



A Scientist Track Investigator Program to Support Early Career Outcomes for Clinician Scientists

Norman D. Rosenblum, MD, David P. Bazett-Jones, PhD, and Hugh O'Brodovich, MD

Clinician scientists, clinicians who devote most of their professional effort to creating new knowledge about health and disease through research, are critical to universities and academic health science centers. However, their numbers are declining,¹ in part because of the challenges facing clinician scientists after obtaining their initial faculty appointment. Even clinician scientists with extensive research training during fellowship remain disadvantaged compared with their non-clinical PhD counterparts in the amount of time spent in research training and research productivity. Further research training, aimed at closing this gap, is often deterred by many factors, including the lack of well-defined research mentorship strategies.² Accordingly, in 1996, the Department of Pediatrics and the Research Institute (RI) at The Hospital for Sick Children initiated a Scientist Track Investigator (STI) program designed as a mentored research junior faculty position to facilitate the transition from research training to independence. We report the elements of this program and associated outcomes.

Methods

A candidate for the STI program had to: (1) be a full-time member of a clinical department at The Hospital for Sick Children, with research training and productivity consistent with future success in research; (2) have at least 75% (50% for surgeons) allocated time for research; and (3) have the support of the clinical department chief and scientific program head in the RI. All newly appointed faculty clinician scientists were expected to enroll in the STI program and, in a 2- to 4-year term as a STI, develop an independent research program. This goal was facilitated by the department head and division chief providing job descriptions specifying the research, clinical, and education activities, and the RI provided human and material resources and an appointment to a scientific program with access to the program's resources. Each STI was assigned a research advisor who was expected to provide ongoing guidance to the STI in developing a research plan, the conduct of research plans, research productivity, establishing independence, and academic success. The STI was expected to participate in the activities of his/her respective RI research program, meet with the research advisor, and use his/her allocated resources to develop a research career.

Formal assessment of the STI's progress, presented in oral and written form, was performed via semi-annual meetings of a committee consisting of the research advisor, RI program head, and clinical department chief/division head. The assessments were shared with the clinical department and the RI's chief of research to highlight any suggested actions. At the end of the STI term, a reclassification review was initiated to determine whether the STI had demonstrated sufficient potential for leading an independent research program that would be novel and productive of high-quality publications. The STI also had to function in a collegial manner within the clinical division and research program. A successful review resulted in promotion to scientist in the RI and continued appointment as a clinician scientist in his/her clinical department. An unsuccessful review resulted in termination of the clinician scientist appointment.

Subjective and objective measurements were used as a means of evaluating the STI program. A questionnaire was administered to STIs, research advisors, clinical division heads, and RI program heads who had participated in the program between 1996 and 2005. Statements within each category were rated on a scale from 1 (poor) to 5 (excellent). Objective outcomes of the STI program were research grants awarded to STIs as a principal investigator and research publications.

Results

The rate of responses (Table; available at www.jpeds.com) by STIs, research advisors, division heads, and program heads were 59%, 56%, 56%, and 46%, respectively. More than 70% of STIs rated the capacity of the STI program to achieve its goals as "good" or better, but gave a lower overall rating (42%), perhaps because of specific criticisms detailed below. Research advisors and administrative leaders rated achievement of goals higher (90% as "good" or better). Most STIs (>70%) and research advisors/administrative leaders (>70%) reported that research time and funding for research

RI	Research Institute
STI	Scientist Track Investigator

From the Department of Paediatrics, University of Toronto, Program in Developmental and Stem Cell Biology, Research Institute, The Hospital for Sick Children, Toronto, Ontario, Canada (N.R.); Research Institute, The Hospital for Sick Children, Department of Biochemistry, University of Toronto, Toronto, Ontario, Canada (D.B.-J.); and Department of Pediatrics, Stanford University, Stanford, CA (H.O.)

The authors declare no conflicts of interest.

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was consistent with that promised initially and was sufficient. Both groups were less enthusiastic in their rating of the amount of research space available to STIs ("good" or better rating, 53% and 59%, respectively). Although most STIs rated the semi-annual progress meetings as "good" or better, STIs consistently rated the elements within this category lower than research advisors/administrative leaders. STIs were aware of the guidelines for, but were critical of, the reclassification system. Most STIs rated overall clarity of expectations and the level of productivity in publications and grants needed for reclassification as fair or poor. Research advisors and administrative leaders were more supportive of the reclassification criteria. STIs rated problem solving arising from the semi-annual meetings highly. More than 80% of STIs rated the team's capacity to address personal and system problems as "good" or better. Ratings by research advisors and administrative leaders were concordant with these STI ratings.

