

## 92ND INDIAN SCIENCE CONGRESS

## BRIEF REPORT AND RECOMMENDATIONS

1. SUMMARY OF 92<sup>ND</sup> SESSION

The 92<sup>nd</sup> session of the Indian Science Congress was jointly hosted by the National Institute of Occupational Health (Indian Council of Medical Research) and the Niima University of Science & Technology. It was held at the picturesque campus of the Niima University, Ahmedabad, during 3-7 January 2005. The focal theme of the Congress was 'Health Technology as Fulcrum of development for the Nation'. The Congress was organized under the Indian Science Congress Association (ISCA) general presidency of Prof N. K. Ganguly, Director General, Indian Council of Medical Research.

## 1.1 Inauguration

The Hon'ble Prime Minister of India, Dr. Manmohan Singh, inaugurated the Congress on 3<sup>rd</sup> January 2005. After releasing the souvenir, he addressed the august gathering of scientists from different parts of our country and abroad and urged them to work for up-liftment of the society and mankind at large. Pledging commitment to the promotion of science, he acknowledged the role of 'The Indian Science Congress Association' for its pioneering work not only in promoting science, but also in shaping the science policy of the country. Expressing his concern over various issues that have created barriers to nurturing science in the country, he assured of a proactive role and support of his government to the cause. He recognized the acute problem of quality manpower in the realm

of science in the country and shared concern over non-existence of science as a career for the youth in India. He committed support of the government in creating systems for retention of bright people in science and encouraging them for taking it as a lifelong career.

Dr. Singh quoted Winston Churchill "empires of the future are going to be empires of minds" and emphasized that use of science and technology should not only be towards addressing social and economic problems in the country but should also affect our thinking approach and our way of working. Dr. Manmohan Singh said that S & T must play a greater role in our strategy to address problems of mitigation and management of impact of natural disasters, including pre-disaster preparedness.

He expressed to improve the quality of teaching and increase the enrolment of students in science and mathematics at the school level. He added that apart from keeping the international commitments, an important objective of the government is to bring in balance in intellectual property regime, which will give a full expression to the creative ability of India's intellectual prowess and also protect interest of the society at large. Research and innovation in agriculture and energy has been emphasized. A new technological revolution in the energy sector is required that would meet the growth demand for energy in more economical and sustainable ways.

Focusing on the theme of the Congress, the PM added that biotechnology, pharmaceuticals and health technology are priority areas for public policy. Alternative pathways for drug discovery, where India has distinct comparative advantages, must be created. Dr. Singh informed that the government is formulating programmes to launch a National Rural Healthcare Mission. The PM also announced the constitution of Scientific Advisory Council, under the chairmanship of Prof. C. N. R. Rao, to address the challenges of Indian Science. Dr. Singh avowed his government's following commitments :

- 1 The development of basic and applied science and the promotion of excellence, with no discrimination between applied and basic science
- 1 Rebuilding the science base in universities, which will include creating synergy between new initiatives in science and technology and our university system
- 1 Promotion of public-private partnerships, to increase funding for frontier areas of scientific and technological research
- 1 Ensure the de-bureaucratization and the academic autonomy of science and technology institutions
- 1 The restructuring of the science and technology support systems.

His Excellency, The Governor of Gujarat, Pt. Naval Kishor Shama, expressed hope that India would find a significant place in the global scientific community. He added that healthcare for over one billion people demands changing

the spectrum of health care technology in India. He summed up saying that our vision must be to make India a developed nation by 2020.

