Special Article

Research Awards Program of the Canadian Anesthesiologists' Society/Canadian Anesthesia Research Foundation: survey of past recipients

[Programme de bourses de recherche de la Société canadienne des anesthésiologistes/Fondation canadienne de recherche en anesthésie : enquête auprès des anciens récipiendaires]

Donald R. Miller MD FRCPC, Denise Wozny BA

Purpose: To review the effectiveness of the Research Grants, Career Scientist Award and Fellowship Program (RGCSFP) of the Canadian Anesthesiologists' Society (CAS)/Canadian Anesthesia Research Foundation (CARF) by surveying past recipients.

Methods: The CAS Research Committee database of past RGCSFP recipients was reviewed to identify all past award recipients from the time of program inception in 1985 until the year 2005. A questionnaire was mailed to all past recipients with retrievable addresses. The questionnaire asked specific questions regarding past and current research, publications, grant procurement and mentoring of trainees. In addition, opinions regarding the program's effectiveness were solicited.

Results: Of the 100 mailed survey forms, 66 (66%) were completed and returned. The number of original published articles per respondent was 30.1 ± 28.5 (mean $\pm$ SD) at the time of the survey, and the life-time number of all publication types was 38.5 ± 34.6 . Cumulative research funding increased in relation to the number of years in research, and amongst past recipients with > 15 years in research, individual research funding from all sources was $\$585,747 \pm \$773,716$. Ninety-six percent of respondents agreed or strongly agreed that the program was valuable.

Conclusions: The RGCSFP has supported a large number of new and established anesthesia investigators in Canada, and these individuals have demonstrated high research productivity. The program is considered to be very valuable according to past recipients.

CAN J ANESTH 2007 / 54: 4 / pp 314–319

Objectif : Evaluer l'efficacité du programme de bourses de recherche, de bourses de carrière en recherche et de fellowship (RGCSFP) de la Société canadienne des anesthésiologistes (SCA) et de la Fondation canadienne de recherche en anesthésie (FCRA) par une enquête auprès des anciens récipiendaires.

Méthode : La base de données du Comité de recherche de la SCA au sujet des anciens récipiendaires de bourses RGCSFP a été examinée afin d'identifier tous les récipiendaires depuis la mise en place du programme en 1985 jusqu'en 2005. Un questionnaire a été envoyé à tous les anciens récipiendaires dont on a retrouvé l'adresse. Le questionnaire posait des questions spécifiques sur leurs recherches passées et présentes, leurs publications, l'obtention de bourse et le mentorat de stagiaires. En outre, nous avons également demandé leurs opinions sur l'efficacité du programme.

Résultats : Des 100 questionnaires postés, 66 (66 %) ont été complétés et renvoyés. Le nombre d'articles originaux publiés par répondant était de $30,1 \pm 28,5$ (moyenne $\pm$ SD) lors de l'enquête, et le nombre de publications de tous types à vie était de $38,5 \pm 34,6$. Le financement de recherche cumulatif a augmenté en fonction du nombre d'années de recherche, et parmi les récipiendaires passés ayant effectué > de 15 ans de recherche, le financement de recherche individuel, toutes sources confondues, était de \$585

From the Department of Anesthesia, The Ottawa Hospital, The Ottawa Heart Institute, and University of Ottawa, Ottawa, Ontario, Canada.

Address correspondence to: Dr. Donald R Miller, Department of Anesthesia, The Ottawa Hospital General Campus, 501 Smyth Road, Ottawa, Ontario K1H 8L6, Canada. E-mail: dmiller@ottawahospital.on.ca

Competing interests: Dr. Miller is a Trustee of the Canadian Anesthesia Research Foundation (CARF), Past Chair, and current member of Research Committee of the Canadian Anesthesiologists' Society. CARF manages the endowment and raises funds for the program, and the Research Committee is the governing structure which reviews the grant applications. Dr. Miller has never applied for, nor received funding from this program.

This article has been peer reviewed.

Accepted for publication November 28, 2006.

Revision accepted January 9, 2007.

747 ± \$773 716. Parmi les répondants, 96 % étaient d'accord ou tout à fait d'accord que le programme était utile.

Conclusion : Le RGCSFP a soutenu un grand nombre de chercheurs en anesthésie au Canada, qu'ils soient nouveaux ou établis, et ces personnes ont démontré une grande productivité en recherche. Le programme est considéré comme très utile par les anciens récipiendaires.

