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New Delhi

CONVOCATION

26th October 2013

ADDRESS

by

Prof. J.S.Bajaj
Emeritus President, NAMS

Guest of Honour

All India Institute of Medical Sciences
Jodhpur - 342005, Rajasthan, India

Professor J. S. Bajaj



Professor J. S. Bajaj is Emeritus President and Chairman, Academic Council of the National Academy of Medical Sciences. A distinguished physician and internationally renowned biomedical scientist, Prof. Bajaj is widely recognized for his outstanding contributions to health policy planning, medical education, and applied research in endocrinology and metabolic medicine.

Prof. Bajaj received his MBBS degree from Punjab University in 1958, and MD degree from the AIIMS in 1962. As Commonwealth Scholar, he did postdoctoral research in endocrinology and diabetes at Royal Postgraduate Medical School, London and University of Newcastle upon Tyne in England. He joined the Faculty of the AIIMS in 1967 where he served as Professor (and later head of the department) of medicine since 1979, formally retiring in 1996. He was the first ever medically qualified health professional to have been appointed Member, Planning Commission, Government of India in 1991 and reappointed in 1996. Recognized as an astute clinician, he was appointed Honorary Physician to the President of India from 1977-82, and again from 1987-92.

Prof. Bajaj has been deeply interested in medical education and health planning since 1967. As the Chairman, Expert Committee on Health Manpower Development constituted by Govt. of India (1987), and also as Chairman, Consultative Group on National Education Policy in Health Sciences (1991), he steered major initiatives for reorientation of medical and paraprofessional education and facilitated the development of health-related vocational courses in secondary education. As Member, Planning Commission, his strong advocacy for including national objectives such as lowering of infant mortality and birth rate as well as enhancing level of female literacy as valid measures of performance indicators for according weightage for allocation of central assistance to State Plans, facilitated the formulation of *Gadgil-Mukherjee* formula which was approved by the NDC in December, 1991. This acted as a major incentive for enhanced investments by States in health, female literacy and related social sectors.

He was a member of the Governing Body and Chairman, Academic Committee AIIMS from 1994-99. He was President of the National Academy of Medical Sciences from 1992-94, and of the National Board of Examinations from 1994-97. He was the Foundation President of the South-East Asia Regional Association for Medical Education, served on the Executive Board of World Federation for Medical Education from 1988-2003, and participated in developing policy initiatives and implementation strategies to enhance quality and relevance of medical education at the national, regional and international levels.

Professor Bajaj's most outstanding researches include the original work on Role of brain in the regulation of insulin release and glucose

***53rd Annual Conference & Convocation
National Academy of Medical Sciences***

Address by Prof. J.S. Bajaj, Emeritus President

Hon'ble Chief Guest, Dr. R. Chidambaram; President, Dr. C.S. Bhaskaran; Distinguished Guest, Dr. S. Padmavati; Officers of the Academy; Director, AIIMS, Jodhpur and the Members of the Organizing Committee; Esteemed Fellows, Delegates and Honoured guests,

It is with a sense of great pleasure and profound pride that I welcome Dr. R. Chidambaram, the Chief Guest of the evening. Dr. Chidambaram has a distinguished career as Nuclear Scientist. His career path has intimately intertwined with bio-medical sciences. He received his PhD in Nuclear Magnetic Resonance (NMR) in 1962 and was conferred with the Martin Forster Medal for best doctoral thesis. *'For their discoveries concerning magnetic resonance imaging'*, Paul C. Lauterbur and Sir Peter Mansfield were awarded Nobel Prize in 2003. Its use is now well known to every medical student.

For his DSc., he extended his studies in material sciences and worked with X-ray crystallography, a method also used for identifying the structure and function of many biological molecules, including vitamins, drugs, proteins and nucleic acids such as DNA. X-ray crystallography is still the chief method for characterizing the atomic structure of new materials. As you may recall, Professor Dorothy Hodgkin, was awarded Nobel Prize in Chemistry in 1964 for her work elucidating the structure of penicillin and Vitamin B₁₂, using X-ray crystallography. *She reinvented crystallography with every major molecule she solved. More importantly, she helped establish one of the characteristic features of contemporary science : the use of molecular structure to explain biological function.*

May I remind this august audience that Dr. Chidambaram also shares a unique distinction with Dr. Dorothy Hodgkin : both have been refused US entry visa. It happened to Dorothy Hodgkin in 1953 when she was invited by Nobel Laureate Linus Pauling for discussion of the helical structure of protein amino acids at a conference. Likewise, Dr. Chidambaram was not positively reciprocated when he approached the US for a visa to attend the 1998 annual conference of the International Union of Crystallographers, of which he is a member. Consequently, he withdrew his visa application. Prof. Dorothy Hodgkin was awarded the Nobel Prize 11 years after the refusal of visa; we hope and pray that Dr. Chidambaram follows a similar path.