Shri Kapil Sibal, Hon'ble Minister for Science & Technology, Government of India in his address, referred to a quote from Jawaharlal Nehru "The future belongs to those who make friends with science", delivered at the 24th Indian Science Congress on 26th December 1937. The Minister stressed upon the need for gene revolution, without any environmental hazard or tinker in any fundamental manner with the ways of nature, to make India self-sufficient with regard to food. He mentioned that Govt. of India has evolved many models at the national level through programmes and initiatives, such as Technology Development Board, Programme Aimed at Technological Self-Reliance, New Millennium Indian Technology Leadership Initiative and Drug and Pharma Programme of Ministry of Science & Technology. The Government has signed intellectual property right agreement on science and technology with the European Union and Russian Federation. Shri Sibal announced that the Department of Science & Technology plans a *Ramanna Fellowship*, in the memory of Prof. Raja Ramanna. The scheme will offer continuous research support to 'performing scientists', irrespective of their employment status, affiliation and age, with the idea of guaranteed working-level support to them in an un-interrupted fashion based only on their track record. While minister urged the scientific community to provide solutions to the issues of national

importance, he in turn made the following commitments :

- 1 Provide necessary enabling environment and autonomy to the functioning of the scientific community.
- 1 Invest in human resource development and expand the skilled human resource base to meet the needs of technology for industry, academia and Research & Development (R & D) institutions.
- 1 Provide a suitable regulatory mechanism for an effective bio-technology policy.
- 1 Strengthen the management system for intellectual rights including awareness, modernization of the patent office, providing for an effective system of enforcement of such rights and helping educational institutions and small industries in protecting their intellectual property.
- 1 Provide for an effective public private partnership in R & D and technology-based industries.
- 1 Set-up national missions in nano-technology, transport intelligence systems, technology development for judicial re-engineering, eradication of malnutrition and discovery of curative and preventive medicine for malaria, HIV-AIDS and tuberculosis.

The Chief Minister of Gujarat, Shri Narendra Modi narrated the scientific achievements of the state of Gujarat. He informed that the Government of Gujarat has created an independent department of Science and Technology, in the year 2003. In order to ensure

a unified effort for the development, Shri, Modi said that health care delivery could now be taken to the doorsteps of the common man at very little cost due to the advances in the communications system. The CM said that Gujarat instituted the Bhaskara Institute of Space Application and Geo Informatics, and it is engaged in the advancement in remote sensing applications for inventory, mapping and monitoring of natural resources and to enable effective developmental planning.

Prof. N. K. Ganguly, Director General-ICMR, the general president of the 92<sup>nd</sup> Indian Science Congress, stressed upon the focal theme of the Congress "Health Technology as fulcrum of development for the nation". The president emphasized that the human health is at the center of concern for sustainable social and economic progress in all countries. He stated that India accounts for over 20% of the world maternal death. Prof. Ganguly stated about the module for home care in the case of pneumonia in children, providing antibiotics at home and referral guidelines, a module on reduction of mortality due to septicaemia through administration using robotics, and also about the indigenously produced HIV vaccine to prevent HIV pneumonia.

Prof. Ganguly stated that proportion of genetic disorder could be prevented by appropriate approaches in primary public health care. Prenatal genetic diagnostic facilities in identifying mutations specific to Indian population are now available in the country and will help in reducing childhood disabilities. He added that effective injectable, long-acting contraceptive, drug for safe medical abortion, non-injectable oral drug

for reduction of postpartum bleeding and a technology for effective management of anemia are available in the country. India is fast developing into a vaccine manufacturing hub and some of the vaccines indentified for development on priority include those for cholera, diarrhea, malaria, rabies, meningitis, HIV, tuberculosis and a vaccine against cervical cancer. Prof. Ganguly pointed out India's advancement in drug development, such as developing new drugs for tuberculosis, a new antidiabetic topically delivered insulin, anti-retroviral drug, a novel drug for psoriasis and anti-malarials, etc. He was worried about the cardiovascular diseases affecting our population at a much younger age. In the field of cancer, india has a cancer mapping system, which uses advanced computer and information technology. A peptide-based anticancer drug for the treatment of colorectal cancer has been synthesized indigenously in the country and is ready for human trials. The president emphasized on the need for immediate attention in the area of manufacturing of medical and scientific instruments. There is a need for critically reviewing the teaching methods in medical courses. Prof. Ganguly in his address included medical insurance, funding for S & T sector and scientific autonomy.