IN view of an identified need to foster research within the specialty of anesthesia, the Canadian Anesthesiologists' Society (CAS) established a Research Fund in 1979, as a "vehicle to collect money from donations from a bequest in order to support a Canadian (citizen or landed immigrant) who will carry out research in the field of Anaesthesia in a Canadian centre."¹ A target of \$1 million had been set by the CAS Council on June 26, 1976. The intention was to invest the accumulated donations to create an endowment for a research grant, which would be awarded to the most deserving applicant as chosen by a committee.² Since that time, the endowment has grown to in excess of \$1.4 million, with the Canadian Anesthesia Research Foundation (CARF) being established as the registered charitable organization to continue the fund-raising legacy which supports three operating grants through its endowment. The CARF awards include: 1) Canadian Anesthesiologists' Society Research Award; 2) Dr. R.A. Gordon Patient Safety Research Award (co-sponsored by the Canadian Patient Safety Institute); and 3) the David S. Sheridan Canadian Research Award.

Over the ensuing years, industry-sponsored operating grants, a research fellowship, two career scientist awards, and a resident's research award were added incrementally, as the need for more grant funding and salary support for research within the specialty became increasingly apparent. Indeed, CARF funds alone were unable to match the growing demands from a steadily increasing number of applications and escalating grant budgets. The inclusion of industry-sponsored research grants and salary awards now account, at least in part, for a large increase in cumulative dollar value of the program observed in recent years. Collectively, the CARF and industry-funded awards constitute the Research Grants, Career Scientist and Fellowship Program (RGCSFP) of the CAS (Table I). Regardless of the funding source, applications for all operating grants and salary awards are subject to the same rigorous peer assessment through the Research Committee of the CAS.

Monitoring outcomes and measuring the success

of a research program that is continuously evolving presents considerable challenges. Such monitoring is potentially beneficial for future planning of types of grants and funding initiatives. Accordingly, in 2005, a survey of past recipients of the RGCSFP was undertaken, as a means to evaluate the program's overall effectiveness. The survey asked specific questions of past recipients regarding their research programs, publications, grant procurement, mentoring of trainees and perceived benefits to individual researchers. This report presents the results of that survey.

Methods

A three-page survey form was developed and validated internally in the Department of Anesthesia at the University of Ottawa by clinical investigators who were not past recipients of the Research Awards Program. The survey (available as Additional Material online at: www.cja-jca.org) asked questions regarding research training and experience as well as current practice patterns. Respondents were also asked to indicate their key areas of research, as well as the number of peer-reviewed and other publications, sources of peer-reviewed funding, and the number of trainees. Comments regarding the program were solicited by way of a series of specific questions, and a space for free-text comments was also provided.

Survey forms were distributed to all past recipients of the program with retrievable addresses for the period 1985 - 2005. As the Resident's Research Award encourages resident research without providing funding at the level of an operating grant, responses from past resident recipients were not solicited. Respondents were asked to complete the forms and return them in pre-addressed, stamped envelopes. To enhance the response rate, confidentiality of the information was ensured, and two subsequent mail-outs were forwarded to all non-respondents, approximately one and three months after the initial mailing.

Data from the questionnaires were collated and entered onto Excel spreadsheets. For recipients who had received more than one CAS research award, data were attributed to the first award which that individual received in that program, to avoid double-counting. Summary data were generated using SPSS 11.0 for Windows (SPSS Inc, Chicago, IL, USA), and are presented as mean ± SD or percentages as appropriate.

Results

One hundred retrievable addresses were identified. Mailing addresses were not available from the CAS data base for 12 past recipients. Completed survey forms were received from 66 of the 100 past recipients

TABLE I Canadian Anesthesiologists' Society/Canadian Anesthesia Research Foundation Research Grants, Career Scientist and Fellowship Program - 2006

AWARD	VALUE
<i>Career Scientist Awards</i>	
Bristol-Myers Squibb Canada/CAS Career Scientist Award in Anesthesia and Perioperative Medicine	\$270,000*
CAS/Abbott Laboratories Ltd Career Scientist Award in Anesthesia	\$120,000†
<i>Fellowship Award</i>	
Abbott Laboratories Ltd/CAS Fellowship in Anesthesia	\$65,000
<i>New Investigator Awards</i>	
Canadian Anesthesiologists' Society Research Award	\$30,000‡
Baxter Corporation Canadian Research Award in Anesthesia	\$20,000
David S. Sheridan Canadian Research Award	\$10,000‡
<i>Open Awards</i>	
Dr. R.A. Gordon Patient Safety Research Award	\$40,000‡
Organon Canada Ltd Canadian Research Award in Anesthesia	\$20,000
<i>Subspecialty Awards</i>	
Novo Nordisk Canada – CAS Research Award in Perioperative Hemorrhage, Hemostasis and/or Transfusion Medicine	\$40,000
Dr. Earl Wynands Research Award in Cardiovascular Anesthesia and/or Perioperative Blood Conservation	\$30,000
Bristol-Myers Squibb Canada – CAS Research Grant in Neuroanesthesia	\$20,000
Smiths Medical Canada Ltd Canadian Research Award in Pain Research and/or Regional Anesthesia	10,000
<i>Resident's Research Award</i>	
CAS/Vitaid – LMA Resident's Research Grant	\$5,000

