

COMMENTARY

*Perspectives***Is it the clinician-scientist or clinical research that is the endangered species?****Eliot A. Phillipson, MD**

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It is now over 20 years since the clinician-scientist was first declared an endangered species in the United States.¹ This designation was based on the observation that the number of MDs being funded by National Institutes of Health (NIH) grants was decreasing, both in absolute and relative terms. Similar analyses in Canada confirmed that the US figures also applied to the Canadian research enterprise. For example, in the decade from 1986 to 1996, the proportion of MDs and MD/PhDs among grantees of the Medical Research Council of Canada decreased from over 40% to under 30%, and the number of applications from health professionals for MRC fellowships decreased from almost 400 to 100 per year.² The endangered status of the clinician-scientist resulted in several initiatives in the US to reverse the trend, most notably a significant expansion of undergraduate MD/PhD programs. There is now clear evidence that these programs (which are funded by NIH) have been highly successful and have produced an impressive cohort of clinician-scientists who are well-established independent investigators.³ Indeed, although graduates of MD/PhD programs represent only 2.5% of all medical school graduates in the US, they hold one-third of all NIH grants awarded to clinician-scientists. In Canada, the endangered status of the clinician-scientist also prompted several responses, including development of the Royal College Clinical Investigator Program and the MRC Clinician-Scientist Program.

Despite these initiatives, reports continue to appear in leading journals highlighting the continuing endangered status of the clinical investigator.⁴⁻⁸ In fact,

these concerns have recently been given prominent air time in the US in a detailed report published by the National Academy of Sciences, entitled "Addressing the nation's changing needs for biomedical and behavioral scientists."⁹ This extensive report notes that of all the current NIH research grants classified as biomedical or clinical in content, only 26% are held by principal investigators with an MD or MD/PhD, and that the total number of MDs and MD/PhDs in the country's research workforce has declined by 35% since 1985.

Although concerns over the number of clinician-scientists continue to receive attention, the focus has shifted somewhat in recent years, such that it is not so much the number of clinician-scientists that is the principal issue, but rather the number who are engaged in clinical research. For example, in the US less than 10% of the graduates of MD/PhD programs are involved in clinical research, with most pursuing research in more basic cellular and molecular biology.³ Reflecting this dichotomy is the finding of the National Academy of Sciences report⁹ that of all the MDs and MD/PhDs funded by NIH grants, only 34% are involved in "clinical" research; and of all NIH grants classified as "clinical" in nature, only 38% are held by MDs or MD/PhDs. These figures become even starker when the definition of "clinical" research used in these analyses is taken into consideration. Specifically, the definition was very broad and included 3 categories of research: patient-oriented research, including studies of human disease mechanisms, therapeutic interventions, and clinical trials; epidemiologic and behavioural stud-

ies; and health outcomes and services research. It is only the first of these 3 categories (patient-oriented research) that involves direct physical contact with patients and for which the involvement of MDs may therefore be mandatory. Thus, if we subtract those in the fields of epidemiology and health services research from the 34% of MDs and MD/PhDs funded by the NIH whose research is "clinical" in nature, the remaining number who are involved in direct, patient-oriented investigation becomes exceedingly small. To be specific, of the 3119 MDs and MD/PhDs funded by the NIH in 1997, only 1061 (34%) were involved in "clinical" research; and of these, even fewer were involved in direct, patient-oriented research. Although comparable figures are not available in Canada, using the usual "one-tenth" extrapolation, it may not be unreasonable to conclude that in 1997 fewer than 100 MDs and MD/PhDs received funding from the Medical Research Council for direct, patient-oriented research.

Many will argue, with considerable validity, that the decline in numbers of clinician-scientists involved in patient-oriented research reflects the difficulty of capturing funding from the granting agencies for this type of research, particularly during the final decade of existence of the Medical Research Council. However, it is also possible that the lack of funded research in this domain reflects in part a lack of qualified applicants. This argument is supported by the observation (already noted) that during the past 10 to 20 years, most clinician-scientist trainees have opted for careers either in basic biomedical sciences (including laboratory-based studies of disease mechanisms) or in clinical epidemiology and health services research. In contrast, few have pursued careers in direct, patient-oriented investigation. These trends are understandable given, on the one hand, the intellectual excitement of reducing a complex system to its fundamental cellular and molecular properties and on the other hand, the ascendancy of clinical epidemiology and health services research as driving forces within the health care delivery system.