#### 1.2 President's Visit and Address to the Congress :

His Excellency, the President of India, Dr. APJ Abdul Kalam addressed the Congress at a special ceremony held at the Science City, Ahmedabad on 5<sup>th</sup> January 2005. The president narrated his experience how Science activated his imagination, creativity and knowledge as a result of his association with Shri Vikram

Sarabhai, at the Physical Research Laboratory at Ahmedabad. Dr. Kalam emphasized the role and potential of R & D in the Pharma sector and expressed his confidence that India can now compete on a world stage. The President delineated specific areas like stem cell research, converting molecules to drugs, where India was now emerging as a global trendsetter. He then explained how an interactive tele-education delivery system could help remote areas to have access to quality education. He made emphasis on the use of bio-fuel that could create at least 12 million jobs. Dr. Kalam is in favour of competitive production of supersonic Brahmos missile. The President was touched by the calamity of the tsunami and urged upon the need for Tsunami prediction system. In his address, the specific points made are :

- 1 India to be a nation with no rural-urban divide
- 1 Equitable distribution of resources
- 1 Agriculture services and industry sector should work in perfect harmony.
- 1 Education for all and should not be denied to all meritorious candidates because of societal and economic discrimination.
- 1 The country would be the best destination for the most talented scholars and scientists from all over the world.
- 1 The best of the health care will be available to all and communicable like AIDS/TB, water and vector-borne diseases, cardiac diseases and cancer would be eradicated.
- 1 The Government will use the best of technology to be responsive, transparent,

easy accessible and simple in rules, thereby being corruption-free.

- 1 There will be a prosperous, healthy, secure, powerful and happy society.
- 1 India will be one of the best places to live in on the earth and bring smile on billion-plus faces

#### 1.3 Technical Sessions of the 92nd Science Congress :

Around 4,500 delegates including scientists, science managers, policy makers and science students attended the 92<sup>nd</sup> Science Congress. The technical sessions were attended by the best health specialists and other experts from different parts of the world who gave direction to combat dreaded diseases like malaria, cholera, HIV/AIDS, TB, diabetes, coronary heart disease, amongst others.

This time more than 150 foreign delegates attended the Indian Science Congress, which is a record in the history of ISC. There were special delegations from US, Germany, Canada and many other nations. In the Congress, there were 14 parallel sectional programmes in different field of science, which included nearly 350 symposia lectures, special lectures, invited talks, young scientists' lecture and a large number of poster presentations, 14 plenary sessions (nearly 70 presentations by eminent scientists), 6 special lectures, 2 public lectures, 3 panel discussions and award lectures in diverse fields of science. On 6<sup>th</sup> January 2005, there was Health science summit for the entire day. There were special symposia on Malaria, Maternal and child health during the Congress. A total of 450 plus special lectures by eminent

scientists and nearly 750 presentations by researchers spread out in 14 sections and other plenary programmes.

#### 1.4 Children Science Congress :

The Children's Science congress continues to be a parallel national event, along with the annual event of the Indian Science Congress. This year the Congress location was arranged at the Science City. The selection of students for participation in the Congress was made from the district level. The criteria for selection include teamwork, innovation, practicality and relativity to societal problems. The theme for the Children's Science Congress is declared at the beginning of every year at the Indian National Science Congress. The theme for this year is 'Harness Water Resources for a Better Future'.

The children's participation include interaction with major scientists, including His Excellency, Dr. A. P. J. Abdul Kalam President of India. The interaction of students and scientists is one of the major reasons to enable students to discourse with, and question the leading brains, thus enabling them to strengthen their grasp on the subject, while reassuring the older generation that there is indeed scope among students to grow with a scientific attitude towards life.

Visits to places like SAC-ISRO and VSCSC were aimed at furthering the scientific thirst already present in the participating students. Events were planned on Origami workshops, essay competitions, rocketry workshop, vedic mathematics, to encourage the students to their overall development and improve practical skills. While profiling the schedule for the duration of

the Congress, a special mention may be made of the projects of the students—those have acted as a key to their participation. These projects have served their purpose of building up their inquisitive and co-operative spirits and are proofs that with a little guidance, children are capable of doing wonders.

