

Cell biology in India: The future needs an international perspective

There is a lack of trained scientists to fill the increasing number of jobs and funding opportunities in the Indian scientific research sector. This is a great opportunity for the international scientific community to help build and nurture a vibrant cell biology research community in India.

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I have worked at the National Centre for Biological Sciences (NCBS) in Bangalore since 1995, following graduate and postdoctoral training in the biological sciences at Rockefeller University and Columbia University in New York, USA. I feel very fortunate to work as a cell biologist in India today; Indian science is experiencing a radical growth in research opportunities, and the rate of change has accelerated in the last five years.

Ten years ago, there were approximately 20 new jobs available each year for scientific investigators. However, with the establishment of over 30 new universities, many new institutes, and special niche educational institutes that engage in research and education (such as the Indian Institutes of Science Education and Research) during the past decade, there are now hundreds of new jobs offering research opportunities being created each year. Although information about these opportunities is difficult to obtain, efforts are being made to make job information more manageable (for example, see www.indiabioscience.org).

In 1995, a 25% increase in funding for scientific research in India over a five-year period barely kept pace with inflation. Now, the scientific research budget for the next five years is set to double, or even triple, compared with the previous five years. Research and development spending in India is currently 0.8% of GDP. In the twelfth Five-Year Plan (2012–2017), the outlay for science and technology will be doubled to Rs150,000 crore (USD 30 billion), which amounts to only 0.6% of GDP. There is hope that funding will eventually grow to 1.5% of GDP in future plans. At the moment, however, it is the capacity of the research community to absorb this money in a meaningful way that is limiting. Infrastructure is also improving markedly at all levels, albeit at rates that vary according to location. I would argue that this growing investment in scientific research is not only sustainable, but essential for a growing economy like India to augment and leverage its core capital — its large and young population. Investing in local and creative activities to generate new knowledge is surely a sustainable model for growth. Investment in education at all levels is also set to receive a huge boost: the Indian government plans to increase spending on education from 8% of GDP to 15% of GDP over the next five years.

What does all this have to do with cell biology research in India? I would be the first to admit that the scale of our research in cell biology is very small — there are fewer cell biologists engaged in research in the whole of India than in New York or San Francisco alone, and they are certainly not of the same quality. The scientific community in India is small and the number of cell biologists doing good work even smaller; high-quality biological research tends to be concentrated

around traditionally strong subject areas such as structural biology and informatics.

There are, however, some advantages to such a small community; for example, there are very satisfying opportunities for a high number of research collaborations. By collaborating with a soft-matter physicist, an immunologist and an active and lively fruitfly research community, my research in membrane biology is now a truly interdisciplinary enterprise. With vibrant physical, chemical and mathematical sciences communities distributed across the country, ambitious collaborative programmes are being crafted.

With the reduction of core resources and research opportunities elsewhere in the world, doing cell biology research in India is an exciting prospect for many international researchers. It is critical that cell biology grows and develops in India, with appropriate investment in scientists who have the right training and attitude towards research. A sense of openness and willingness to take risks must be created for new areas of research to develop, and to promote an open, non-hierarchical research environment. Participation of the international cell biology community is essential to direct and encourage high-quality researchers to work in India (including non-Indian scientists, as well as scientists of Indian origin who have trained abroad). New incentives to attract the international scientific community to India are growing and are being actively encouraged at many levels, from new principal investigators exploring fresh avenues of research to more senior scientists building and enriching dynamic institutions and setting up collaborative research ventures that are not possible within the traditional funding structures of the USA and Europe. For example, when a German lipidomics researcher moved to the NCBS, an ambitious collaborative lipid research programme was established with the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, Germany. Multinational research teams are now engaged at a new stem cell biology institute (inSTEM) located at NCBS. These ventures are forging meaningful collaborations with groups at Stanford University and Harvard University, USA, the Mechanobiology Institute in Singapore and Kyoto University, Japan, to accelerate the creation of competitive research among cell biologists in India.

Finally, with its largely untapped and unexplored biodiversity, India is also a hotbed for studies in ecology and evolutionary biology. When combined with a vibrant cell biology community willing to chart new terrain, an exciting future for the field beckons without the immediate pressures to engage in overtly translational research. Even in this realm, there is an exciting ecosystem forming, with an opportunity to chart out new territories for the assured and confident cell biologist.

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