CAS = Canadian Anesthesiologists' Society; LMA = laryngeal mask airway. *Includes \$90,000 from the recipient's institution. †Includes \$60,000 from the recipient's institution. ‡Canadian Anesthesia Research Foundation-funded operating grant.

(response rate = 66%) whose mailing addresses were retrievable from the 2005 membership database of the CAS.

Grants

The number of awards presented annually progressed from one in 1985, to 12 in 2005. The increase in cumulative monetary value of the awards presented annually is shown in Figure 1. While the survey data base was closed in 2005, as of June, 2006, \$3.685 M in funds had been disbursed through the CARF to support 159 separate research grants, fellowships or career scientist awards from the RGCSFP.

Past recipient profiles

Respondent characteristics are summarized in Table II. All but two (who practice in the United States) have a current faculty appointment at a Canadian Academic Health Sciences Centre. Notably, 32 of the 66 respondents had either a Master's or a PhD degree in addition to their medical degrees, with formal research training averaging 2.5 ± 2.2 yr (range 0–10 yr). Amongst past recipients, 35% of respondents were Full Professors, while 26% were Associate Professors at the time of the survey.

Publications and grant procurement

The number of original published articles per respondent was 30.1 ± 28.5 at the time of the survey, with a life-time total publication number of 38.5 ± 34.6 (range 0–147, Table III). The cumulative amount of research funding of past recipients from all peer-reviewed sources was analyzed according to the number of years in either full-time or part-time research. Total research funding increased in relation to the number of years in research (Figure 2), and amongst past recipients with more than 15 years in research, the mean individual research funding had accumulated to $\$585,747 \pm \$773,716$ (range \$20,000–\$3,321,087). The most frequently identified sources of peer-reviewed grant funding outside the CAS/CARF program included: the Canadian Institutes of Health Research ($n = 23$), the Heart and Stroke Foundation of Canada (or the Foundation's provincial counterparts) ($n = 17$), Physician Services Incorporated ($n = 11$). Past recipients were competitive internationally as well, with grants from the National Institute of Health ($n = 3$), the American Society of Anesthesiologists ($n = 2$), the Deutsche Forschungsgemeinschaft ($n = 2$), the International Anesthesia Research Society ($n = 2$) and the Society of Cardiovascular Anesthesiologists ($n = 1$).

FIGURE 1 Cumulative monetary value (\$Can) of research grants, fellowships, and career scientist awards are shown for the period 2000 – 2006, in comparison to the base year 1985. Numbers of awards (*n*) presented annually were: *n* = 7 in 2000 and 01; *n* = 9 in 2002 and 03; *n* = 10 in 2004; *n* = 11 in 2005 and *n* = 12 in 2006. Awards have been presented annually since 1985; data for the years 1986 – 1989 are not shown.

TABLE II Past recipient profiles (*n* = 66)

<i>Respondent characteristics</i>	<i>Number (%)</i>
Sex (M/F)	54/12 (82/18)
CAS member (<i>n</i> / %)	63 (95)
Faculty rank:	
Professor	23 (35)
Associate Professor	17 (26)
Assistant Professor	20 (30)
Resident	1 (2)
None	5 (8)
Degrees held:	
M.D. (or equivalent) (<i>n</i> / %)	34 (52)
M.D. and Master's degree (<i>n</i> / %)	24 (36)
M.D. and Ph.D (<i>n</i> / %)	8 (13)
Years in formal research training (<i>n</i>)	2.5 ± 2.2
Years in clinical practice (<i>n</i>)	13.9 ± 6.6
Years in research (<i>n</i>)	11.6 ± 7.2
In 2005, percent of time in:	
Clinical practice (%)	62.9 ± 21.9
Research (%)	23.4 ± 18.2
Education (%)	5.4 ± 6.1
Administration (%)	8.1 ± 11.0

