

# The Increasing Importance of Translational Vision Research in Refractive Surgery

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**W**ith this issue, the *Journal of Refractive Surgery* introduces a new section entirely dedicated to translational research in refractive surgery.

The term, translational research, has gained popularity in the past few years. The motto of the Association for Research in Vision and Ophthalmology for 2012 is "Translational Research: Seeing the Possibilities." This gain in interest has been attributed to its link to funding, as many scientists share a common concern about the difficulty in fundraising. Although many understand this term to mean simply complying with a funding source's motivation (in the selection process of research initiatives), this belief does not provide the bigger picture. The term should also be focused on utilizing and streamlining high-level basic and preclinical research concepts and ideas in a timely and efficient manner. This type of focus would imminently enhance patient care, reduce adverse effects related to invasive surgical methods, improve the state-of-the-art in both detection and treatment methods, and respond to unmet medical needs.

## DEFINING TRANSLATIONAL VISION RESEARCH

The famous term "from bench to bedside," which originated in the 1990s, was often used to illustrate the bridge between basic science and applied medicine. Retrospectively, this term may have been the beginning stages of what is now known as translational research/medicine.

"Official" definitions are available for the term translational research. One of the most widespread definitions is from the United States National Cancer Institute: "Translational research transforms scientific discoveries

arising from laboratory, clinical, or population studies into clinical applications to reduce [cancer] disease incidence, morbidity, and mortality."<sup>1</sup> This definition could certainly apply to the field of vision research.

Using this understanding of the term, the aim of translational vision research could be to ease and accelerate the translation of scientific findings into therapeutic applications. Whereas such efforts are easy to understand for clinical and epidemiological studies, this concept is still novel to most basic and laboratory sciences.

## THE "OIL OF THE 21ST CENTURY" FUELS TRANSLATIONAL RESEARCH

Interestingly, links exist between financial limitations of governmental funding bodies, intellectual property generated at universities, and the advancement of translational research.

In past years, governmental support for academic research institutions has been declining both in Europe and North America,<sup>2,3</sup> leading to an insecure financial situation for many basic research groups. Current funding concepts enforce the researcher to seek alternative funding models/sources to support his/her concepts and ideas. The basic researcher also learns that the negotiation power and motivation for many funding sources remains within the intellectual property portfolio. Companies and investors (eg, venture capitalists) evaluate the strength of a patent to determine how much funding they are willing to provide to further the research concept, as intellectual property provides a limited monopoly to prevent concurrent use or sale of the protected invention. Mark Getty, chairman of Getty Images, and one of the world's largest Intellectual Proprietors calls intellectual property the "oil of the 21st century"<sup>4</sup> enforcing this concept.

The closer the product is to commercialization the easier the funding is to secure. When seeking financial support from industry or investors, two of the most frequently asked questions are: 1) how close is the product to commercialization, and 2) when will the return of investment occur? Both of these questions are intimately linked. Therefore, the translational research component is forced on to the researcher at an earlier stage to figure out how his/her concept/idea can be

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translated into a commercialized product to fulfill an unmet medical need or improve the state-of-the-art. In summary, the reduction of available governmental research funds promotes growth and innovation through the power of intellectual property and demand for translational research.

### THE MODERN RESEARCHER

Until recently, medical research was often divided into basic (performed by PhDs) and clinical research (performed by MDs). Although basic researchers investigate topics of interest to the clinical scientist, the deeper understanding of the clinical needs often is absent for the researcher because the information exchange between MDs and PhDs is sometimes nonexistent even within the same department. Fortunately, MD-PhD programs have expanded greatly in size in past decades.<sup>5</sup> These programs produce clinicians and surgeons who are extensively trained in cellular and molecular biology techniques. Through the promotion of these educational programs, the clinical scientist has a broader research outlook including the possibilities and sophisticated techniques that only a laboratory offers. Therefore, the clinical scientist would naturally be a promoter of translational research as he/she would conduct research and development activities based on his/her knowledge of the current state-of-the-art in treatment methods and/or unmet medical needs.

### HOW DOES TRANSLATIONAL RESEARCH FIT INTO CLINICAL REFRACTIVE PRACTICE?

The past two decades have brought significant technological advances to this field. Although these advances are profound, a component remains missing. The field of refractive surgery is focused on performing surgeries in a biological tissue that is subjected to biological responses. The knowledge about this tissue, unfortunately, has remained rather stagnant in comparison to its technical counterpart. In our opinion, the next big breakthrough will concern new concepts and therapeutic measures originating in cell and molecular biology approaches. A combination of these two areas may open a means to treatment modalities that are currently unimaginable.

To promote this concept, the basic/preclinical research has to be conducted and later translated into a clinical setting. However, without considering and including the long-term goal of clinical application when first drafting research proposals and concept plans, the ability to secure adequate funding may be significantly reduced. And, without adequate funding, the research possibilities and levels of creativity are limited. Therefore, beginning with the end goal in

mind largely increases a scientist's chances to explore research concepts and ideas.

Exactly how this multi-faceted concept fits into daily clinical practice is a viable consideration. First, documenting unusual findings and cases during routine patient follow-up is a basic, yet important, exercise in formulating potential research initiatives, as the initiatives would focus on understanding the source of the finding/problem. Second, consciously being aware of problems in current treatment and/or prevention methods, for example, is another important starting point for developing possible research concepts. A good example is the clinical observation that deep surface ablation leads to corneal scarring. The identification of a pharmacological substance or pretreatment of the cornea prior to surface ablation might reduce the stromal scarring response. Such concepts would later translate into commercial products to improve the state-of-the-art. And lastly, discussing these findings and problems among colleagues helps assess the importance and need for these potential concepts.

### SUMMARY

Addressing these business and financial components of research, we believe that including a section on translational vision research especially for refractive surgery will be a welcome addition to the readership of the Journal. Although the section "Translational Science" is new, the Journal has published a number of articles in past years that would have been ideal candidates for such a section.<sup>6-11</sup> The inaugural Translational Science article in this month's issue is from Santhiago and colleagues on short-term cell death and inflammation after intracorneal inlay implantation in rabbits.<sup>12</sup> Although not all scientists are in agreement with the promotion of this term, the Journal aims to provide different outlooks and modern usage of translational research in this way to advance the field of refractive surgery.

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