As Director of Bhabha Atomic Research Centre, and later as Chairman, Atomic Energy Commission, Dr. Chidambaram ensured a continuous and constant supply of high quality radio-isotopes both for research as well as for diagnostic and therapeutic purposes. For the last several years, he steers the National Knowledge Network which provides ultrafast cyberway that has become a key determinant for the success of Prime Minister's vision of present decade as the '*Decade of Innovation*' and the year 2012-13 as the '*Year of Science*'. NKN is stimulating major initiatives in key knowledge-sharing areas including health, education, science and technology, bioinformatics, and agriculture.

As the Chairman of the Committee on Tertiary Health Care Institutions, constituted by the Planning Commission, we identified NKN as a major mode for enhancing the quality of medical education & research and for delivery of health care in remote areas. I am convinced that after listening to his inspiring address you will also share my firm belief that Dr. Chidambaram is not only a nuclear scientist but also a leading visionary with major contributions towards biomedical research and for ensuring dissemination of medical knowledge and health care through tele-medicine and tele-education.

First Convocation Address by Dr. S. Radhakrishnan :

50 years ago, on the 8th December, 1963, Rashtrapati Dr. S. Radhakrishnan delivered address at the first Convocation of the Academy, then known as Indian Academy of Medical Sciences. On the Golden Jubilee of the first convocation we pay our respectful homage to Dr. S. Radhakrishnan and reflect deeply on his words of wisdom on that occasion. I was present in Vigyan Bhawan and was greatly inspired by his exhortation :

*“Our boys and girls, our men and women, are not inferior in intelligence or innate ability. They are people who can be raised to the level of first-class researchers in medical sciences as they have been raised in other sciences in this country. You also find the environment, an atmosphere of research, a love of advancing the frontiers of knowledge. This must be instilled into every young mind. You must try to give them the critical and creative powers with which they are endowed, full scope and full opportunity for expression. I think if our teachers have got that sense of **not merely transmitting knowledge but transmitting love of research**, our boys and girls would respond adequately to the appeal which they make”.*

In the Golden Jubilee year, our Academy looks back with some satisfaction as the young scientists working with our senior Fellows are doing first rate research as shall be evidenced by scientific presentations of NAMS Awardees in a special session tomorrow. However, this endeavor is perhaps minuscule and needs to be considerably enlarged.

It is often said that bio-medical research in our medical institutions is handicapped because of lack of tools of ultramodern technology which is required today for research. To my mind, it is perhaps only partially true. Viewed in a wider perspective, we cannot but agree with the profound truth stated by Warren Weaver. *'Science is not technology, it is not gadgetry, it is not some mysterious cult, it is not a great mechanical monster. **Science is an adventure of the human spirit.** It is essentially an artistic enterprise, stimulated largely by curiosity, served largely by disciplined imagination, and based largely on faith in the reasonableness, order and beauty of the universe of which man is part.'*

During the last six decades that I have been a student of medicine, there has been a quantum leap in our knowledge of biomedical sciences. Indeed, it may be justifiably argued that the cumulative import of advances in scientific knowledge in the last six decades may have even exceeded that due to progress of medical sciences during the last six centuries. Who were the men and women who made this possible? On a deeper introspection of history of medicine, my belief is reinforced that the Holy trinity which characterizes most gifted scientists includes :

(i) Intellectual integrity; (ii) Perceptive intuition; and (iii) Courage of conviction.

Intellectual integrity:

Let me cite two examples to illustrate intellectual integrity. Frederick Grant Banting and John James Richard Macleod shared the Nobel Prize in 1923 for '*the discovery of insulin*'. However, the fact remains that the concept, design and implementation of experimental work which led to the discovery of insulin was done only by Frederick Banting and Charles Best during the summer of 1921 when Macleod who was Professor of Physiology was fishing in Scotland and enjoying his summer holiday. On his return to Toronto he saw the results, and realized that a great discovery has been made. The first published data was in the paper entitled "*The Internal Secretion of the Pancreas*"* by Banting and Best. However, in a subsequent paper Macleod managed to get his name included and thus became the claimant of the Nobel Prize. On learning that Nobel Prize was awarded to himself and Macleod, Banting sent a telegram : '***At any meeting or dinner please read following. I ascribe to Best equal share in discovery. Hurt that he is not so acknowledged by Nobel Trustees. Will share with him.***' Today generations of scientists and millions of patients with diabetes remember with gratitude the discovery of insulin by Banting and Best, while Macleod's name remains confined to the dustbin of history.

