



Evaluating the scholarship and Fellowship Programme of the Royal Australasian College of Surgeons

The Royal Australasian College of Surgeons (RACS) raises funds through the Foundation for Surgery to support Surgical Trainees and Fellows conduct innovative surgical research. The Foundation for Surgery, established in 1981, generates funds through donations from individuals or bequests, and collaborations with external organizations.

The majority of the scholarships/Fellowships offered by RACS are for the duration of 1 year and provide a salary. A small number of scholarships support scholars for 2 or 3.5 years to complete a Doctor of Medicine or a Doctor of Philosophy. The scholarship programme also offers small project grants that provide funds for small clinical/research projects or for purchasing equipment. In 2016, the RACS scholarship programme directly funded \$1.8 million worth of scholarships/Fellowships, with a combined total value of over \$9 million across the past 5 years (2012–2016 inclusive).

Funding a period of research during training has shown to increase the number of trainees pursuing a career in academia and improves the satisfaction rate of those undertaking clinical training.¹

The objective of this study was to identify the impact of the RACS scholarship programme on Australian and New Zealand Fellows and Trainees.

A survey was distributed in late 2014 to 66 Trainees and Junior Fellows who received a research scholarship/Fellowship between 3 and 7 years ago (2007–2011), excluding recipients of travel scholarships, or the John Mitchell Crouch Fellowship offered to Senior Fellows. In total, 41 scholars completed the survey (response rate of 62.1%).

The highest number of successful scholarship recipients held positions in the specialty of General Surgery (27.8%, 10/36) and Plastic and Reconstructive Surgery (19.4%, 7/36). In the smaller specialties of Otolaryngology Head and Neck Surgery and Paediatric Surgery Trainees/Fellows, no scholarships were awarded for the reported period.

Of the 41 survey responses, 32 (78.0%) participants completed a higher degree as part of their scholarship funded research, despite most scholarships having a 1-year duration. Two (of 41, 4.9%) of the scholars completed higher degrees prior to receiving the scholarship.

Scholarship recipients were surveyed on the research outcomes following their RACS scholarship, with 92.7% (38/41) believing they had developed a deeper level of understanding in a new field that benefited their area of practice. Furthermore, 35.0% (14/40) believed their research had improved patient management, and 20.0% (8/40) suggested their research had benefits for hospital management. During the scholarship-funded period, 51.2% (21/41) of scholars established collaborations with other local professionals.

The level of research activity was measured through the number and journal impact factor of the scholars' peer-reviewed publications. The average number of peer-reviewed publications was 6.5 (from 14 scholars). The average journal impact factor was 4.01, ranging between 0.782 and 28.054 for the *European Journal of Surgery* and *Nature Medicine*, respectively.

Importantly, a high proportion of scholars (90.0%, 36/40) believed they had increased their ability to critically evaluate scientific literature, as well as writing a literature review (82.5%, 33/40) and the ability to interpret statistics (77.5%, 31/40).

The scholarship programme was also a contributor to the development of non-technical skills with 67.5% (27/40) of scholarship recipients stating that they had acquired additional skills in project and personnel management, enhanced communication skills and improved independent critical thinking.

In total, 72.5% of scholars (29/40) had supervised the research of junior medical staff and over half of the scholars (64.1%, 25/39) that responded had developed the skills of Junior Fellows/Trainees. Six scholars (of 39, 15.3%) had furthered the knowledge of junior faculty through initiating a formal training programme.

Over two-thirds of scholars (70.7%, 29/41) performed further independent research. Importantly, almost half of the scholars (46.3%, 19/41) received a further grant (other than a RACS scholarship) subsequent to the scholarship period, with 10 of the 41 scholars (24.4%) receiving a prestigious National Health and Medical Research Council research grant. Over three-quarters of scholars (77.5%, 31/40) believed their career advanced as a result of receiving the RACS scholarship.

The objective of distributing surveys to scholars was to identify the benefits for recipients and to determine how the scholarships/Fellowships had affected their success in forging an academic and surgical career.

Previous studies conclude that it is important to encourage research early during training and undergraduate studies to engage clinicians in research during their future career.²

The distribution of scholarships across surgical specialties was highest in General Surgery, which correlates with the largest proportion of Trainees and Fellows in RACS. Interestingly, the Plastic and Reconstructive specialty consisted of the second highest number of scholarship recipients awarded, but is only the fifth largest surgical speciality in RACS. This may be attributed to the high-quality Plastic Surgery research institutes in Australia: the Bernard O'Brien Plastic Surgery Institute and Professor Ian Taylor's Plastic Surgery Institute at the Royal Melbourne Hospital.

