Initiative (NMITLI). Randomized controlled clinical trials for rheumatoid and osteoarthritis[16], hepatoprotectives, diabetes, hypolipedemic agents, asthma, Parkinson's disease, and many other disorders have reasonably established clinical efficacy and a review of some exemplary evidence-based researches and approaches has now resulted in wider acceptance of Ayurvedic medicines[17].

This experience gives us another message that we must increase and improve the publications related to quality, safety and efficacy of Ayurvedic medicines in international peer-reviewed journals. This is a matter of serious introspection and debate for Ayurvedic, pharmaceutical and medical scientists.

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Measuring science and missing generation

This is in response to two recent editorials[1,2], viz. 'Requiem for a missing generation' and 'Measuring and assessing science'. After reading these editorials, one gets a feeling that not only are these two closely related but also the second might have emerged out of a continued thinking on the first. Both deal with issues that are of far-reaching significance, especially for publication of science journals in the country and strengthening of peer reviewing. Hence these may deserve greater in-depth analysis of the causative factors to think of an action plan if deemed necessary.

If one is dealing only with the science-study that has been published (i.e. which is not under submission), then following Garfield, the leadership of Indian science has adopted quite an objective and quantifiable method. One can calculate the Science Citation Index (SCI) and Impact Factor (IF) with regard to a candidate and/or his studies. A study published in a high IF journal (and hence may also have the probability of higher SCI) is naturally considered better. Invariably the journals published in the developed (i.e. scientifically advanced) countries have higher IFs. For example, according to a recent publication the IF of *Current Science* is 0.60, while that of *Nature* is 27.955. In view of the large gap (in IF values) it is presumed that the Current Science Association and the editors of *Current Science* would have given a serious thought to it, and their analysis and findings in this regard may be illuminating and educative.

If IFs of science journals published from India (*Current Science* is certainly among the prestigious ones) are much less compared to those of foreign counterparts, then how and why are the leaders of Indian science occupying high positions expected to give weightage to publications in the 'lowly-placed' Indian science journals? Why publish these science journals at all in the country?

Thus if, in selection process, including those of TIFR and HCRI of Allahabad, such objective and quantifiable methods have been employed to find/get the 'best', i.e. subjectivity has been nearly avoided, then what is the problem? Under the given circumstances, is it not the most rational procedure? This may be the reason why the most important among the questions asked to a candidate by the Indian scientific leadership (peers) is: How many papers have you published in high IF (i.e. foreign) journals? And this naturally (and happily) propels the Indian scientists to first try to publish in the high IF (foreign) journals.

The only 'small hitch' which might come up is when one is allowed to ask whether the parameters IFs and SCIs – which are supposed to measure/assess science – are totally independent of the state-of-development of a country and/or a research group. Because doing science at the quantitative/analytical level – acceptable to the high IF journals today – requires significant funding, facilities/logistics, state-of-the-art gadgets (both hard/softwares), highly skilled/trained manpower, visionary scientific leadership and a vibrant environment besides ensuring a continued interaction with peers in advanced countries. Evidently,

in India, these conditions may exist only at a very few premier institutes like TIFR, IISc, etc. and it is difficult to imagine that a science department of an average university can even hope to possess them to reach the levels acceptable by the high IF journals.

It may also be worth finding out how true measure of quality is IF, or does it, at least partly, also depend on circulation, advertisements and support of high priests of science? Similarly SCI may also be correlated with interactions between persons or groups, which work on similar or closely related problems, and hence refer/review each other's work. If this is the case, then it is implicit that in spite of the fact the global competition is creeping in every walk of life, the problem of a 'level-playing-field' seems to remain for developing countries. Does it suggest that while assessing/measuring science some sort of 'normalization' – with respect to the factors listed above – might not be inappropriate? The use of high IFs – i.e. journals from advanced countries – implies that in 98% cases the peers for judging of 'better (or best) science' exist only in those countries. This seems to be supported by the fact that formulations of the problems at the frontiers or cutting edge, are mostly done in the advanced countries. This could probably mean that over the past 50 years the country has perhaps not been able to develop a reliable, confident and effectively operative inhouse peer review system in most of the scientific disciplines. Could it mean that in the field of scientific research an 'academic independence' has not been attained yet, i.e. even after 50 years of political independence, and there may still exist a deep-seated inferiority or lack of confidence. Or in view of the inherently universal nature of science this might not be a valid question.

It may be argued, in some sense at least, that after the likes of J. C. Bose, P. C. Ray, S. N. Bose, M. N. Saha, S. K. Mitra, C. V. Raman, K. S. Krishnan, G. N. Ramachandran, Birbal Sahni, D. N. Wadia, etc., almost all the following generations (in science) could be regarded 'missing', as opportunity of doing science of 'far-reaching significance' is perhaps 'missed or lost'. Could it be because most of these eminent people were taught and trained by British teachers and hence received the 'spark' from the long tradition of British science; while the following generations, despite excellent quality and quantity of scientific output in some cases, have not 'sparkled' to that extent?

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The editorial 'Requeim for a missing generation' makes compelling and thought-provoking reading[1]. Our thoughts on the issues brought up by the article by Bagla[2] 'Missing generation leaves a hole in the fabric of research'[2] are equally pained, but have a slightly different flavour.

The offending article collates quotations attributed to several senior colleagues, and draws a provocative conclusion that seems incorrect at best. While a crisis of sorts does seem in the offing, having to do with declining total scientific output from India in comparison with increasing output from say China and several other countries outside the West, to blame a particular generation in the age group 45–55 seems facetious. This group contains several scientists from different fields, whose work is well-known internationally. A serious debate about cross generational excellence will be possible only when meaningful analyses of objective indicators such as the citation index etc., are available. We do hope that such data will be compiled and discussed openly, with luck even inside India, which has no shortage of fora.

Thinking beyond brain drain, possibly a healthy reality in today's world, the basic issue is one of maintaining student input into science at healthy levels. The information technology boom in India of the early nineties has taken away many of the bright youth, creating a numerical rather than excellence depletion in the age group of ~ 30–40. This phenomenon has obvious global parallels; one only has to see the nationality profile of graduate schools in the best US universities, where it is difficult to find too many local students. Recent bounce back in science enrolment due to recession in IT is noticeable, but its continuation depends upon reducing the gap with industry level pay packages as well as providing intellectual challenge in a congenial environment. Science has to improve its public image in India, moving away from its current 'poorly paid dull boy' image. Further, inclusive consultation and debate is needed about issues such as (a) societal factors that promote or inhibit scientific excellence and how these have changed in recent times, (b) strategies for effective funding, e.g. focused spending on areas of strength versus developmental spending on areas of weakness, (c) alternate nongovernmental funding paradigms, (d) methods for reinvigorating aging institutions. From this type of process, creative solutions have a chance of emerging. Achieving some of these is the true challenge of the day. Mudslinging of the sort that the *Science* article indulges in, achieves nothing.

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