Outcomes of Canadian National Institute for the Blind Baker research grants from 1998 to 2009

Erin A. Compeau*, Keith Gordon, PhD†; Yvonne M. Buys, MD, FRCSC‡

ABSTRACT • RÉSUMÉ

Objective: To assess the outcome of Canadian National Institute for the Blind (CNIB) Baker research grants.
Design: Retrospective case series.
Participants: Eighty-six Canadian vision researchers who received 88 CNIB Baker grants from 1998 to 2009.
Methods: Grant recipients were invited to complete a survey relating to their CNIB Baker grant. Questions included the number of publications, presentations, patents, impact of the grant research on health policy, further research funding, and career advancement. For those not responding to the survey, a MEDLINE search was conducted to locate any potential publications. Each publication was reviewed to obtain the year of publication, journal impact factor, and to determine whether the CNIB Baker grant was acknowledged in the publication.
Results: Eighty-five (96.6%) of the grant recipients completed the survey. For the 3 nonrespondents the results for publications was obtained by conducting a MEDLINE search. Forty-seven (53.4%) grants resulted in 87 publications. This translates to an overall mean investment of $33 823 per publication. Seventy-one (83.5%) grants resulted in a total of 280 presentations, 9 (10.6%) in a health policy change, and 4 (4.7%) in a patent. Forty-seven (55.3%) investigators responded that the CNIB Baker grant assisted in obtaining subsequent research funding and 71 (91.7%) indicated that the grant contributed to their career advancement.
Conclusions: The goals of the CNIB Baker grants in furthering vision research, to assist in career advancement, and in obtaining future funding from other granting agencies seem to have been achieved. The expenditure per publication is consistent with the literature.

Objet : Évaluation du résultat des subventions Baker pour la recherche de l'Institut national canadien pour les aveugles (INCA).
Nature : Rétrospective d'une série de cas.
Participants : 86 chercheurs canadiens sur la vision, qui ont reçu 88 subventions Baker de l'INCA entre 1998 et 2009.
Méthodes : Les récipiendaires des subventions ont été invités à répondre à un sondage concernant leurs subventions Baker de l'INCA. Le questionnaire a porté sur nombre de publications, les exposés, les brevets, la portée de la recherche subventionnée sur les politiques de la santé, le financement d'autres subventions de recherche et la progression des carrières. Pour ceux qui ne répondirent pas au sondage, une recherche sur MEDLINE a été menée pour repérer toute publication potentielle. Chaque publication a été examinée pour en obtenir la date, le facteur d'impact dans les journaux, et établir si l'on a mentionné la subvention Baker de l'INCA dans la publication.
Résultats : Quatre-vingt-cinq des récipiendaires de bourse (96,6%) ont répondu au sondage. Pour les 3 qui n'ont pas répondu, le résultat des publications a été obtenu par une recherche sur MEDLINE. Quarante-sept subventions (53,4%) ont permis 87 publications, ce qui se traduit par une moyenne d'investissement de 33 823 $ par publication. Soixante-et-onze subventions (83,5%) ont permis un total de 280 présentations, 9 (10,6%) des modifications aux politiques de la santé et 4 (4,7%) des brevets. Quarante-sept investigateurs (53,3%) ont répondu que la subvention Baker de l'INCA avait aidé à obtenir d'autres financements de recherche et 71 (91,7%) ont indiqué que la subvention avait contribué à la progression de leur carrière.
Conclusions : Les subventions Baker de l'INCA semblent avoir atteint leurs buts en faisant progresser la recherche sur la vision, en aidant la progression des carrières et en obtenant des financements d'autres agences de dons. Les dépenses par publication concordent avec la littérature.

Lieutenant colonel Edwin Albert Baker was both a founding member and Managing Director and General Secretary of the Canadian National Institute for the Blind (CNIB) from 1920-1962. After his retirement in 1962, CNIB established the CNIB Baker grants to support Canadian vision research. The grants are peer-reviewed, typically for 1 year with a value of up to $40 000, and are awarded to both new and established Canadian residents conducting vision research in Canada. The goals of the grants are to promote studies that may either lead to prevention of vision loss or address the rehabilitative needs of Canadians living with vision loss. For new researchers the grants are also provided to assist in career advancement and in obtaining future funding from other granting agencies.

Since 1962, CNIB has awarded nearly 6 million dollars in grants to 203 projects. The effectiveness of the grants in achieving the stated goals however has never been assessed. This study was designed to evaluate the outcomes of CNIB Baker grants in achieving the goals of both research, as assessed through knowledge translation by means of publications and presentations, and career advancement and subsequent funding.

From the *Schulich School of Business, York University, Toronto, Ont.; the †Canadian National Institute for the Blind, Toronto, Ont.; and the ‡Department of Ophthalmology and Vision Sciences, University of Toronto, Toronto, Ont.

