

Aging – A challenge in the new millennium*

There has been an enormous increase in the human population throughout the world. It has already reached six billion. Over one-sixth of this number is contributed by India alone. Approximately 70 million Indians are aged over 60 years. As old age is associated with different problems – medical, biological, psychological, social, economic, etc. the increasing number of elderly people is alarming for the society and the nation as a whole. To discuss these issues and to develop a strategy to keep the elderly population healthy and happy, an International Symposium on Aging – A Challenge in the New Millennium and Tenth Biennial Meeting of the Association of Gerontology (India) was organized by the Department of Zoology, Banaras Hindu University, Varanasi.

The symposium covered different areas under three disciplines of gerontology – biological, medical and psycho-social. About 200 gerontologists from different parts of India, USA, UK, Canada, France, Japan, Taiwan, Sweden and Switzerland participated in this symposium. They presented their research findings and discussed about various problems of the aged population like dementia, cancer, gene dysfunction, apoptosis, metabolic disorders, etc. There were 13 sessions in this three-day symposium. In addition, there was a poster session where many young scientists presented their research findings.

The scientific session started with the plenary lecture by Etienne-Emile Baulieu (INSERM, France), winner of the Albert Lasker Prize. He illustrated the role of sex hormones as anti-aging drugs and explained how adrenal gland hormone dehydroepiandrosterone (DHEA), whose concentration diminishes sharply as we age, counteracts the effects of aging. This was followed by a lecture on brain aging and its correla-

tion with dementia by Jim Edwardson, (Institute for the Health of the Elderly, Newcastle General Hospital, UK). W. Meier-Ruge (Gerontology, University of Basel, Switzerland) described pathogenesis and etiology of sporadic senile dementia of the Alzheimer type. The non-cognitive abnormalities in dementia were discussed by Nilamadhab Kar (Kasturba Medical College, Manipal). Shirin Barodawala (J.J. Group of Hospitals, Mumbai) presented an autopsy study on the aging brain from the Indian population and mentioned the prevalence of Alzheimer's lesions.

C. Nath (Central Drug Research Institute, Lucknow) focused on the central cholinergic system and its relevance to Alzheimer's disease. Sudhir Srivastava (National Cancer Institute, USA) and Hari Shukla (Institute of Medical Sciences, BHU) drew attention towards the rising frequency of different types of cancer among the aged. They emphasized the need for early diagnosis of the disease. Virinder Moudgil (Oakland University, USA) elaborated upon the expression of genes in cancer and their regulation by sex steroid hormones. Vijay Kumar (All India Institute of Medical Sciences, New Delhi) discussed clinical observations on the abnormal expression of estrogen receptor and its defects in the breast cancer. Pramod Rath (Jawaharlal Nehru University, New Delhi) described a novel human complementary DNA for a phosphatase with a possible link between cancer and aging. Aparjit Dey (All India Institute of Medical Sciences, New Delhi) discussed cognitive function and health-related quality of life in older hypertensive patients receiving anti-hypertensive therapy. He also gave an account of the lymphocyte profile in older patients suffering from tuberculosis.

Madhu Kanungo (BHU, Varanasi) and Karl Riabowol (University of Calgary, Canada) highlighted the emerging trends in molecular biology to understand the basic process of aging at the level of genes. Presentations on programmed cell death, DNA repair and aging were delivered by Mahdi Hasan (King George Medical College, Lucknow) and Kalluri SubbaRao (Uni-

versity of Hyderabad). Akio Inoue (Osaka University, Japan) discussed the aging of cardiac cells, whereas C. S. Paulose (Cochin University, Cochin) elaborated upon the adrenergic receptor gene expression in pancreatic regeneration and insulin secretion during aging. Keiko Suzuki (Kagoshima University, Japan) presented experimental evidences for the age-related changes in the expression of a novel anti-tumour perchloric acid-soluble protein. The correlation of blood-brain barrier with brain aging was explained by Rakesh Shukla (Central Drug Research Institute, Lucknow). Ramesh Sharma (North Eastern Hill University, Shillong) discussed the age-dependent regulation of adenosine deaminase.