TABLE III Individual publication records of past recipients

<i>Publication type</i>	<i>Mean (± SD)</i>	<i>Range</i>
All types (<i>n</i>)	38.5 ± 34.6	0 - 147
Original articles (<i>n</i>)	30.1 ± 28.5	0 - 115
Review articles (<i>n</i>)	3.2 ± 5.0	0 - 21
Books (<i>n</i>)	0.2 ± 0.7	0 - 5
Book chapters (<i>n</i>)	4.9 ± 6.6	0 - 30
Abstracts (<i>n</i>)	36.9 ± 35.4	0 - 149

Mentors

Respondents indicated that, at the time of completing the survey, 55 (83%) had supervised graduate students, including residents and fellows, during their professional careers. The mean life-time number of graduate students supervised was 18 ± 29 (range 1–185). The cumulative number of trainees obtaining a Master's degree under the supervision of all past recipients was 70, while the number of trainees at the PhD level under the supervision of this cohort was 32.

Opinions of the research program

Ninety-six percent of respondents indicated their agreement or strong agreement that the RGCSFP was of personal benefit to them (4% did not answer the question), and 96% agreed that the program was well organized and that the grant review process was fair (49% strongly agreed; there was no disagreement). Ninety-six percent agreed or strongly agreed that the Research Fellowship is important, and 96% of respondents also agreed that the Career Scientist Program is important. Fifty-four percent of respondents indicated that the number of operating grants is adequate, while only 39% indicated their agreement or strong agreement to the statement that the amount of research funding offered by the program is adequate.

Free-text comments

Eighteen respondents provided free-text comments, which were uniformly complimentary of the program. Four past recipients wrote that the RGCSFP is essential in providing funding for young investigators, and that the program lends credibility when applying to other agencies such as the Canadian Institutes of Health Research. One recipient commented that the program was an important factor in his decision to

FIGURE 2 Cumulative research funding per recipient, according to the number of years in either part time or full-time research. *Includes an extreme value of \$5.4 M of peer reviewed funding for one past recipient. This amount is reported in the text but, was not included in the calculation of the means for the histogram.

return to Canada following research training in the United States. Three respondents indicated that more grants are required, and that small operating grants are often non-productive use of valuable research funding. Three individuals wrote that the monetary value of the operating grants needs to be increased, while another indicated the need for investigator salary support and protected time to do research. Finally, another past recipient expressed the need to be able to fund large randomized controlled trials to address important clinical outcome issues in anesthesia, as commonly done in other specialties such as cardiology.

Discussion

This survey is the first formal initiative to evaluate the effectiveness of the RGCSFP of the CAS. While observing a significant increase in the number of operating grants, and the large monetary value of the fellowship and career scientist awards, the amount of funding for individual operating grants has increased more modestly relative to the costs of conducting clinical and laboratory research. For example, over the past 20 years, the CAS Research Award increased from \$20,000 to \$30,000, barely keeping pace with inflation, while the costs of conducting randomized controlled trials has increased exponentially over the same time period. Recognizing that many of the operating grants only provide “seed funding”, the overall response to the survey was generally very positive. Most past recipients have established successful track

records in procuring grants from a number of funding agencies, and have published a large number of peer-reviewed original investigations contributing to the body of scientific literature.

Other societies have embraced the need for programs to fund research within the specialty of anesthesia. In 1983, the International Anesthesia Research Society (IARS) established the Anesthesia Award & Grant Funding Program, which to date has awarded > US\$7,000,000 funding for 100 projects in anesthesia. A survey of IARS members undertaken in 1998 identified that financial support from other sources was disappearing, and that IARS’ continued support of education and research would be crucial to the specialty.^A In 1986, the American Society of Anesthesiologists established the Foundation for Education and Research (FAER), to “stimulate, develop, promote, authorize, commission or contract for, and finance education and research in subjects germane to the provision of anesthesia care and perioperative medicine”.^B

Since 1986, FAER has awarded over 400 grants, and in 2004, provided over \$2,000,000 in research funding. A survey of past recipients of that program was published in 1998.³ Measures of success in that survey included time currently spent on academic pursuits; number of times anesthesiologists had been mentors to less experienced investigators; promotion to higher academic ranks, and subsequent research funding. At the time of the FAER survey, 97% of recipients held academic rank, and the former recipients indicated that funding from FAER made a critical difference in their careers. These findings are similar to the results from the current survey, which identify that 91% of past recipients from the Canadian program hold academic rank.