Originally received Sep. 4, 2010 Final revision Apr. 4, 2011 Accepted May. 13, 2011

Correspondence to Yvonne M. Buys, Toronto Western Hospital, 399 Bathurst St., EW6-405, Toronto, ON M5T 2S8; y.buys@utoronto.ca

Can J Ophthalmol 2011;46:386–390
0008-4182/11/$-see front matter
doi:10.1016/j.jcjo.2011.07.012

1. What is the name of your study which was awarded the Baker Grant?

2. Did this grant result in a peer-reviewed publication(s)?

○ Yes

○ No

If "yes", please provide the reference.

3. Is there a paper currently in preparation for publication?

○ Yes, in press

○ Yes, submitted

○ Yes, in preparation

○ No

If "no", please indicate why you do not intend to seek publication.

4. Did this grant result in a presentation(s)?

○ Yes

○ No

If "yes", please provide details of the presentation(s), including the name of the meeting(s) and date(s).

If "no", briefly explain why the grant did not result in a presentation.

5. Did this grant result in a press-release?

○ Yes

○ No

If "yes", please provide the date.

6. Did the grant result in a health policy change?

○ Yes

○ No

If "yes", please provide the details.

7. Did the grant result in a patent?

○ Yes

○ No

If "yes", please provide the details.

8. Did the grant contribute to future funding from any other source?

○ Yes

○ No

If "yes", please provide the details.

9. Did the grant contribute to the development of your career?

○ Yes

○ No

If "yes", please provide the details.

Fig. 1—Survey sent to grant recipients.

Table 1—Publications related to Canadian National Institute for the Blind Baker grants from 1998 to 2009

Outcome	Grants with a Peer-Reviewed Publication (47 grants)	Grants with No Peer-Reviewed Publications (41 grants)
Number of peer-reviewed publications	87	0
Publications in press*	1	1
Publications submitted*	1	6
Publications in preparation for submission*	16	15
Total number of grants	47	22

*Each grant reported 1 publication for each of these categories. The 3 nonrespondents to the survey are not included for these categories.

Methods

The CNIB database for CNIB Baker grants was accessed to obtain information on the grants funded including the year and amount of the grant, name of the investigator, and title of the grant. Grant recipients were sent an electronic survey (Fig. 1) requesting information on the outcome of their grant. For those not responding to e-mail, attempts were made to locate a current telephone number to contact the individual directly. For the grant recipients where no contact was possible a MEDLINE search using the authors' last name and initials was conducted. Any publications were then compared to the grant title and included if appropriate.

The completed surveys were summarized. For publications the results of the survey and MEDLINE search were combined. The average number of publications per grant was calculated in addition to the number of years from obtaining the grant to first publication. The impact factor of the publications was also obtained using the 2009 journal citation report.[1] Finally, each publication was obtained and reviewed to determine if the CNIB Baker grant was acknowledged.

Results

From 1962 to 2009 there were a total of 203 grants for a total of $5 944 797.80. The title of the grants was only available from 1998 onward, so the analysis was limited to these grants. From 1998 to 2009 there were a total of 88 grants awarded with a mean value of $33 439 (range $7200 to $100 000) for a total of $2 942 638. The majority of the awards (80) were for 1 year, however, there were 5 awards for 2 years and 3 awards for 3 years. Two awards were combined CNIB Baker grants and Canadian Institutes of Health Research (CIHR) grants and 1 award was combined with the Foundation Fighting Blindness (FFB). All awards involved vision research with 52 (59%) of the awards being clinical studies and 36 (41%) basic science.

Eighty-five grant recipients (96.6%) completed the survey. Results for the publications for the 3 nonrespondents were obtained from a MEDLINE search. Forty-seven (53.4%) of the grants resulted in a total of 87 publications (Table 1). For those grants that resulted in a publication there was a mean of 1.9 ± 1.2 publications (range = 1-6) with the first publication an average of 2.9 ± 1.8 years from the year of the grant (range = 0-7 years). Overall the mean investment per grant for a publication was $33 823. When only considering those grants that resulted in a publication, the mean investment per grant for a publication was $16 808. Of the 87 publications, 9 were published in journals with no impact factor. For the remaining 78 peer-reviewed publications, the mean impact factor was 3.519 ± 2.493 (range = 0.615-18.126). Each published article was also reviewed to determine if the CNIB Baker grant was acknowledged. In 55 (63.2%) of the manuscripts there was a published acknowledgment.

