the bedrock of every developed nation's S&T strategy', he said, adding that, 'it is a matter of concern that science departments in India's vast university system have suffered greatly due to lack of investments, both in materials and in terms of faculty'. For reversing this, he suggested encouraging collaboration between the universities and local private industries. If necessary, this can be supported by seed money from the Government. About the alarming decline in the number of talented young students opting for science as a career, he emphasized that 'we should lose no time in addressing the many complex issues of higher education in India'.

Vajpayee stated that one of the most neglected areas of our S&T strategy is 'increasing and enriching the inputs of S&T knowledge in the vast informal and unorganized sector of our economy'. He said that there was a 'big need and an equally big scope to appropriately take the fruits of the formal S&T establishment to our carpenters and vegetable vendors, to our electricians and construction workers. When this happens, India will see a dramatic surge in quality, productivity, and efficiency in every area of our economy'. 'We must take science to the people.' Quoting Pandit Jawaharlal Nehru: 'Scientists are a minority in league with the future,' he reiterated that 'a bright future can be realized only when science is in league with the majority of our society'.

Vajpayee hoped that the thoughts and concerns he had expressed would be 'spelt out in sharper detail in the new National S&T Policy document' that is in the final stages of preparation.

Nirupa Sen

Keeping Indians healthy: Some issues

'Health Care' was one of three themes at the recently concluded Indian National Science Congress in Lucknow. The other two themes were Education and Information Technology. The desire for good health has been a goal since time immemorial, with society constantly striving towards it.

In an evening lecture, 'Health: The Goal Forever' M. S. Valiathan (Manipal Academy of Health Education (MAHE), Manipal) spoke of the importance of 'well-being'. This he put ahead of 'freedom from illness'. All ancient civilizations had laid emphasis on the necessity for preventive care. An ancient Indian greeting when translated from Sanskrit reads 'May all be well with you'. This shows the importance attached to health, said Valiathan. A great deal had been achieved in the last fifty years; however, everybody is dissatisfied with the health care system and there were several complaints.

Valiathan categorized the ills of the system as having 'three diseases'. The first, was the problem of access. Due to the paucity of infrastructure at the primary and secondary health centres, people had no option but to flock to tertiary facilities, such as large hospitals. The solution for this was not by raising allocations for health care or by transferring health care to Panchayati Institutions. More than this was needed. India had to attack the problem 'head-on' with a new approach. He suggested that patients must pay for items like gauze, dressing, etc. and a good insurance system should be put in place. Primary health centres that presently lay emphasis on family planning should also focus on alleviating common illnesses which constitute 90% of the needs in health care, he added.

The second problem was that of quality. Valiathan said there was a lack of quality in medical education and hospital care. He stressed that quality must improve. For this, accreditation and internationally accepted standards must be laid down for health care in the country. The third disease was lack of 'innovation'. Health care depended on instrumentation, technology and biotechnology products. India is presently importing 90% of these requirements. He cautioned that in the future 'medical procedures' could be patented and he wondered where it would leave us. There was a need for tremendous innovation in view of WTO and IPR regimes. He said innovation had been accomplished in the past, citing examples such as the Green Revolution, White Revolution and Missile Technology development. Danger was staring in our face in the area of health care. There was a perceived necessity for the innovative spirit to be activated in health care-related areas, he added. Above all, having self-confidence was of the essence. Citing a story of how a tiger cub was raised amidst the sheep and therefore lost its identity, he said, 'many of us are bleating tigers, we need to recognize ourselves now'.

In the plenary session, 'Health Care: Reaching the Unreached' N. K. Ganguly (ICMR) pointed out there was a great divide between advances in science and technology and health care. He emphasized that advances made in areas such as molecular biology etc. had not reached the health care system in the country. He said there was need for health sector reform on a massive scale. He hoped that the proposed new S&T policy document would link S&T to the social sector, or else, he cautioned 'we will not reach the target'.

B. M. Hegde (MAHE, Manipal) in his talk 'Health Care vs Medical Care' said that emergency medicine constituted only 10% of the sick population. Only this needs modern hi-tech medical and surgical care. 'Rest of them could make do with conventional traditional systems of medicine coupled with "changes in the life style"'. He drew attention to basic problems such as lack of toilets in rural areas and of sanitation in cities. There was a necessity to empower people, especially the women and explain the need for nutrition, toilets and clean drinking water through a comprehensive village development plan.

In his talk, 'Primary Health Care in India: Will Information Technology (IT) really make a difference', R. D. Lele (Jaslok Hospital, Mumbai) explained the role of a hospital as a 'Health Maintenance Organization'. In this concept the hospital would provide health check-ups and health-related advice to subscribers ranging from antenatal care to various health conditions. The family as a whole would be treated and their medical records of allergies and past illnesses main-

tained. This family approach would help in identifying risk factors for a young child to future diseases like diabetes and hypertension and lifestyle modification could begin even at an early age. He said if we were proactive we could transform policy to a reality with the help of IT.