#### 1.5 Science Expo—Pride of India exhibition

Shri Kapil Sibal, Hon'ble Minister for Science & Technology, Government of India, inaugurated the Pride of India exhibition on the sidelines of the Congress. The exhibition had a special section called "Hall of Pride", dedicated to the two sculptors of our nation—the nuclear scientist, Prof. Raja Ramanna and the industrialist, Kasturbhai Lalbhai. The 'Pride of India Expo' included more than 80 participants from various R & D laboratories, major corporates, state and central government institution and departments, amongst others took part in the exhibition.

The Indian Council of Medical Research depicting achievements and activities of its institutes, put up the largest pavilion in the Pride of India Expo. As the host of the Congress, the National Institute of Occupational Health has a pavilion, showcasing its range of activities. The expo got an overwhelming response from the public and around two lakh people visited the exhibition.

## 2. RECOMMENDATIONS

### Science and Technology Policy

1 In order to see India as a prosperous, healthy, secure, powerful and happy nation, a greater emphasis must be placed on the science and technology policy.

- 2 In the long term science has to come to our rescue for understanding the designs of nature, foretelling them and devising methods for reducing the damage and post disaster management, even if the investments required are high.
- 3 The scientific community must move away from trodden path onto a new road to discovery and invention through the use of technologies in collaboration with nature for the good of humanity.
- 4 Science must provide acceptable solutions for everyday problems of the common man. The development of newer indigenous technology will help create jobs, capital and wealth for the poor.
- 5 Science & Technology must find solutions for industries, which are employment oriented to make Indian goods competitive in the world market.
- 6 Scientists must design their efforts to develop a new mind-set focusing on discovering new technologies for industries generating employment, for low cost yet pucca shelters, for curing or preventing disease, for agricultural growth and whatever it takes to make India's products competitive in the world market.
- 7 In the knowledge age the scientific community that consists of providers and seekers of knowledge must become agents of change. Agents who can bring about intellectual competitiveness and new economic opportunities for India.
- 8 The public-private' partnerships will have tremendous influence on the development

- of technologies and how these are managed. There is a need for high level of funding for research, including contract research.
- 9 The domain knowledge for traditional professions is under constant change and revolutionary revision. There is a need for a new system of learning to serve the ever-changing educational needs of knowledge age workers.
  - 10 Only 20% of the science budget is allocated to CSIR, DBT, DST & ICMR together. There is a need for massive renewal of our science and technology infrastructure. The health budget is also inadequate and health research budget is meager. We need to address these issues with urgency and find solutions applicable to our setup. One solution is allocating a percentage of funds collected through sale of substances injurious to human health like tobacco and alcohol for restoration of health.
  - 11 We can open up our science to the world so that we have relevant players not only in India but also in global arena.
  - 12 In India, a large number of scientific organizations generate data, which are of paramount importance. The 92<sup>nd</sup> Science Congress recognizes the importance of creating national databases, which can be used by one and all to submit their observations to a central location.
  - 13 Restructure science and technology support systems as well as debureaucratize science and technology policy implementation.
- Health Technology
- 14 Health plays a vital role in development, not only an outcome, but a co-determinant. Enhancement of investment in health is necessary to yield exceptionally high rates of return.
  - 15 There is a need to develop technologies for achieving our millennium goals of reduction of infant mortality rate and reduction of maternal mortality.
  - 16 Strengthening of policy for education of girl child will kick a cycle of late marriage, lower fertility rate, lower infant mortalities and greater economic independence of women.
  - 17 It is absolutely necessary to translate the Indian health research system data into preventive and intervention health strategies for the country. We now need to create a National Health Research Forum, and integrate with the National Health system to provide guidance.
  - 18 Immediate attention is required in the manufacturing of medical and scientific instruments in our country, so that we become the leading suppliers of the instruments in the world market.
  - 19 There is a need to strengthen and develop appropriate animal facilities for health research, for drug development, etc.
  - 20 Innovative methods need to be developed to differentiate between those who can pay for health care and for those who cannot pay, for the people who are at the age group with peak levels of earning and for

people who are at lowest level of earning like children and old people.

