

# Training for Translation – The Physician Scientist’s Career Path

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*“Translational research transforms scientific discoveries arising from laboratory, clinical, or population studies into clinical applications to reduce cancer incidence, morbidity, and mortality”*

*Translational Research Working Group NCI.<sup>1</sup>*

The terms “translational research” or “bench-to-bedside” have become buzzwords in the last ten years and are used to refer to the process of transfer of knowledge from the basic sciences to its application in the clinical and community based setting.

The “translation” of scientific discovery into clinical outcomes may seem like a fluid process but in reality is met with major stumbling blocks related to challenges faced in science, medicine and public health. Although this process has been a natural part of the advancement of medical and scientific knowledge, since their emergence, it has gained increased focus in the last number of years for a variety of reasons. Major advances in scientific research have been made in many fields at an unprecedented pace in the last decade. One such example in the genomic field has been the human genome project and the subsequent deep sequencing data that continues to emerge from this.<sup>2</sup> This has resulted in a plethora of new data emerging in the life sciences with the knock on effect in the translational field being that high-throughput mechanisms are needed to bring benefits to patients in an effective and timely manner. This translation is, increasingly, being carried out by highly skilled individuals in the translational field who are capable of bridging the gap between science and medicine. Many of those with an interest in these fields in recent years have opted to pursue this path in a coordinated manner through dual training with doctorate degree in medicine and science, often as a formal MD/PhD program.

Since 2005, the National Institute of Health (NIH) in the United States has focused on funding translational research with an increasing focus on the biomedical field and collaboration between clinicians and scientists. In 2006, they launched the Clinical and Translational Science Award program with the stated goals of accelerating the process of translating laboratory discoveries into treatments for patients, to engage communities in clinical research efforts, and to train a new generation of clinical and translational researchers.<sup>3</sup>

This is however not a new concept, but recognition of an increasing and unmet need. Many of the major discoveries in clinical medicine that have benefited patients all over the world

have been led by physician scientists who were able to formulate scientific hypothesis based on clinical observations. Physician scientists work in a dual capacity in both fields where they can act as catalysts for discovery and innovation on both sides. However, gaining a strong background in both clinical medicine and basic science remains a challenge. This pathway traditionally begins with attending medical school and gaining clinical expertise as a physician. It is not always possible to acquire significant experience in laboratory-based research during this time, with most students learning the basics in taught courses and some electing to spend summer months in laboratory rather than clinical settings.

This has been addressed in recent years in the United States and other countries with several academic institutions now offering MD/PhD programs aimed at highly competitive candidates who are interested in dual training in medicine and science. The American Association of Medical Colleges has a detailed list of the available programs in the United States on their website. (Available from: [https://www.aamc.org/students/research/mdphd/applying\\_md-phd/61570/mdphd\\_programs.html](https://www.aamc.org/students/research/mdphd/applying_md-phd/61570/mdphd_programs.html), updated 2010 Oct 1; cited 2013 Sept 18) These programs provide mentorship and training in a coordinated and focused manner and prepare individuals for becoming independent physician scientists. In Europe and Asia several programs are also being developed to train physician scientists and in Latin America there are now two countries offering MD/PhD programs, Mexico and Brazil (Available from: <http://www.itesm.edu/wps/wcm/connect/snc/portal+informativo/por+campus/monterrey/institucion/n200013654789>, cited 2013 Sept 18).<sup>4,6</sup> It will take time for more of these programs to become established, as the curricula and objectives of such newly developed programs evolve, but the impetus and incentive for universities to offer these programs is increasing.<sup>7</sup> Such programs are usually designed to allow a more time-efficient track to the completion of training, as the length of the traditional non-integrated path can be a major deterrent for many individuals.

Outside of these programs students who wish to pursue a career as a physician scientists should be guided by their mentors and, most importantly, by their own research interests. Encouragement at this level is vital in early career development of physician scientists and can lead to life-long collaborations. Strong mentorship can help students to avoid compartmentalization of research training and practice from their clinical training, this is one of the main road blocks in the development of early physician scientists who often see these as distinct areas and have difficulty merging progress in both.