P. V. Ramamurti (S.V. University, Tirupati) discussed the psycho-social approach towards the care and management of the Indian elderly. Prakash Behere (Wardha) elaborated upon the community care of psychogeriatrics in Third World countries – a lesson to learn from success and failure of the West. The role of brahmacharya and yoga in the management of aging was discussed by Krishna Tripathi (BHU, Varanasi). Bhakta Patnaik (Lincolnshire, UK) demonstrated the holistic approach to take care of the elderly population. D. P. Saxena (Gorakhpur University, Gorakhpur) discussed the sociological aspects of aging among the Indian senior citizens. Sujatha Ramamurti (S.V. University, Tirupati) gave an account of nutrition in the elderly. T. R. Lakshminarayanan (Coimbatore) mentioned about health and emotional problems in relation to nutritional status of the aged people. D. Jamuna (S.V. University, Tirupati) discussed psycho-social aspects of institutionalized elderly. Vighnesh Bhat (Kuvempu University, Shimoga) expressed his views about the community perception of aged population. Jyotsna Kalavar (Penn State University, USA) presented data on life expectancies of elderly men and women living in formal care homes. Shubha Soneja (HelpAge India, New Delhi) deliberated upon the role of NGOs in an aging world. Jennifer (National University, Taiwan) discussed the role of NGOs in elderly care in Taiwan.

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M. S. N. Reddy (S.V. University, Tirupati) focused on challenges of health care for the elderly. Indira Jai Prakash (Bangalore University, Bangalore) gave an account of the positive approaches that are likely to be taken for the care of the elderly in the new millennium.

One of the scientific sessions dealt specially with Ayurveda and aging. Ram Harsh Singh (Institute of Medical Sciences, BHU, Varanasi) and other experts from different parts of the country discussed about the Ayurvedic approaches to maintain good health at old age. The deliberations mainly focused on the concept of aging and its care in ancient Indian medicine. Hemant Singh (Central Drug Research Institute,

Lucknow) spoke about Brahmi and its function as a memory-enhancing drug.

Besides regular sessions, there were two special round table discussion sessions. In one session organized by Aparjit Dey (AIIMS, New Delhi), participants discussed about the training and education of medical professionals and caregivers to take care of the elderly population. I. S. Gambhir (Institute of Medical Sciences, BHU, Varanasi) informed about the medical facilities available for the elderly in the hospital. Ake Rundgren and Ove Dehlin (Malmo University, Sweden) gave an account of education and research in geriatrics and gerontology in Sweden. Another session organized by P. V. Ramamurti (S.V. University, Tirupati) dealt with the

issue of 'National Policy for Older Persons'. The outcome of the discussions was recorded in the form of recommendations and have been communicated to the Government of India for consideration and implementation.

To sum up, the symposium was academically highly fruitful and useful to know how to lead a successful and healthy life at old age. The symposium was beneficial for scientists, social workers, policy planners as well as the common man.

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RESEARCH NEWS

It takes two to tango: New quasicrystals and novel superconductors

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Most elements are metallic. The remaining ones can be cajoled by suitable application of pressure or temperature to become metallic. The utility of metals is enhanced, when they are alloyed with each other. Contrary to popular belief, alloyed pleasures are many. The alloying of two elements leads to a binary alloy, as man found at the dawn of civilization by alloying copper with tin and iron with carbon in an inadvertent fashion. Since then, many alloys have been made with multi-components leading to ternary, quaternary, quinary and higher order alloys. We have over 3000 combinations possible for binary alloys. Their phase stability has been well documented. The combinatorial possibilities increase enormously, with over 80,000 ternary and 1,500,000 quaternary alloys. It is humanly impossible to evaluate all these systems by experiments. Yet many engineering alloys, such as the nickel base alloys used in jet engine turbine blades, con-

tain more than 12 elements. Often, metallurgists have been guided by hunches and empiricism in developing them. Modern supercomputers hold out the promise that in the not-too-distant future, all the phase diagrams may be calculated from first principles and alloys can be designed for specific applications. But till this happens, we will have to rely on serendipity.

As binary alloys have been studied for a long time, it may be assumed that there are no surprises left. But wait a minute, just at the beginning of this millennium two startling discoveries have been announced. The first relates to the discovery of a stable icosahedral quasicrystal in cadmium-ytterbium system by An Pang Tsai of the National Research Institute of Metals, Tsukuba. The second is the announcement of the discovery of a new superconductor in magnesium-boron system by Jun Akimitsu of Aoyama-Gakuin University, Tokyo at a meeting in Sendai in January

2001. It is noteworthy that both discoveries have come from Japan. Both have been reported in *Nature*^{1,2}.

Quasicrystals made their debut in 1984, when Dan Shechtman and coworkers found to their amazement crystallographically forbidden five-fold rotational symmetry in rapidly quenched aluminium-manganese alloys³. Dubbed as 'quasicrystals', they have become the most intensely pursued intermetallics during the past eighteen years, leading to over 10,000 publications. Several systems based on aluminium, gallium, titanium, zirconium, hafnium, zinc and magnesium alloys have been shown to form quasicrystals. An important finding was that several of the quasicrystals are stable, finding their rightful place in phase diagrams. Indian scientists have made several contributions to this research field. S. Ranganathan and K. Chattopadhyay discovered decagonal quasicrystals⁴ in 1985, while P. Ramachandra Rao and G. V. S. Sastry