

LETTER TO THE EDITOR

EMERGENT ISSUES FOR PHYSIOLOGISTS OF TODAY AND TOMORROW

Sir,

(Received on August 12, 2007)

Physiology forms the basis of Medical Practice as it provides insight into the vital processes (*we teach mainly these processes at macro level*) and thus to the effect of malfunctions (*patho-physiology*) of various systems. In a larger context Physiology forms the hub for studying diet and drugs, work and athletic performance, ergonomic evaluations of tools and workspaces to improve work efficiency and productivity along with assurance of positive occupational health and safety (1). In the recent years, it is felt that Physiology is losing its prime position among life sciences due to exciting advances in molecular and cell biology and molecular genetics. These sciences appear to be the only portals of technical approach to study the biological sciences hereafter. Such advances in these biophysical sciences may be heralding a revolutionary turning point in the study of life sciences. As per one recent definition, Molecular Biology claims to be a rich integrative science that brings together Biochemistry, Biophysics, Molecular Biology, Microscopy, Genetics, Physiology, Computer Science and Developmental Biology (2). It appears that Molecular Biology is getting ready to take the center stage. In another charge Genetic Determinism is giving way to Environmental Control of life processes (3, 4). The integral proteins built into the cell membrane act as receptor-effector units (REUs) for the perception of environment

and thus control the whole range of activity from cellular functions to behavior. Multidimensional energy systems (such as metabolic, bioelectric, bio-electronic, piezo-electric, bio-photonic energy systems) are operating at very elemental levels of REUs in bio-functioning. These energies from the tiniest of molecular elements of REUs interplay at sub cellular to cellular to tissue to organ and systems. It may even go well beyond the physical body involving subtle bio-energetic and morphogenetic fields and can influence environmental and societal planes. In this frame work an organism can be considered as both tangible and informational part of the environment. Several hitherto elusive and mysterious processes (like *Mind, Memory, Thought, Behavior, Consciousness, Extra Sensory Perceptions, and Spirituality*) which can cause perturbations in the living milieu altering behavior and causing evolution are yet to be demystified (4). *Where do we stand with our conventional teaching of Physiology?*

Hence, an urgent need is perceived for integration of allied fields as described above to reengineer Physiology as Integrative Physiology to regain its pivotal status in the arena of life sciences, for a better understanding of life processes. In addition to Physiology, Cell Biology, Molecular Biology, Genomics (study of DNA

sequencing, looking for genes, study and understanding the functions of repeats of the genome of given organism) and proteomics (structure, classification, function etc. of the complement of protein in a given organism), neurobiology, neuro-immunomodulation, microbiology, mathematical and computer modeling are to be considered as integral arms of this new Integrative Physiology. Visualising this quantum jump, the Physiology Section of the 86th Session of Indian Science Congress (2007) mooted the establishment of one National and several Regional Institutes (attached to selected Universities) of Physiological Sciences (1). The aims and specific mandates of these Institutions can be as follows:

- To develop as centers of excellence with specialized facilities to carry out multidisciplinary research,
- To provide postgraduate and doctoral training in Integrative Physiology, and
- To interact and integrate with above-mentioned newer disciplines.

An apex committee estimates that a space of about 18000 square feet at respective locations and a total initial budget of about rupees 14 crores (plus the recurring expenditures) may be required for the establishment. The funding could be shared by Ministry of Human Resource Development, Government of India, concerned State Governments, and the UGC. *While it is evident that we all need it, it is not evident what locus standi will be there for medical physiologists.*

Let me share some of my thoughts about

it. I believe that Physiology will face an emergent problem from the present dynamisms towards Integrative Physiology, because Physiology as such is a dynamic field of biomedical sciences. But we in third world countries are never bothered to imbibe these advances sincerely (5, 6, 7). So we have to change our aspirations and priorities at least now to strengthen the position and status of Physiology and thereby raising serious polemics on this subject. Towards the proposed debate, we may like to discuss the followings:

1. All medical physiologists must practice Clinical Medicine (any branch or general) seriously and continue teaching Physiology in the clinical set up. One year initial core training for MBBS students will continue as on now. But the medical physiologists will have to work in clinical departments. M.D. (Physiology) training has to be modified accordingly. *What should we do to achieve this change?*
2. Non-medical physiologists who form the back bone of our current set up will lead the research programmes, lectures and practical exercises of basic physiology during the initial one year core training of medical students. All of them will have to undergo orientation or higher studies in the National Institute or Regional Departments of Integrative Physiology. Clinical practical exercises and related lectures may preferably be handled by medical physiologists only.
3. There should be mechanisms to promote physiologists (both medical and non-

medical) to imbibe the essentials of newer related subjects and integrate them. *How may we achieve this goal?*

4. *Do we need to prune down the Medical Undergraduate syllabus to the optimum utility for clinical practice? We need to deliberate seriously on this issue.*
5. Our outlook and levels of motivation and sincerity must change and we must come

out of 'volumes and capacities of lungs' and 'neuroanatomy of rat brain' and enter into serious research projects which will be useful to the society at large.

The discussions held by Dr. Shashi Bala Singh, Prof. KN Sharma and Prof. Lazar Mathew during 4th Congress of FIPS are acknowledged in the preparation of the present letter.

GROUP CAPTAIN (DR) N. SURESH BABOO

*Professor of Physiology (Retired),
201, Woodlands Estate Apartments,
TC-17/2432 (11), Jagathy,
Thiruvananthapuram – 695 014 (Kerala)
Telephone 0471-2345166*

REFERENCES

1. Singh SB. Need for establishment of National Institute of Physiological Sciences/Departments of Integrated Physiology at selected Universities. Theme Lecture. *Proc Fed Ind Physiol Socc* (4th Congress), DIPAS, Govt. of India, New Delhi, Jan. 2007.
2. Lodish H, Berk A, Paul M et al. *Molecular Biology*. WH Freeman & Co, New York, 5th Edition, 2004 pp. 1–30
3. Strachan T, Reed AP. *Human Molecular Genetics*. Garland Science, (Taylor & Francis Group), London, 3rd Edition, 2004 pp. 15–40
4. Sharma KN, The New Biology: Challenge to Physiologist. FIPS Oration Lecture. *Proc Fed Ind Physiol Socc* (4th Congress), DIPAS, Govt. of India, New Delhi, Jan. 2007.
5. Mathew L, Physiological Sciences: A base for Technological Development. FIPS Plenary lecture. *Proc Fed Ind Physiol Socc* (4th Congress), DIPAS, Govt. of India, New Delhi, Jan. 2007.
6. Ravi K and Mathur R (Chairpersons). Physiology Education in India. FIPS Symposium II. *Proc Fed Ind Physiol Socc* (4th Congress), DIPAS, Govt. of India, New Delhi, Jan. 2007.
7. Chawla A, Baboo NS (Chairpersons). Ergonomics and Human Factors. FIPS Symposium VI. *Proc Fed Ind Physiol Socc* (4th Congress), DIPAS, Govt. of India, New Delhi, Jan. 2007.