21. A strong public health care system, supported by education and awareness, is required to reduce the disease load and the burden on health services, to enhance productivity and catalyze a vibrant economy. It is recommended for more investment on public health, building up health care systems and infrastructure, enhancing access to effective health interventions for poor and vulnerable groups, etc.

#### Agriculture and Food Policy

22. Science & Technology must provide answers for the undernourished and the illiterate. Fortifying the crops is a realistic and achievable breakthrough. This ensures that chronically undernourished segment of the population derives micronutrient supplementation from the staple diet and even with little variety in the food, and thereby nourishment status is improved.
23. Implement nutrition safety net schemes in an integrated manner on a life-cycle basis. Promote the widening of the food security basket by encouraging the establishment of Community Grain Banks based on local grains. Organize a Food Guarantee Program combining the principles of Employment Guarantee Scheme and Food for Work.
24. Engender the Food for Work Program so as to assist women to undertake a wide variety of human and social development programs. Sustain, strengthen and spread the on-going self-help revolution by ensuring backward

linkages with technology and credit and forward linkages with markets. Enhance the productivity of cropping and farming systems by helping to bridge the prevailing gap between potential and actual yields, through mutually reinforcing packages of technology, services and public policies

25. Promote a Food based approach to Nutrition Security through the widespread cultivation and consumption of vegetables, fruits and a wide range of millets, legumes and tubers and by introducing a nutrition dimension in land use planning

#### Biotechnology

26. The gene revolution should be such that it should not bring about an environmental hazard or tinker in any fundamental manner with the ways of nature. We need new seeds for our farmers, which are drought and pest resistant and bio-fertilizers. We also need bio-fuels to resolve energy crisis
27. The capability of decision-making in the area of GM food items in the country needs to be reviewed on an urgent basis. It appears that the welfare gains resulting from the health enhancing attributes of golden rice will even dwarf the farm productivity gains in Asia
28. We need to put resources for appropriate capacity building in the areas of tissue culture and bioengineering, stem cell biology, nano-technology and undertake vast programmes in these areas. A strategic initiative in this direction is highly warranted

29. The Indian Council of Medical Research and the Department of Biotechnology (Govt of India) have embarked on a stem cell research programme in a mission mode, to promote 'stem cell city clusters', to link all publicly and privately-funded research groups within a city, enabling them to share facilities, ideas, and research and business opportunities, as well as promoting interactions between researchers and clinicians

Innovation and Intellectual Property :

30. The basic innovation lies in identifying new ways to indigenously develop services and products in India : example Biometrics Suite, menthol mint oil, new molecules.
31. Intellectual and technological capability is concentrated in a small part of the population ; every effort should be made to attract and retain capable people.
32. The 92<sup>nd</sup> Indian Science Congress acknowledges with high esteem of the declaration of the Prime Minister of India, constituting National Science Advisory Council. The scientists look forward to pursue the Council's guidance in addressing the challenges facing Indian science.
33. It is recommended that the young scientists may be motivated to work on local problems that are alarming and need indigenous solutions-be it housing, education, food, healthcare, environment, handling of wastes, etc. and build a pool of intellectual property.
34. Awareness of the Indian Science Congress must reach smaller cities and villages, particularly among students. The Children

Science Congress should be a part of the Indian Science Congress. It may be worthwhile to introduce a special section titled "Science for School Children", within the framework of the science Congress. An ideal regime of intellectual property rights would need a balance between the private incentives for innovators and public interest of maximizing access to the fruits of innovation.

Drug Development

35. There are concerns of a global decline in the manufacturing of new drugs in the category of "neglected diseases". Emphasis is required on the upgradation of drugs and technology to tackle diseases prevalent in this part of the world.
36. To rise India as a pharma giant, steps should be taken for quality and quantity of technical manpower, reinforcement of infrastructure and need for expanded spending on R & D in medicinal chemistry, molecular modelling, the study of complex chemical structures, modern analytical techniques, etc.
37. A system should be developed to introduce pharmacology at an earlier stage in education and set up regional drug research centers.

