of applicants relative to the amount of funds available in the BPCC category.

In regards to career trajectory the following conclusions can be made:

- The majority of respondents, regardless of having received a training award or not, are currently working as cancer researchers. This suggests that having received a training award had little impact on whether or not a trainee went on to work as a cancer researcher.

- Respondents have a similar number of years experience working as a cancer researcher in any capacity with most having greater than five years. However, in all four comparative analyses a larger percentage of successful applicants are working as independent researchers. In

fact, when comparing successful applicants to unsuccessful applicants without a training award the difference is statistically significant. This implies that the reception of a training award impacted the speed with which successful applicants moved into the role of an independent researcher, especially when compared to unsuccessful applicants without a training award.

- The majority of respondents are working in academia and/or clinical environment with the exception of unsuccessful applicants without a training award where most are working in academia and/or government. This is unexpected since a larger number of unsuccessful applicants without a training award applied for a post MD research fellowship than successful applicants. As such, this could suggest that the failure to receive a post MD research fellowship can have an impact on whether or not a trainee goes on to work in a clinical environment although further analysis beyond the scope of this project would be required to confirm this point.

In conclusion, findings suggest that receiving a training award had little impact on whether or not a trainee went on to work as a cancer researcher since the majority of respondents, regardless of having received a training award or not, are currently working as cancer researchers. However, the receipt of a training award is shown to have influenced the speed with which successful applicants moved into the role of independent researchers, especially when compared to unsuccessful applicants without a training award. Finally, the majority of respondents are working in academia followed by clinical environment with the exception of unsuccessful applicants without a training award where the majority are working in academia followed by government.

In regards to <u>career performance</u> the following conclusions can be made:

- Generally, a small percentage of respondents have been named an investigator on a cancer-related research grant that received funding. The only exception being successful clinical applicants where well over half have received research funding. In regards to type of research funding received, most respondents received individual grants with a very small percentage receiving team grants.

- The majority of respondents have been an author or co-author of a publication in a cancer-related journal at some point in their career. However, when comparing the number of publications respondents have authored or co-authored a few statistically significant differences begin to emerge. Specifically, successful applicants have authored or co-authored a significantly higher number of publications in cancer-related journals than both unsuccessful applicants without a training award and competition funded trainees. There are no significant differences between successful applicants and unsuccessful applicants. Regardless, this still suggests that the reception of a training award could have impacted a trainee's publication count since trainees who received a training award have published more often than trainees who failed to receive a training award.

- There are few differences in relation to respondents' influence on clinical guidelines with the majority having failed to author or co-author a paper that has been cited in clinical guidelines.

- Respondents' patent record is similar with a small percentage of respondents having filed a patent related to their work in cancer research and an even smaller percentage involved in the successful commercialization of a product as a result of their work in cancer research.

- The majority of respondents report being satisfied with their job and a similar number feel their work is contributing directly to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer. This indicates that regardless of receiving a training award respondents are overwhelmingly satisfied with their career and feel their work is having an impact on cancer control.

To summarize, there are few differences in regards respondents' career performance. Their patent record, influence on clinical guidelines, receipt and type of research funding, level of job satisfaction, and perceived contribution to the eradication of cancer and/or the enhancement of the quality of life of people living with cancer is similar. However, the publication count of successful applicants is significantly higher than both unsuccessful applicants without a training award and competition funded trainees.

In regards to perceived program value the following conclusions can be made:

- The majority of respondents agree that (a) receiving a training award encourages trainees to pursue a career in cancer research, and (b) training awards are a good mechanism by which to build capacity in cancer research. On the other hand, respondents are in less agreement about funding training awards at the expense of research grants. Interestingly, less than half of successful applicants and unsuccessful applicants agree that training awards should be funded at the expense of research grants, whereas, well over half of competition funded trainees agree that training awards should be funded at the expense of research grants. Most interesting about this funding scenario is the fact that the group of trainees that never received a (post PhD or post MD) training award is more in favour of funding training awards at the expense of research grants than trainees who received and / or applied for a training award. Ultimately, this tells us that respondents are sure about the value training awards, but are less sure about funding training awards if it comes at the expense of research grants. In general, trainees who agree with funding training awards at the expense of research grants tend to cite the need to cultivate the next generation of researchers whereas trainees who neither agree nor disagree tend to mention that both are important and are unable choose between the two, and finally respondents who disagree point to the fact that trainees can get trained via other mechanisms including research grants and that there is little point in training researchers if they are subsequently unable to acquire the necessary funding to pursue their research.