Following completion of an MD/PhD, candidates are likely to be

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highly competitive for residency programs in their chosen field. Ideally this path would see them continue their dual training by having protected time for research throughout, however this is often not feasible due to the high clinical commitment during this time. To address this, growing number of residency programs in the United States have established research track programs that are specifically aimed at MD/PhDs or those aiming to become physician scientists, which allow them to develop their clinical expertise while continuing to make advances in their chosen scientific field (Available from: <https://freida.ama-assn.org/Freida/user/viewProgramSearch.do>, updated individually by programs; cited 2013 Sept 18. Available from: <http://www.physicianscientists.org/search/custom.asp?id=776>, updated continuously; cited 2013 Sept 18).

Outside of the US this is also increasingly the case with investigators and funding agencies alike recognizing the importance of addressing the need for funding and support to translational research. Several public sector organizations, modeled on the NIH Center for Advancing Translational Sciences in the USA, are being developed and funding agencies in developed and developing countries are making specific funding available to the translational research sector.<sup>8</sup> In Europe, several initiatives have been established to promote translational research centers, such as the European research infrastructure (EATRIS) or the UK National Institute of Health Research Biomedical Research Units and Centres.<sup>6,9,10</sup> This is also being addressed by international societies and meetings which aim to promote translational research initiatives and foster collaborations.<sup>10</sup> This coordinated approach aids the development of physician scientists to becoming principal investigators by again avoiding compartmentalization and de-skilling in either area.

Following this many physician scientists will complete further post-graduate training or a fellowship in their chosen field before becoming faculty members at universities, medical schools and research institutes. The major challenge faced at this point is attainment of funding for research. This is often facilitated at the early physician scientist stage by the wonderful national and international collaborations that have developed between medicine and science. This can aid physician scientists to becoming independent principal investigators with the support of senior colleagues. Through this, physician scientists are in a position to enhance care of patients both directly and indirectly. While there remain several obstacles in the career development path of physician scientists there is no doubt that this is a highly rewarding career track, which is in the midst of an exciting era.

It is clear that medicine and science are now moving at an unprecedented pace and alongside this there is inevitably an increasing demand for experts who have the ability to translate between these two exciting areas. To achieve this early opportunities for students to engage in both disciplines should be encouraged and mentorship provided through this challenging but immensely rewarding process.

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## References

1. Available from: <http://www.cancer.gov/researchandfunding/trwg> updated 2012 Apr 25; cited 2013 Sept 18.
2. Lappalainen T, Transcriptome and genome sequencing uncovers functional variation in humans. *Nature*. 2013;501(7468):506-11.
3. Woolf SH. The Meaning of Translational Research and why it matters. *JAMA*. 2008;299(2):211-3.
4. Cheng MH. Infrastructure for translational research in Asia. *Mol Oncol*. 2007;1(3):255-7.
5. Oliveira RV, Campos PC, Mourão PA. An MD-PhD program in Brazil: students’ concepts of science and of common sense. *Braz J Med Biol Res*. 2011;44(11):1105-11.
6. Newby DE, Webb DJ. Translational research: a priority for health and wealth. *Heart*. 2010;96(11):815-6.
7. Rubio DM, Schoenbaum EE, Lee LS, Scheingart DE, Marantz PR, Anderson KE, et al. Defining translational research: implications for training. *Acad Med*. 2010;85(3):470.
8. Translational research and experimental medicine in 2012. *Lancet*. 2012;379(9810):1.
9. Chen X, Andersson R, Cho WC, Christiani D, Coico R, Drazen J, et al. The international effort: building the bridge for Translational Medicine: Report of the 1st International Conference of Translational Medicine (ICTM). *Clin Transl Med*. 2012;1(1):15.
10. Becker R, van Dongen GA. EATRIS, a vision for translational research in Europe. *J Cardiovasc Transl Res*. 2011;4(3):231-7.