Vaccine Research

38. We should hasten our indigenous vaccines development programme for vaccines against cholera, diarrhea, malaria, rabies, meningitis, HIV, tuberculosis, and cervical cancer at a fraction of the cost of the imported vaccines.

39. A mechanism may be evolved so that the research institutions and the pharmaceutical industries can effectively participate in the Global HIV Vaccine Enterprise. The Global HIV Vaccine Enterprise will emerge as a massive experiment for a new way of both cooperating towards a common goal in mitigating the deadly diseases of the century while maintaining the essential competition of ideas that compels scientific progress.

#### Communicable Diseases

40. Tuberculosis—There is a necessity of developing laboratory technique, as clinical diagnosis is insufficient. Basic science needs to be promoted to develop new drug and diagnostic surveillance to be intensified and society has to sustain the quality of DOIS program
41. HIV—Monitoring strategies are suggested, including expansion in ANC and STI surveillance across the nation to create a central long-term bio-repository. High emphasis should be given to accelerate the development of microbicides, the topical products, to prevent the sexual transmission of HIV/AIDS.
42. Kala Azar—A national action plan is warranted to avert a possible epidemic of this potentially fatal disease.
43. Cholera—It is proposed to set up a global warning system for pre-indication of the cholera outbreak.
44. Bio-Terrorism—The preparedness for bio-terrorism requires strategies for detection, integration, surveillance systems, reporting communication, vaccine production,

regulation and application, as well as judicious implementation of regulatory measures.

#### Information Technology & Health

45. Every village should have connectivity so that interaction between the people of the country increases and sharing of the knowledge and information takes place efficiently.
46. It is timely to harness this IT revolution as development of high capacity and widely accessible networking infrastructure, that would permit the country's science and technology to flourish domestically and globally. The effective telecommunication policies with proper investment in facilities and training are needed to stimulate entrepreneurship and capital formation in the country.
47. The use of telecommunication, internet and other technologies for connectivity in communication will serve as a backbone for the successful management of science and disease management requirements.
48. The reuse, retrofit and replication of what is developed globally to meet the local in country requirements; and not "reinventing the wheel" syndrome will support the disease management requirements at a fraction of the cost.
49. Proper communication of science is pivotal to its success, as all of the stakeholders ranging from scientific community, population at large, government professionals, public policy organizations and science student need many levels of

information in many forms and at many stages. It is crucial for optimal communication that "information" be acquired, integrated, managed, analyzed and disseminated on demand, on time and as needed.

50. Science Information delivery and proper communication will dramatically improve the disease management processes of awareness, registry, surveillance, control, prevention, epidemiology clinical research, clinical trials, treatment, care and post treatment care components.

#### Remote Sensing and Disaster Management

51. Application of remote sensing technology should be strengthened in priority areas like food security, water security, highway planning, railway network, and environmental conservation, weather and ocean state forecasting and disaster support.
52. The seismologists, geologists and other scientists should work to develop suitable natural disasters (Tsunami, Earthquake, etc) prediction systems. There is a need to strengthen research in this area on a priority basis

#### Environment

53. We need to undertake massive remedial measures on four fronts—water, air, soil and occupational health hazards. Emphasis

is required for willful enforcement of regulatory provisions and technology implementation for safeguarding environment and health of the people.

#### University Education policy

54. The crumbling state of our medical education needs immediate attention.
55. Our universities need to be dynamic and adoptive to the changing needs and priorities of the society and should provide an arena of freedom to young innovative minds. The universities are plagued with a number of problems of teaching faculty and relevance or otherwise of science courses. It is disturbing that there are declining number of students opting for undergraduate courses in basic sciences. The institutes are under-financed and under-staffed
56. Effort should be made to harness the full potential of trained workforce spread all over the world.
57. Creation of science cadre with the help of strong universities, which would be able to provide high quality science education. A database of experts in frontier areas of science such as nano-technology, genetic engineering, tele-medicines and awareness of patent laws needs to be prepared. It also proposes to set up several centers of excellence in science education throughout the country.