In addition to the 87 peer-reviewed publications, an additional 2 papers were in press, 7 papers were submitted, and 31 were in preparation for submission (Table 1). In total, 48 grants (54.5%) resulted in 89 papers either published or in press and 69 grants (78.4%) with a publication either in preparation, submitted, or published. For the 19 grants with no publications, the most common reasons provided were study ongoing in 4 cases, problems with recruiting subjects in 3 cases, and insufficient data in 1 case.

Additional outcomes from the survey respondents are summarized in Table 2. Seventy-one grants (83.5%) resulted in a total of 280 presentations that represents a mean of 2.5 ± 3.8 presentations per grant (range = 0-22 presentations per grant). Nine grants (10.6%) caused a health policy change that ranged from changes in hospital policy to creating standards to objectively measure disease severity to changes in federal or provincial health care policy and reimbursement. Four grants (4.7%) resulted in a new patent.

Comparing the clinical studies to the basic science studies there were no statistically significant differences in these studies either resulting in a publication or presentation. Of the 52 clinical studies, 25 (48%) and 44 (85%) had at least one publication or presentation respectively. For the 36 basic science studies, 22 (61%) and 30 (83%) had at least 1 publication or presentation respectively. In total, 48 and 39 of the publications, and 170 and 110 of the presentations were from clinical studies and basic science studies, respectively.

Finally the contribution of the grant towards the researchers' academic development was assessed. Forty-seven of the grant recipients (55.3%) indicated that the CNIB Baker grant contributed to obtaining subsequent research grants. These included 9 CIHR grants, 2 each of Natural

Table 2—Survey results for Canadian National Institute for the Blind Baker grants from 1998 to 2009

Outcome	Number (%) Responding "Yes"
Grant resulted in a presentation(s)	71 (83.5)
Grant resulted in a press release	6 (7.1)
Grant resulted in a health policy change	9 (10.6)
Grant resulted in a patent	4 (4.7)
Grant contributed to further funding	47 (55.3)
Grant contributed to career development	77 (91.7)

Sciences and Engineering Research Council of Canada, Fonds de la recherché en santé, and Foundation Fighting Blindness grants, and 1 Glaucoma Research Society of Canada (GRSC) grant. Seventy-seven recipients (91.7%) responded that the CNIB Baker grant contributed to career advancement that included 2 students entering ophthalmology (1 currently a retina fellow at Johns Hopkins), 1 competing their Masters, 4 PhDs, 2 obtaining postdoctoral positions (1 at Harvard Medical School), and a total of 9 academic promotions (4 associate professor, 2 full professor, 2 tenured positions, and 1 college professor in Biology). An additional 2 recipients commented that the CNIB Baker grant helped to establish their lab.

Discussion

Research is important for guiding and improving health care and developing innovations. Assessing the outcome of research projects is equally important not only for the researcher and their institution but also for the agency that funds the research. Research outcomes can be considered under various headings including knowledge gain (publications and presentations), wealth generation (e.g., the economic value of a healthy society), and health gain (contribution to clinical guidelines, health policy, or practice)[2] in addition to personal outcomes for the researcher (career development, future research funding). Traditionally research outcomes have been assessed through bibliometric methods as this is objective and relatively easy to obtain, however, this approach is limited by only considering 1 aspect of knowledge gain through peer-reviewed publications.

To assess the outcome of CNIB Baker grants we conducted a survey to determine the effectiveness of the grants specifically considering the goals of the granting agency that included knowledge, wealth, and health gain in the field of vision research and career development for Canadian vision researchers. We were limited to grants from 1998 to 2009 due to a lack of information regarding the grants before 1998. The response rate to the survey was high (96.6%). This was important because many of the questions (Fig. 1) could only be answered by the investigator and there was some concern that investigators with less successful studies may not have participated causing bias to the results. Questions 3-9 of the survey could not be corroborated, which may have biased some responses, specifically those related to the impact of the research. This is a limitation of this study given the likelihood that a survey posed by a group that has given and may continue to give grants to the people responding may elicit a favourable response.

Most publications assessing research outcomes report the number of peer-reviewed publications. To date 47 of 88 CNIB Baker grants (53.4%) have resulted in 87 peer-reviewed publications, including those papers that were reported to be in press, this number increases to 48 (54.5%) grants resulting in 89 peer-reviewed publications. Given that the mean time from receiving a grant to a first publication was 2.9 $\pm$ 1.8 years the number of peer-reviewed publications will likely increase over time. This is further supported by the response to number of papers submitted (7), the number in preparation (31), and the 4 studies that are still ongoing. When considering these additional papers, 78.4% of grants have a publication either in preparation, submitted, or published.

