Editorial

From the Editor's Desk

Bench to Bedside: Translational Research Demystified

The term "Bench to Bedside" is used to describe the process by which the results of research done in the laboratory are directly used to develop new ways to treat patients, according to the National Cancer Institute (NCI) dictionary. This term is not new. The idea that clinical and basic scientists could work at the interface between basic science and clinical medicine and lead to significant breakthroughs has existed for a long time.[1] In 1968, the Editor of the New England Journal of Medicine used the expression "Bench-Bedside Interface" to describe two papers that demonstrated for the first time, that chronic granulomatous disease of childhood could occur in females.[2] Although not a recent term, its significance is being recognized in the current era more than ever before.

Every novel discovery begins with a burning question and evolves through a journey that starts with experiments in the laboratory. To translate the findings of laboratory research into clinical application that can result in new methods of diagnosis, treatment or prevention is the big challenge. And that is where translational research steps in. Translational research is defined by the European Society for Translational Medicine (EUSTM) as an interdisciplinary branch of the biomedical field supported by three main pillars: bench-side, bedside and community.[3] Translational research applies findings from basic science to enhance human health and well-being, i.e. it aims to "translate" findings in fundamental research into medical practice and meaningful health outcomes.

Phases of Translational Research

Translational Research describes a continuum of research wherein scientific discoveries are integrated into clinical applications and conversely, clinical applications are used to generate research foci for basic science: the "bench to bedside and back to bench" approach.[4] It consists of different phases. Initially, a two-stage model was described which consisted of ***T1 research*** *which refers to basic science discoveries used to develop new treatments for disease ("bench to bedside"), and* ***T2 research*** *aimed at translating the findings from clinical trials into everyday practice and community settings ("bedside to community"), thereby improving utilization of proven therapies in clinical practice and community settings.[5]*

Later on, Translational research was redefined to include 3 phases. In this model, T1 describes basic science to clinical science, T2 clinical science to clinical practice, and T3 is used to denote the translation of clinical practice to more widespread health improvements.[6] There is now an emerging consensus 5-phase (T0–T4) definition for translational research.[7] T1 involves processes that bring ideas from basic research through early testing in humans.[7] T2 involves the establishment of effectiveness in humans and clinical guidelines.[7] T3 primarily focuses on implementation and dissemination research while T4 focuses on outcomes and effectiveness in populations. To involves research which wraps back around to basic research.[7]

Translational research comes with its own set of challenges. It incorporates aspects of both basic science and clinical research and requires skills and resources that are not readily available in a basic laboratory or an exclusively clinical setting. To achieve this, clinics and laboratories have to be linked to each other. This can be a daunting task, with several barriers and challenges. There are inherent cultural differences between basic scientists and clinicians including differences in education and training that may affect collaborations and result in lack of communication. Other hurdles include lack of resources in terms of workforce and infrastructure and the presence of regulatory issues.[8] These may involve ethics in human research, regulations involving tissue banking and material transfers and implementation of clinical trials.[4,8] Creation of a pool of clinician-scientists is vital to build a robust clinical and translational research

capability. Training modules that aim to do so should be meticulously planned and incorporated in the curriculum. During training, clinicians should have exposure to laboratory research and similarly, basic scientists should have exposure to the clinical environment, rather than remain restricted to only basic and clinical research respectively. Integration of the two aspects are critical for progress of Translational Research and this can be a major challenge. Collaborations and funding are the driving forces of Translational Research in terms of bringing together expertise, integrating basic science and clinical applications, and training future generations of clinician-scientists. As discoveries move from "bench to bedside", invaluable information may be gained by moving back from the "bedside to the bench", as research travels a full circle. Similar barriers and challenges may be experienced with this arm of Translational Research and need to be appropriately addressed.[4]

Nevertheless, Translational Research is here to stay for its significance has been recognized all over the world. The road may be bumpy but the journey is exciting and worth it!

You would be happy to know that Delhi Journal of Ophthalmology is spreading its wings and how! The current issue has a comprehensive article from Moorfields Eye Hospital, London, on OCT Angiography and its principles and applications in retinal diseases. We also have our friends from Nepal sharing their experience on ocular trauma. The Guest Editorial by Dr. Partha Biswas covers the hot topic of FLACS in a lucid manner and is a must read for all.

I hope you would enjoy this rich compilation of interesting articles. Just a quick reminder to download the new DJO App on your mobile phones for easy access to all published articles. It is fast and free and will keep you in touch with the latest news and updates.

As always, I shall eagerly await your feedback and comments.

Warm regards,

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