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Editorial

Translational Physiology: Present Status and Future Perspectives

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Translational research refers to the explorations pertaining to discoveries from basic science to applied medicine to increase the quality of human health. This has been devised particularly in medicine, in which the findings of basic research are extended to the clinical research setting (bench to bedside) and then to clinical practice and eventually to the health policy (bedside to community).[1] The term translational research was introduced about 25 years ago and has since become a guiding force in biomedical research. Due to enormous contribution of physiology from understanding the pathophysiology of disease processes to the development therapy modules and management of various diseases, the Nobel Prize in Medicine has been titled as Nobel Prize in Physiology and Medicine. Over past three decades, physiology has contributed tremendously to various aspects of clinical medicine including advancement in disease treatments; and therefore, physiology has been additionally designated as translational physiology. Translational physiology is a vibrant and multidisciplinary subject in medicine.

The concept of translational physiology differs from traditional integrative and clinical physiology through its broad investigative scope, spanning basic research to community health. Although translational physiology offers exciting opportunities, it remains underdeveloped and underutilized in developing nations, including India.[2] A key challenge moving forward is to expand physiological research by extending investigations into communities of patients and or at-risk individuals. This expansion will support bidirectional physiological inquiry across the translational continuum: basic research findings can be explored at the population level, and mechanisms can also be examined through "reverse translation" in clinical research settings and preclinical models based on initial observations made in populations.[1]

The phases of translational research include four phases: T1 to T4. T1-First phase of translational research, or "Bench to Bedside," moves a basic discovery into a clinical application; T2-"Bedside to Practice" research provides evidence of the value of taking the basic discovery in the clinical setting; T3-Research that moves the evidence-based guidelines developed in phase 2 into health practice; T4-Research to evaluate the 'real world' health outcomes of the original T1 development.[1] In India, the physiology has been restricted mostly to the T1 and T2, for various reasons that include lack of interest of new generation researchers in experimental research, conduct of clinical research in less sample size, less protocol designs in clinical trials, use of poor data analysis tools, data generated are not supported by robust mechanistic evidences, therapeutic modules are tested in a less-time duration (usually in days and weeks) schedule and follow up of patients are not practiced routinely, data generated don't represent the observation in a general population, and data are published less scientific and non-PubMed journals. Interventional physiology has not been developed in its true essence and spirit.

There are important questions in translational physiology need to be addressed along with a range of experimental strategies, potential barriers, and approaches for promoting progress in the field. Translational physiology provides a novel framework for physiology programs and an investigational platform for physiologists to study function from molecular events to public health.[3] Under the visionary leadership of the author of this article during his tenure as Director of the Institute, the establishment of three years full-time DM (Doctorate in Medicine) course in Clinical and Interventional Physiology (CIP) at All India Institute of Medical Sciences (AIIMS) Patna, which happened for the first time not only in India, but also in the entire world, has created new avenues for instituting various modalities of interventional (translational) physiology. The interventions such as deep brain stimulation, transcranial magnetic stimulation, intraoperative monitoring and therapy, vagal nerve stimulation, HRV-assisted bio-feedback therapy, respiratory-device assisted bio-feedbacks, yoga therapy, exercise therapy and so on that have been devised as part of the DM program, provide greater opportunities for physiologists to become true interventionist in the field of medicine. Implementation of such an ambitious program requires strong support from the authority in establishing advance research, investigational and therapeutic facilities, infrastructure for indoor patient-management services of CIP, manpower recruitment and training, inter-disciplinary cooperation, trans-disciplinary support and collaboration at the national and international levels. Most important, the physiologists to develop

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sincere interest and attitude to be part of this Interventional Physiology continuum.[4]

It holds great promise for increasing the depth, completeness, and societal impact of physiological research, while strengthening the essential role of physiology and physiologists within the biomedical research enterprise.[5] Utilizing and implementing the opportunities and scopes of translational physiology into essential practice, will enhance the dignity of the physiologists as interventional physiologists.

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