K. Kasturirangan (Department of Space) spoke of 'Education and Health Care: Bridging the Access Divide' and the use of space technology as a tool for bridging this divide. He said the Indian innovation of exploiting the vantage point of space for social upliftment, empowerment of the rural population, developmental communication, training the trainers, among many others draws no parallel. Kasturirangan said that space offers the plausibility of transferring patient records, medical images and laboratory results through reliable voice and data links enabled by VSAT technology. This would ensure linking the islands of medical skill with the vast mainland of needs. Successful pilot projects have been undertaken already in some states such as Tamil Nadu, Karnataka, West Bengal and Tripura. The health care net, he said, would be expanded to Leh, Andaman and the North-East. In an experiment in Jhabua, Madhya Pradesh – a mainly tribal belt – programmes were beamed on health, watershed development and role of women, etc. to about 150 hamlets. The success of this experiment has now been expanded to two adjoining villages around Jhabua and similar efforts are being made in Gujarat. The GRAMSAT satellite would cater to such developmental needs, he added.

N. H. Antia (Foundation for Research in Community Health, Mumbai) gave insights into decentralized health care for the 'peoples sector in health and medical care'. Health in the 'Peoples Health Sector' is primarily a function of the individual, family and the local community. An Indian Council for Social Science Research (ICSSR)/Indian Council for Medical Research (ICMR) Report (1981) titled 'Health for All – An alternative strategy' (prepared under the chairmanship of V. Ramalingaswami) provided for a 'more holistic concept of both health as well as medical care', felt Antia. Medical aspects were graded either as those requiring social skills or technology. The report stated that 70% of all health care could be undertaken by e.g. a female village health functionary covering 200 people. Another 15% of health care problems could be attended by local female paramedical workers (Sahyoginis) trained for two years and each could help about 5000 people. At the taluka/block level, 95% of all health could be treated with the help of a 40-bed people's hospital having good infrastructure that could cater to 100,000 population. And the same hospital, together with a 'dharmashala' could provide medical (including surgical) facilities that would further extend the size of the facilities. Only 5% would require super-speciality skills and facilities at the district or city level.

According to Antia, despite a national expenditure of over Rs 80,000 crores in the public and private 'health' sectors, which is equivalent to 5% of our GDP, more than half of our people do not have access to even basic health or medical care. The public sector has to provide medical services to the entire population and is plagued by problems of funding etc. It is based mostly on the western model with only 4% of its budget provided to the Indian Systems of Medicine and Homeopathy, added Antia. On the other hand, he felt the private sector which now accounts for three quarters of the national health expenditure is almost entirely curative and hence profit-oriented. Even the poorest are now expending 20% of their meagre household expenditure on such services under duress of pain and suffering, and is only next to dowry as the cause of rural indebtedness. This is the result of the failure of the public sector, he added.

Antia cited several advantages of a community's own health care system which are closely interrelated with the development of Panchayati Raj. He added, as it may take over a decade for the Panchayati Raj to operate effectively on a countrywide scale, various methods for implementing the broad strategies of the Community Health Care System will have to be evolved in the interim period depending on local socio-economic, cultural, epidemiological and geographic conditions.

With the Health Policy of the Government of India in the making, it is hoped that some of these issues could be seriously considered and proper steps taken on a war footing for their implementation. Health care could only then become a reality for several of the 'unreached' in our villages, towns and cities.

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Whither electric vehicles?

Electricity is the natural medium for the application of motive power. Its supply is unlimited. It is everywhere. It is to movement what the sun is to growth.

– *Western Electrician,* January 1889

In the late 1890s, at the dawn of the automobile era, steam, gasoline and electric vehicles all competed to become the dominant automobile technology. By the early 1900s, the battle was over and Internal Combustion Engine Vehicles (ICEVs) were poised to become the prime movers of the twentieth century.

At present, about 60 million ICEVs are manufactured every year worldwide and it is projected that there would be about one billion ICEVs on the earth's roads by 2002, i.e. one for every seven people. This upsurge in the use of ICEVs is causing considerable pollution problems in our urban conurbations. In response to the growing concerns over the urban air quality, the state of California enacted in 1994, a legislation requiring that by 1998, 2% of cars offered for sale be zero-emission, increasing to 5% by 2000 and ultimately 10% by 2003. These deadlines however have been amended, largely because of the failure of battery-powered vehicles, which were originally seen as a solution, to perform at a level approaching that of the existing ICEVs. However, pure battery-powered vehicles are no longer regarded as an acceptable alternative to ICEVs, except possibly as Neighbourhood Electric Vehicles (NEVs) which are designed to provide low-speed