SPECIAL COMMUNICATION

State of the Research Enterprise in IR and Recommendations for the Future: Proceedings from the Society of Interventional Radiology Foundation Investigator Development Task Force

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ABBREVIATIONS

IDTF = Investigator Development Task Force, RCP = research consensus panel, RMB = Research Mentorship Board

Interventional radiology (IR) is a dynamic specialty that thrives on innovation, and central to the mission of the field is the pursuit of technologically innovative, clinically relevant, and collaborative multidisciplinary research. The Society of Interventional Radiology Foundation (SIRF) has played a key role in IR research programmatic development, and a decade ago a major SIRF effort began to expand the scope of the IR research enterprise. Some notable successes have been achieved along the way (eg, the ATTRACT, CORAL, BEAT, and PRESERVE trials), but critical evaluation reveals significant room for improvement. The current funding environment for high-impact extramural research programs is the most challenging in the history of IR, and this situation is unlikely to improve significantly over the next decade.

Because IR relies heavily on innovation for growth, a strong research enterprise is essential to the viability of the specialty. A review of IR research over the past decade raises 2 vital questions: first, does the current enterprise optimally serve the specialty and improve outcomes? and second, if not, how can its overall impact on sustaining and growing IR be improved? Awarding grants without further supporting and cultivating those who have the initiative to apply their innovations has proven to be insufficient in meaningfully advancing the IR research enterprise. This is evidenced by the high proportion of Society of Interventional Radiology (SIR) Pilot and Academic Development (Ernest J. Ring) grants that have not been developed beyond initial testing (so-called "one and done" projects), and the extremely small number of projects subsequently funded by major agencies. To address these observed deficiencies in the current IR research support structure in the context of an ever more challenging funding environment, the SIRF assembled a task

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force to critically evaluate the current state of IR research and explore how the SIRF can facilitate meeting future needs and goals. Although similar in many respects to a research consensus panel (RCP), the project differed in that action items were determined over ~1 year and initiated over the course of the following year. The group was also expected to begin a long-term process based on these goals and to report on efforts to date aimed at advancing the research capability, accomplishment, and repute of the specialty. The present document serves both to lay out the results of the meeting and as a progress report through the end of 2017.

METHODS

Panel Membership

On October 15–16, 2015, the SIRF convened an Investigator Development Task Force (IDTF). Panel membership included a group of expert scientists and physician scientists with a wide array of research experience (range, 1–34 years of faculty-level experience) and at all career stages (spanning Assistant Professor, Associate Professor, and Professor ranks). The IDTF included 13 total participants, 11 (85%) residing in the United States and 2 (15%) international. Of the participants, 8 (62%) were present at the initial meeting and the remaining 5 (38%) participated over the next 24 months as the work unfolded via teleconferences as well as in-person and e-mail discussions.

Agenda Methodology

The IDTF goals were to assess the current state of affairs in IR research, identify problems and underlying causes, propose adaptive solutions to address principal issues, and begin the process of implementing solutions. The focus was primarily on improving the SIRF grant program for coming generations of IR researchers. In addition, participants were charged with providing recommendations that would initiate dialogue in the IR community at large regarding how to respond to the challenges identified and the proposed solutions. For the initial discussion, panelists were asked both to identify issues in IR research and to prioritize them. The highest-priority topics were then assigned to teams for further discussion within breakout groups. Each team then provided a 30-minute presentation. After each presentation, an open discussion was held to enable a comprehensive assessment. For each of the topics, action items were identified and assigned. With continuing efforts through December 2017—primarily via teleconferences—action items were moved forward, proposals clarified, timelines estimated for implementation, and early-stage implementation in several areas begun.

RESULTS

An assessment of the perceived obstacles and challenges facing the field of IR research resulted in several frequently cited concerns. These included an underdeveloped culture of research compared with other medical specialties, insufficient institutional and mentorship support, inadequate dedicated IR funding, and limited training in research and basic science. At their core, interventional radiologists (IRs) are innovators; however, to be credible this must be accompanied by due diligence to test these innovations in a hypothesis-driven manner. The IDTF prioritized 6 core areas to help accomplish this: sustainability, incrementalism, mentorship, accountability, leverage, and visibility. The panel produced 6 presentations in these areas, the results of which are summarized below and in the **Table**.

Sustainability

A key goal of the SIRF grant program is to improve patient care by providing investigators with resources for generating preliminary data for extramural funding. Although SIRF funding is modest, the National Institutes of Health (NIH) and similar funding sources provide a level of support that allows a research enterprise to be sustainable. The IDTF examined the NIH funding success of SIRF Pilot and Ring grant awardees over an extended period. The SIRF has seen robust growth in the number of investigators applying for support, with 2- and 5-fold increases in applications for the Pilot and Ring mechanisms over 9 years, respectively (**Fig 1**). However, although a total of 53 SIRF grants (46 Pilot and 7 Ring) were awarded in the 2008–2017 funding cycles, only 2 (4%) of those SIRF awardees subsequently secured NIH funding. The IDTF then examined how many Pilot grant recipients later applied for a Ring award. Only 4 pilot grant recipients (9%) applied for a Ring award and only 1 of those (25%) was actually awarded the grant. In comparison, 88 applications from 67 investigators did not receive SIRF funding during the same time period, of which 3 investigators (3%) later received NIH funding. In summary, a SIRF award was neither as effective as desired nor sufficient to guarantee sustained research activity. Notably, the Pilot and/or Ring conversion to larger funding may be underrepresented by not including those funded by nontraditional mechanisms (non-NIH grant programs) and by the medical industry.

The pay line varies from year to year, but the average pay line for SIRF Pilot grants (40%) is much higher than any equivalent federal grant (eg, the 2016 National Cancer Institute pay line was 9%). Despite this, very few investigators who were not awarded at their first submission exhibited tenacity in reapplying until successful. Among applicants, only 20% (9/48) resubmitted applications. Furthermore, review of the literature suggests little overlap between investigator-published topics and grant-related topics, suggesting a lack of focus and commitment of IR researchers to a specific topic, which is crucial to ensure long-term sustainability.

Only a handful of institutions generate more than half of the applications for SIRF Pilot and Ring grants (**Fig 2**). Similarly, just 7 institutions received more than half of all the awards. More than 80 IR programs exist, suggesting that fewer than 10% of these academic programs carry out the bulk of SIRF-funded research. This underscores the effect that the institution, institutional mentorship, resources, infrastructure, and leadership have on supporting the research activities of individual investigators. These institutions have