

Opinion Article

Physiologist at crossroads – Options for a stable and fulfilling career

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Medical science is witnessing an era of advanced technology for diagnosis and management of disease. An interdisciplinary approach – across the different specialities of medical science is being practiced, thus making the approach holistic and integrated. In such a scenario, physiological sciences are bound to play an important role. However, physiology, the mother of science, traverses through all sub-disciplines of medical science, is now facing declining recognition and losing its charm among budding postgraduate medical students as a branch of choice.

Time has now come to raise the awareness among medical community on the scope of physiology as a stable and fulfilling career. Physiological science has emerged from traditional zone of ecological and evolutionary physiology to new genomic, cellular, molecular and computational biology. Awareness has to be raised among postgraduate students and general medical community about the career options in physiology in academics, research and clinical spheres. A notable fact to remind physiologists is that the prestigious Noble Prize among the medical specialities is given for Physiology or Medicine recognising the pioneer place of physiology in medical research.

Careers directly related to master's degree in physiology are as follows:

1. Career in research

Physiological sciences have research at their core. The research avenues are unlimited and promising with a goal of understanding the complex system from the level of genes to the whole organism. Physiologists have a lead in research in functional genetics, different animal model organism computational biology and interdisciplinary research efforts. Regenerative medicine in the form of inducible pluripotent stem cells research is the promising future of tomorrow requiring more physiological research.

The large amount of transomic research can also be pursued by physiologists. Entire clinical science is based on successful research. Physiological research can prevent the transition from pre-symptomatic to symptomatic disease state by recognition of the cause and effect of the factors involved.

The Medical Council of India and National Medical commission have mandated establishment of clinical physiology laboratories in every department to provide support to the clinical specialists for patient care. This will not only aid in better diagnosis and management of patients but also expedite diagnosing and managing cases pertaining directly to their specialised physiological subdiscipline. A functional clinical laboratory with trained and skilled workforce would enable the young dynamic postgraduate in physiology to opt for career as clinical physiologist.

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- i. Post MD. PhD Course (ICMR sponsored) after completion of postgraduate course in physiology, higher study options are available in research in the form of PhD in which specialised post-MD PhD courses are available through ICMR in KGMU,^[1] Lucknow, NIMHANS, Bengaluru and Sri Ram Chandra University, Chennai. Each year 25 candidates are inducted into the course through an entrance examination conducted in the month of May and June. Research avenues could be neurophysiology, exercise/sports physiology, respiratory physiology, sleep physiology, etc. A physiologist with an advanced research training would have an edge in job and career opportunities.
- ii. Post-doctoral research associates in various laboratories and research institutes across the globe offer innovative research opportunities for fresh or experienced physiology graduates. However, most of these post-doctoral research opportunities are available in developed countries, and those who are prepared to go overseas for higher studies can opt for same. A few examples of such research fellowships are as follows:
 - a. Post doc fellow in developmental epigenetic, Baylor College of Medicine, USA
 - b. Post doc research fellow in cardiovascular health, UT Health San Antonio, Texas, USA
 - c. Fellowship in translational research Cincinnati Children's Research Foundation, USA
 - d. Post doc fellow in auditory neuroscience Pittsburgh University, USA
 - e. Postdoctoral courses are also available in: –
 - i. Diabetes, molecular metabolism, cardiovascular research, cancer biology and signal transduction in several universities in the USA and Europe.

2. Career in academics

Medical teachers are greatly needed with the ever-increasing number of government and private medical colleges all over the country. Even fresh medical graduates can expect good salary and early placement first as senior residents and later as faculty in various medical colleges. The option is not purely about teaching but medical institutes can be developed as research centres through research projects by ICMR, SERB, DST, DBT and other government and non-government agencies.

3. Biomedical scientist

Physiologist with their training can also work as biomedical scientist in pharmaceutical and biotechnology companies where on-going research needs expertise for conducting them, especially the Newomic research, and multidisciplinary research in neurophysiology, critical care science, respiratory physiology, sleep physiology, high altitude physiology and gastrointestinal physiology. This would need the physiologist to be well versed in the basic evolutionary physiology and the newer molecular

physiology along with research methodology. Physiologist trained in neurophysiology, exercise, respiratory and sleep physiology along with a competence in conducting and interpreting the test results successfully would be a necessity for any research laboratory.

4. Clinical physiologist

There are many branches of clinical physiology such as electrophysiology, sleep studies, neurocognitive physiology, autonomic function testing, pulmonary function testing and intraoperative neuromonitoring. A physiologist could work independently or as a team with specialist from other fields for better diagnosis and care of patients with his skills in physiological sub-disciplines.^[2]

i. Exercise/Sports physiologists

The American College of Sports Medicine (ACSM) certifies exercise physiologists with in MD or equivalent degree in physiology who complete their course in sports physiology.

Accredited exercise physiologist (AEP) is trained in Australia after obtaining an MD or equivalent degree in physiology.

Certified/accredited exercise physiologists have several job opportunities in developed and developing countries for providing continuous education and guidance for athletic training and research in sports medicine. They have career opportunities in hospitals, corporate wellness programmes, military training centres and rehabilitation clinics. Sports physiology department in India accepts MD physiologists for holding faculty positions.

ii. Sleep physiologist

Physiologists have lot of opportunities in the field of sleep medicine. A lot of work has been done by physiologists in clinical and research aspects of sleep physiology. A doctor with MD physiology or an equivalent degree is eligible for appearing in the International Sleep Certification examination for sleep physicians after they complete the requisite work experience in a sleep laboratory. The Indian Society of Sleep Research is holding a National Sleep Medicine Course every year to train physiologists and doctors from other specialties in the field of sleep medicine. A physiologist can take training in sleep laboratory and further pursue a career in sleep medicine in accredited sleep laboratories across the globe. Furthermore, a 1-year fellowship programme has been launched in KGMU, Lucknow, in chronomedicine for which a candidate with MD/DNB physiology is eligible along with MD/DNB degree holders in other disciplines of medical science.

iii. Neurophysiologist

A physiologist with wider training in neurophysiology is an expert in diagnosing and conducting electromyogram, nerve conduction studies, electroencephalogram, evoked potentials, polysomnography and intraoperative

neurophysiological monitoring. Physiologist can apply for principal investigator, post doc fellow, research fellow in several institutes of neuroscience in the US and Europe for research in neuroscience.^[3]

Physiology which is rightly at the core of medical sciences and along with medicine is the only medical specialty to be recognised by the Nobel Prize committee for award in medical science and research. This in itself reiterates the importance and immense potentials in physiological sciences which if explored by the young and dynamic budding physiologists can be a giant leap for the mankind. The need of the hour is to recognise that the potentials in physiology extend beyond training and teaching under graduate medical students, by opting alternative careers in research and clinical physiology and our young physiologists can achieve career satisfaction and empowerment.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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