Between 1996 and 2006, 35 of 36 STIs completed the STI program; 1 STI left the STI appointment and did not pursue a clinician scientist career. Sixteen were clinical-researchers, and 20 were laboratory-based researchers. Thirty-one STIs, from pediatrics (n = 24), surgery (n = 2), diagnostic imaging (n = 2), critical care (n = 2), and nursing (n = 1) successfully reclassified to scientist. Of the STIs who left before or failed reclassification, 3 were clinical-researchers and 2 were laboratory-based. The failure to reclassify was markedly different for pediatricians (1/25) and pediatric surgeons (4/6). During their tenure, 50% of STIs held a national level grant, with 83% holding a grant from any source. Sixty-one percent of STIs had peer-reviewed publications as a principal or senior author, with 33% of these articles in journals with an impact factor >3.5. Because the time to publication often extends beyond the time during which research is created, we determined the publication activity of graduate STIs whose time since graduation from the STI program was at least 2 years (n = 25). By that time, the proportion of former STIs with a national grant increased to 60%, those publishing as a principal or senior author increased from 61% to 80%, and the proportion publishing in journals with impact factor >3.5 increased from 33% to 52%. To gain insight to the significance of these performance data, we ascertained performance data for clinician scientists who had been promoted to senior scientist within the RI. Promotion from scientist to senior scientist occurs when an individual has been a scientist for at least 6 years and has met institutional standards for developing an innovative, sustainable, and internationally recognized research program. During 2005 to 2006, of the 19 senior scientists in the department of pediatrics, 95% (18/19) held national grants and 74% (14/19) had published research in journals with impact factor >3.5. Thus, by the

end of only 2 years after graduating from the STI, most former STIs had achieved benchmarks for grant and publication activity which, if sustained, will guarantee promotion to senior scientist.

Discussion

We report outcomes for a STI program designed to facilitate development of independent research programs by clinicians who show promise as potential independent investigators. Qualitative evaluation demonstrated overall support of the program by all stakeholders and provided guidance for improvement. Results indicate that clinical departments and a RI can jointly support vital research time and resources and address issues that can potentially limit clinician scientist success. At the same time, qualitative evaluation of the STI program indicated a need for greater understanding of goals and procedures for semi-annual progress meetings and reclassification reviews. This has prompted a review and revision of relevant program components aimed at clarifying expectations and strengthening documentation related to STI reviews.

Quantitative evaluation revealed overall favorable objective outcomes for STIs, consistent with an early career development study from a department of medicine.³ Failure to reclassify to scientist from STI was greater for pediatric surgeon scientists than for pediatrician scientists. This may relate to the difference in protected time allocated in the department of pediatrics (>75%) versus surgery (>50%).

Tracking of research grants and publication activity during the STI program and by the end of 2 years after reclassification to scientist suggests increasingly successful outcomes. Further follow-up will determine the proportion of former STIs that meet the benchmarks for promotion to senior scientist, which generally requires a sustained record of national-level funding and publication in high impact journals. ■

Reprint requests: Norman D. Rosenblum, MD, Division of Nephrology, 555 University Ave, The Hospital for Sick Children, Toronto, Canada M5G 1X8. E-mail: norman.rosenblum@sickkids.ca.

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Table. Assessment of scientist-track investigator program by scientist-track investigators, research advisors and program leaders*

	Rating			
	Poor or fair		Good, very good, or excellent	
	STI	Advisor/Leader	STI	Advisor/Leader
Guidance from research advisor	8/20 (40%)		12/20 (60%)	
Research time				
Promised vs committed	5/20 (25%)		15/20 (75%)	
Time available for research		7/31 (23%)		24/31 (77%)
Research space				
Promised vs committed	9/19 (47%)		10/19 (53%)	
Research space available		12/29 (41%)		17/29 (59%)
Research funding				
Promised vs committed	6/20 (30%)		14/20 (70%)	
Availability of research funds		8/31 (26%)		23/31 (74%)
Semi-annual progress meetings				
Clarity of guidelines	7/20 (35%)	3/31 (10%)	13/20 (65%)	28/31 (90%)
Effectiveness of assessments	8/20 (40%)	7/31 (23%)	12/20 (60%)	24/31 (77%)
Quality of written documents	7/19 (37%)	2/29 (7%)	12/19 (63%)	27/29 (93%)
Reclassification review				
Clarity of expectations re: productivity	10/19 (53%)	5/31 (16%)	9/19 (47%)	26/31 (84%)
Clarity of expectations re: grants	11/19 (58%)	7/31 (23%)	8/19 (42%)	24/31 (77%)
Fit of criteria with discipline	10/18 (56%)	10/31 (32%)	8/18 (44%)	21/31 (68%)
Problem solving by leadership team				
System problems	3/19 (16%)	6/31 (19%)	15/19 (84%)	25/31 (81%)
Personal issues	3/19 (16%)	6/31 (19%)	6/19 (42%)	25/31 (81%)
Overall rating of STI program	11/19 (58%)		8/19 (42%)	
Achievement of STI program goals	5/18 (28%)	2/30 (7%)	13/18 (72%)	28/30 (93%)

*Empty cells represent categories for which data were not requested from advisors/leaders.