These results compare favourably to the literature. In the area of vision research, a review of 73 grants awarded over 10 years from the GRSC found publications related to the research award for 66% of the grants.[3] In this study, publications were identified through a literature search given a poor response (22%) to a survey. Others have reported 45%-82% of funded projects yielding a peer-reviewed publication.[4-6] For each of these studies, the findings were based on survey results that likely bias results as investigators with studies of limited impact may be less likely to participate. Considering both those eligible grants where contact details were not available and nonrespondents in each of these studies the reports are based on 60%-62% of the studies. One of these studies, which reported 82% of grants resulting in a peer-reviewed publication,[4] funded both new and continuing projects that may have also biased results with continuing projects more likely to result in a publication. Considering only new projects 71% resulted in at least 1 publication. A study from Hong Kong[5] reported 70.8% of the grants had a peer-reviewed publication, however, only projects with peer review of a final report were included. There were a mean of 6.34 years from the time of study completion to the survey that likely significantly biased the results toward a higher publication yield.

Attempts have been made to determine a research investment cost per publication. Considering only those publications in print the cost of a publication for the study period was $33 823 that improves to $33 063 if the publications that are in press are included. The GRSC reported an investment of $9727 per publication however they also acknowledged that the majority of studies that resulted in a publication had funding from additional sources that likely underestimates the true research investment per publication.[3] Other studies have reported an expenditure per publication of $21 499 (U.S. dollars) by the Health and Health Services Research Fund in Hong Kong[5], $29 264 (U.S. dollars) by the Australian National Health and Medical Research Council,[7] and £9706 for the United Kingdom National Health Service.[8]

A responsibility of grant recipients is to acknowledge the funding agency in any publications or presentations related to the grant. Each publication was obtained and assessed for a published acknowledgment of the CNIB Baker grant. Thirty-three of the 88 publications (36.8%) did not contain an acknowledgment. This is similar to the results of the GRSC that reported 30% of publications lacking an acknowledgment of the grant.[3] The inclusion of an ac-

knowledgement is a responsibility of the author and this requirement should be specifically communicated by the granting agency on awarding a grant.

Additional metrics assessed included the number of presentations, press-releases, health policy changes, and patents. Given the paucity of published literature on these outcomes, we are unable to evaluate the performance of the CNIB Baker grants, however, these results will serve as a baseline for future comparisons.

An important mandate of the CNIB Baker grants is to serve as seed money that could translate into future funding and career development. For both of these goals, the CNIB Baker grants were very successful with 55.3% of the investigators obtaining subsequent grants including 9 CIHR grants and an overwhelming 91.7% commenting that the grant had a positive impact on the investigators academic career development.

Overall, this analysis supports a positive outcome of CNIB Baker grants. A significant number of grants (54.5%) resulted in peer-reviewed publications and this number will likely increase as a portion of the submitted and in preparation manuscripts are accepted for publication. In addition, 84% of the grants resulted in at least 1 presentation and 11% of investigators reported that their study resulted in a health policy change. This study will hopefully serve as a first step for the CNIB to evaluate the outcome of their research grants and also contribute to the literature in establishing outcomes to be considered by other granting agencies.

Disclosures: Keith Gordon is an employee of the Canadian National Institute for the Blind. The remaining authors have no proprietary or commercial interest in any materials discussed in this article.

Support: This study was supported by a grant from the Canadian National Institute for the Blind.

References

1. 2009 Journal Citation Reports Science Edition. New York, NY: Thomson Reuters. Available at admin-apps.isiknowledge.com/JCR/JCR?RQ=LIST_SUMMARY_JOURNAL. Accessed July 23, 2010.
2. Wells R, Whitworth JA. Assessing outcomes of health and medical research: do we measure what counts or count what we measure? *Aust New Zealand Health Policy.* 2007;4:14.
3. Seif G, Trope G. Impact of 10 years of glaucoma research funding: the Glaucoma Research Society of Canada. *Can J Ophthalmol.* 2010;45:132-4.
4. Shah S, Ward JE. Outcomes from NHMRC public health research project grants awarded in 1993. *Aust NZ J Public Health.* 2001;25:556-60.
5. Kwan P, Johnston J, Fung AYK, Chong DSY, Collins RA, Lo SV. A systematic evaluation of payback of publicly funded health and health services research in Hong Kong. *BMC Health Serv Res.* 2007;7:212.
6. Caddell AJ, Hatchette JE, McGrath PJ. Examining the impact of health research facilitated by small peer-reviewed research operating grants in a women's and children's health centre. *BMC Res Notes.* 2010;3:107.
7. Kingwell BA, Anderson GP, Duckett SJ, et al. Evaluation of NHMRC funded research completed in 1997, and 2003: gains in knowledge, health and wealth. *Med J Aust.* 1992;184:282-6.
8. Ferguson B, Kelly P, Georgiou A, Barns G, Sutherland B, Woodbridge B. Assessing payback from NHS reactive research programmes. *J Manag Med.* 2000;14:25-36.