

EDITORIAL

PHYSIOLOGY: BASIS OF ALL MEDICAL SCIENCES

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“Health and NOT disease is the greatest mystery of medical science”. In a broader perspective Physiology is a science that deals with the normal functioning of any living organism. Given the magnitude of the subject, it is further divided into different categories including, viral physiology, bacterial physiology, plant physiology and animal physiology. Human Physiology is one of the fields of animal physiology that deals specifically with the normal functioning of human body. It explains the mechanisms involved, the cross talks and the cross linkages at subcellular and cellular level, and the pathways followed at tissue, organ and system level to maintain health. This science is the basis of all medical knowledge and is further subcategorized among others, into cellular physiology, system physiology, sports and exercise physiology, and physiology of unusual environment.¹

The word ‘Physiology’ is derived from Ancient Greek *physis*, meaning ‘origin’ and *logia*, meaning ‘study of’.² Its origin can be traced back to Greece (at the time of Hippocrates, i.e., late 5th century BC), China and India.³⁻⁵ Physiology begins with determination of factors for a normal healthy life. It not only sets the normal standards but also correlates the changes and the adjustments made in the body within a certain range, due to the impact of factors like weather change, altitude, nutrition (i.e., type of food intake) and exercise that may cause a deviation from the normal set point. Understanding the response of the body to that deviation, and the power within the body as a whole to either bring the change back to normal or to accept the change and reset the normal standards for the body to continue life as much close to normal as possible is within the domain of Physiology.

The American Society of Physiology was founded in 1877 and physiologists have contributed significantly in the understanding of pathophysiology of diseases leading to improved health conditions. The importance of Physiology as a dynamic, peak medical science is supported by the fact that a Nobel Prize in Physiology or Medicine is awarded by the Swedish Karolinska Institute to those who make significant achievements in this discipline.⁶ Until now 214 scientists have been awarded Nobel Prize in Physiology.⁷ Top research in health sciences are being pursued worldwide in Physiology such as pathways in signal transduction, molecular mechanisms in neuroscience circadian rhythm, autophagy, reprogramming of mature cells to become pluripotent and so on.

Unfortunately, Pakistan has neither been able to become part of those research groups through collaboration nor have we been able to generate a culture of research in Physiology that might have led to some significant contribution to health sciences and prevention of diseases. The reasons for this are manifold, starting from poor infra-structure with no laboratory facilities, deficiency of funds, to lack of interest on part of students and supervisors. But a major cause of all this is the ‘inferiority complex’ and the ‘lack of pride’ among the Physiologists of Pakistan for their field, which has been inculcated in their minds either by their seniors who became Physiologists by chance and not by choice, or by their colleagues in other clinical fields.

The importance of Physiology cannot be denied as it directly affects the daily functioning as well as life of individuals ranging from disease prevention, rehabilitations, recovery, sports and routine functioning under extreme and dynamic environmental conditions. It takes into account response of whole body, its systems in a synchronized mode as one unit. Thus it is the mother of all basic sciences from where originates the basis of a healthy life and prime reasons for disease prevention.

Physiology is not only a basic science with theoretical knowledge; rather it has its applications at macro level as clinical and applied Physiology. Understanding these scientific applications leads to disease prevention and restoration of health. In addition, it also exercises strong inter domains dynamics at micro level with other basic sciences domains such as Anatomy and Histology, Microbiology, Cell biology and Biochemistry. The conclusions drawn with physiologists’ input in these domains have always resulted in new interpretation of pre-existing knowledge and genesis of new ideas leading to advancement in medical sciences.

One needs to appreciate the fact that Physiology defines the normal characteristics and homeostatic conditions of each system. All other clinical fields are the study of deviations from Physiology in their respective areas leading to abnormalities. Unless one has sufficient knowledge of normal characteristics/responses/conditions, one cannot detect the abnormality. Thus in nut shell Physiology cannot be detached as a standalone subject from other basic and clinical sciences. It actually entails that a quality of research brought to the table by physiologist *vis-à-vis* a basic scientist with a different

perspective, i.e., it is not just a scientific explanation or conclusion, rather it actually is a correlation of all the homeostatic mechanisms involved at micro and macro level to maintain health. With the advancement of scientific technology, the shift of Physiology is towards molecular and genetic level for complete understanding of body functions.

The current perception of delineating Physiology as only a basic science subject would not only further deteriorate the understanding of clinical medicine but would also affect the research quality and efforts for disease prognosis and prevention. The idea of stripping Physiology from other domains like Histology and Biochemistry and restricting it to standalone theoretical studies would generate serious consequences for research basic sciences and also adversely impact the clinical fields.

Time has come where we need to redefine the basic science studies with a paradigm shift in the scope of Applied Physiology. Its circle of influence be recognized and given due weightage in both basic sciences as well clinical fields. In case this aspect is overlooked then the basic medical sciences in Pakistan may not be able to compete at regional and global level.

Physiology is the mother of all basic sciences; all other domains flow out of it, as one cannot separate the product from the original equipment manufacturing, for its subsequent product improvement versions. Physiology maintains the status of original science for basic sciences as well as clinical sciences. All their new products and research are dependent upon Physiology. It is an important basic science which is in fact ‘Queen of Basic Sciences’.

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