Whereas understanding the basis for previous trends is clearly relevant, it is perhaps of greater importance that more attention be focused on developing research strategies for the future. In doing so, 2 fundamental questions must be considered. First,

given the evolution of science in its broadest sense, will there be a need in the coming years for clinician-scientists, in general, and for those involved in direct, patient-oriented research, in particular? Some might argue that the declining numbers of both basic (disease mechanism-oriented) and clinical (patient-oriented) clinician-scientists is evidence of a declining need for such individuals. Such a conclusion would be wrong. Indeed, virtually all of the recent papers and reports that have highlighted the decreasing numbers, have done so not to sound the death knell of the clinical investigator, but rather to sound the alarm and issue an urgent "call to arms" to address the problem.⁴⁻⁹ In doing so, the authors note the unique traditional role played by clinician-scientists in bringing the advances of basic science into the clinical domain, on the one hand and in formulating clinical research questions in rigorous terms that can be understood and investigated by basic scientists, on the other hand. They also note, in the context of patient-oriented research, the central role played by clinician-scientists in directly applying the advances of basic science to the investigation and management of patients. All authors point out that there is no less a need today for these traditional roles to be filled by clinician-scientists than there was in the past. In fact, given that the revolution in basic biomedical knowledge and in our understanding of fundamental mechanisms of disease of the past decade is now poised to alter irreversibly the practice of clinical medicine in the next decade, most experts in the field, including leading basic scientists, are urgently calling for initiatives to repopulate the ranks of clinician-scientists. It is particularly telling that, whereas the recent report of the National Academy of Sciences⁹ did not recommend any increase in the production of PhD scientists in the basic biomedical disciplines or in the behavioural and social sciences, it called for intensified efforts to train and retain physicians "until the clinical research workforce includes substantially more MDs than is now the case." The urgent need for clinician-scientists has been summed up succinctly by one authority who wrote that "in the same way that molecular studies were required to breach some of the principal obstacles preventing a mechanistic understanding of disease, so will a resurgence of clinical

translational research be necessary to understand how these molecules function in an intact organism.”¹⁰

Given the compelling need for a continuing and even expanding role for both clinician-scientists and clinical (patient-oriented) research, the second question that must be addressed is: How should academic medicine and the research establishment in Canada respond to meet this need? The answer to this question is complex^{7,8} since it involves motivational, structural and economic elements, including (but not limited to) the following: ensuring that medical school curricula emphasize the scientific principles that underlie the practice of medicine; creating an environment in medical schools and in postgraduate training programs that values clinician-scientists and clinical research, and transmits to students the importance and excitement of research; exposing medical students early in their careers to clinician-scientist role models; providing opportunities for informal research experiences and for formal research training at both the undergraduate and postgraduate levels; minimizing the economic disincentives of undertaking prolonged research training and of a career as a clinician-scientist; lobbying the funding agencies (particularly the Canadian Institutes of Health Research) to increase the number and size of career support awards for clinician-scientists, thereby reducing their dependency on clinical practice plans for adequate time protection; ensuring appropriate mentoring of clinician-scientists early in their careers as independent investigators; and, perhaps most important and fundamental, providing an environment that is “conducive to creating a new generation of physician-scientists — rigorous in their training, confident in their ability to compete and to succeed, and, above all, imbued with the belief that their efforts are essential if we are to improve the lives of people everywhere.”⁷ This mandate may appear somewhat daunting and will require that medical schools, postgraduate training programs, teaching hospitals, funding agencies, and governments become engaged in the process. Clearly, the mandate cannot be achieved by any one group or department acting in isolation.

Thus, in returning to the original question of whether it is the clinician-scientist or clinical research that is the endangered species, the answer is

“both.” And while some doubts regarding our collective ability to sustain the species may be understandable, the costs to society of not doing so would be unacceptable. The challenges to success, as outlined here, are clear; but so is the need. It is hoped that with continuing commitment and a sense of common purpose, the day will not be far off when both the clinician-scientist and clinical research will be removed from the list of endangered species.

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