Analysis of the RACS scholarship programme over the last 5 years (2012–2016) demonstrates a total number of 405 applicants, with 166 scholarships/Fellowships awarded. This gives a success rate of 41%, which is not only encouraging, being higher than that of the National Health and Medical Research Council³ (at approximately 20% for Career Development Fellowships and 16% for Project Grants), but also reflects the competitive nature of the RACS scholarship programme. Furthermore, the level of funding per-capita for RACS is approximately \$1.8 million per annum for 6086 Fellows and 1245 Trainees,⁴ which encouragingly is similar to that of the Royal College of Surgeons of England which awards the equivalent of approximately \$5 million for 20 000 members (equating to a similar level of funding per person in each college).

An important outcome to note from this review is that 78% of respondents were able to achieve a higher degree as a result of the scholarship programme despite the majority of the scholarships having a 1-year term. This would imply that it might be beneficial to increase the duration of a number of the scholarships to a 2- or 3-year term. Without further donations, however, this may be difficult to establish and sustain.

Other direct outcomes from the scholarship and the impact on scholars' careers and quality of health care are difficult to objectively analyse. However, it was encouraging to note that 90.0% of scholars believed they had acquired the skill of critically evaluating scientific information and 67.5% of respondents significantly improved their non-technical skills which are important attributes for all surgeons to accrue, and 70.7% of scholars conducted further independent research following the scholarship-funded period. Furthermore, almost half of the scholars received subsequent research grants that were not awarded by the RACS.

The RACS scholarship programme has succeeded in supporting Surgical Trainees/Junior Fellows and makes key contributions to the surgery-related scientific literature.

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Tamsin J. Garrod,* PhD

Wendy J. Babidge,* PhD

Susan Pleass,*

Ian C. Bennett,† FRACS

David F. Scott,† AM, FRACS

**Research, Audit and Academic Surgery, Royal Australasian College of Surgeons, Adelaide, South Australia, Australia and*

†*Royal Australasian College of Surgeons, Melbourne, Victoria, Australia*

doi: 10.1111/ans.13763

Stem cells and knee osteoarthritis: a legitimate treatment option?

Osteoarthritis (OA) is a degenerative disease that causes pain, stiffness and decreased function. Treatment utilizing mesenchymal stem cells (MSCs) has become a focus of interest as the successful regeneration of cartilage represents a new minimally invasive, non-surgical alternative. Yet, is it a truly legitimate treatment option?

Presently, there are various treatment measures, including microfracture and subchondral drilling, which are performed in an attempt to regenerate articular cartilage. These modalities are generally reserved for defects less than 2–3 cm² and in patients younger than 40 years.¹ As such, this review addresses only the potential for treatment of advanced OA as well as the lack of quality evidence.

MSCs are pluripotent adult stem cells found in numerous human tissues, including bone marrow and adipose tissue. These MSCs are then placed into various growth factors to mature into higher numbers. The product is then injected into the damaged joint or bound with a scaffold and imbedded into an area of defect. A signal is then introduced to begin the cell differentiation process into articular cartilage² (Fig. 1).

Bone marrow-derived MSCs have been utilized in patients who were unresponsive to conservative therapy. Patients reported

subjective improvement in symptoms, whilst objective results are limited to apparent improvements in clinical examination.⁴

Arthroscopic surgery has been used to objectively classify cartilage defects using the International Cartilage Repair Society (ICRS) grading system. Koh *et al.* treated 37 patients with adipose-derived MSCs, and at mean follow-up of 26.5 months, 76% of cartilage lesions remained in the abnormal or severely abnormal state. Authors concluded that tissue-engineered scaffolds may be needed to improve cartilage repair.⁵

Tissue-engineered scaffolds, such as fibrin glue, have been postulated to improve osteochondral regeneration.⁶ However, there is no evidence to date that shows a statistically significant difference between treatment and control groups.⁷ In addition, using a higher dose of MSCs has shown improvement in osteochondral regeneration,⁸ yet it cannot be concluded that a higher dose is more effective than an optimal patient dose, which is currently unknown.

Encouraging results have been reported with combination therapy using adipose-derived MSCs with platelet-rich-plasma and arthroscopic lavage. However, it is impossible to determine whether