A common theme of all these programs, including RGCSFP, is that with an increasingly competitive environment for funding scientific research, the role of national and international specialty societies in the support and development of academic anesthesiologists has grown. Yet despite significant strides in anesthesia research over the past century, which have contributed greatly to an advanced level of clinical care of patients in the perioperative setting, some ambivalence towards the research enterprise of the specialty

A (http://www.iars.org/researchawards/research_awards.shtml - accessed September 1, 2006).

B (http://www.iars.org/researchawards/research_awards.shtml - accessed September 1, 2006).

has been expressed by practicing clinicians and indeed, some grant reviewing agencies as well. It is notable that major medical procedures have been made possible through landmark innovations in anesthesia during the 20th century. Great strides in perioperative medicine, pain management, understanding of the physiological and pharmacological response to anesthetics and analgesics, and regional anesthesia have been made through the body of knowledge advanced through research, and anesthesia is safer than ever before. Despite such progress, investment in the training and research infrastructure of new and established investigators remains critical to advancing the body of knowledge to ensure that the specialty can compete with others, while advancing new discoveries in medicine. For example, the important mechanisms of anesthetic action, drug interactions, and the mechanisms of postoperative neurocognitive dysfunction remain elusive. The challenges of translational research and applying the biology of genomics into the clinical area of the perioperative medicine are as important now as ever before. As highlighted in previous editorials in the *Journal*,⁴⁻⁶ research into education, outcomes research, pain medicine, simulation, transfusion medicine and perioperative patient safety are additional examples of areas where significant knowledge gaps remain to be filled.

Salary support for dedicated Career Scientist Awards has been an important addition to the program since 2000. In contrast to the impressive monetary value of these awards, the available funding for operating grants, which provide support for the direct costs of conducting bench research or clinical trials, is relatively modest (Table I). Even the highest-valued operating grant in this program, (\$40,000) is often limited to the provision of "seed-funding" for many projects. The direct costs of undertaking rigorously-conducted randomized controlled trials can extend from hundreds of thousands, to millions of dollars for large multicentre studies. Clearly, closing the gap between funding availability and the costs of conducting outcomes-based research will require substantial future investment if the specialty is to remain competitive.

This survey has several limitations. First, the number of past recipients is small, and this naturally limits the ability to generalize the results. Second, mailing addresses were not available from all past recipients, and a 66% response rate was somewhat disappointing, particularly in view of the small number of potential responders. The elusive issue of responder bias is a factor which is difficult to measure, as the success rate of grant procurement of past recipients who did not respond is unknown. We attempted a PubMed search

to identify past publications of non-respondents and respondents, but this was problematic, as some respondents returned their completed forms anonymously. Accordingly, we chose to document the number of self-reported 'total' and peer-reviewed publications based on the results of the survey. Another limitation in evaluating the effectiveness of the RGCSFP using this methodology is the lack of an identified historical control group; i.e., Canadian anesthesiologists who never applied for, nor received an award from this program. The difficulty inherent in undertaking such a comparison is the inability to capture the relevant data in a systematic manner.

In conclusion, this survey demonstrates the extent to which the RGCSFP has supported, and continues to support, a large number of new and established anesthesia investigators in Canada, and provides a measure of significant research productivity from past awardees. Past recipients consider this program to be very valuable, while the need to increase the monetary value of individual awards was identified. Despite the methodological limitations, there is compelling evidence from this survey to justify ongoing support of the CAS and CAREF, and to consider expanding the awards of the RGCSFP.

Acknowledgement

We sincerely thank Ms. Anne Alexio, Membership Coordinator of the Canadian Anesthesiologists' Society, for her invaluable assistance with the conduct of the survey.

References

- 1 Shepherd DA. Watching closely those who sleep. *Can J Anaesth (Suppl)* 1993; 40: 113-4.
- 2 Bevan DR, Craig DB. The Canadian Anaesthetists' Society Research Award. *Can Anaesth Soc J* 1985; 32: 460-2.
- 3 King SP, Hug CC Jr. Survey of former recipients of research funding from the American Society of Anesthesiologists and the Foundation for Anesthesia Education and Research. *Anesthesiology* 1998; 88: 519-24.
- 4 Knill RL. Anesthesia research: needs for the nineties. *Can J Anaesth* 1992; 39: 411-9.
- 5 Orser BA, Miller DR. New opportunities for anesthesia research in Canada. *Can J Anesth* 2002; 49: 895-9.
- 6 Bevan DR. The future of academic anesthesia departments in Canada. *Can J Anesth* 2006; 53: 533-9.