In contrast, following the Nobel Prize awarded for elucidating structure of penicillin and Vitamin B12 through X-ray crystallography, Dorothy Hodgkin with her collaborators proceeded to concentrate on the study of the structure

of insulin, using similar techniques. What was most inspiring was what followed : in the 1969 *Nature* article announcing the structure of insulin, the names of her team members appear alphabetically – Hodgkin is third from last. Recognition of, and continuing support to, young investigators is essential for the progress of science.

Perceptive intuition:

Intense passion for research leads to intuitive perception. Nothing illustrates it better than the biography of Otto Loewi who shared the Nobel Prize with Sir Henry Dale in 1936 'for their discoveries relating to chemical transmission of nerve impulses'. Let me describe it in the words of Otto Loewi :

“The night before Easter Sunday of (1921), I awoke, turned on the light, and jotted down a few notes on a tiny slip of thin paper. Then I fell asleep again. It occurred to me at six o'clock in the morning that during the night I had written down something most important, but I was unable to decipher the scrawl. The next night, at three o'clock during a dream, the idea returned. It was the design of an experiment to determine whether or not the hypothesis of chemical transmission that I had uttered seventeen years ago was correct. I got up immediately, went to the laboratory, and performed a simple experiment on a frog heart according to the nocturnal design. I have to describe briefly this experiment since its results became the foundation of the theory of chemical transmission of the nervous impulse. The hearts of two frogs were isolated, the first with its nerves intact, the second without. Both hearts were attached to Straub cannulas filled with a little Ringer solution. The Ringer solution of the first heart, during the stimulation of the vagus nerve, was transferred to the second heart. It slowed and its beats diminished just as if its vagus had been stimulated. Similarly, when the accelerator nerve was stimulated and the Ringer from this was transferred, the second heart speeded up and its beats increased. These results unequivocally proved that the nerves do not

*Banting FG and Best CH (1922). *The Internal Secretion of the Pancreas. Jour Lab Clin Med VII. 5; 251-266.*

influence the heart directly but liberate from their terminals specific chemical substances which, in their turn, cause the well known modifications of the function of the heart characteristic of the stimulation of its nerves.”

The story of Otto Loewi has also contemporary resonance. Three weeks back, on 7th October, the 2013 Nobel Prize in Physiology or Medicine was jointly awarded to James E. Rothman, Randy W. Schekman and Thomas C. Sudhof *'for their discoveries of machinery regulating vesicle traffic, a major transport system in our cells'*. Thomas Sudhof was interested in how nerve cells communicate with one another in the brain. He discovered the signaling molecules, neurotransmitters, that are released from vesicles which fuse with the outer membrane of nerve cells by using the machinery discovered by Rothman and Schekman. Thus the story of neurotransmitters that started with Henry Dale and Otto Loewi has reached its logical culmination, thanks to the work of Thomas Sudhof.

Courage of conviction:

A mentor may transmit his inspiration and aspiration to a young trainee and arouse not only an abiding faith but also a courage of conviction. Let me illustrate by a recent example. A twenty three year old Barry Marshall, as a medical student and intern thought that in a state level medical school in Western Australia, medical research would be unrewarding : “When I was in medical school, I was given the impression that everything had already been discovered in medicine. So I never thought that medical research would be interesting.” As he was doing his residency, his boss suggested that he meets with Dr. Warren who was the Chief of Pathology at the hospital.

Over the years, looking at biopsy specimen of gastric mucosa from patients with gastritis and stomach ulcers, Warren observed a remarkably consistent finding : signs of inflammation were always present close to where a number of spiral shaped bacteria were seen. His repeated attempts to culture the bacteria were unsuccessful. His colleagues thought this was an eccentric idea : how could bacteria survive in stomach's acid environment.

Warren motivated Marshall to observe these bacteria in all cases of gastritis and peptic ulcer. Marshall started systematic study of such patients and undertook to set up culture of stomach aspirates. All attempts were fruitless but Warren always reinforced Marshall's motivation.

During the Easter 1982 holiday, the agar plates were left in the incubator by mistake, and when they were inspected after the holiday they contained numerous colonies consisting of the same bacteria that Warren had observed under his microscope. Soon it became clear that a whole new bacterial genus had been isolated. It was eventually named *Helicobacter pylori*.

Marshall and Warren now conducted a large clinical study, which showed that *Helicobacter pylori* was found in the stomach of most patients with ulcers either in the duodenum or the stomach and that the bacterium was always associated with inflammation of the mucous membrane. In order to prove that the bacterium that had been isolated caused a disease, Marshall tried to fulfill Koch's Fourth Postulate. This implies that an infectious agent that has been isolated must cause the same disease in an experimental animal as in humans.

As several animal models failed to provide a definitive answer, Marshall inspired by Warren and with his courage of conviction did a brave experiment. He underwent endoscopy and gastric biopsy which showed no inflammation and no bacteria. He then drank a bacterial culture containing *Helicobacter* in July 1984. As a result he suffered severe stomach inflammation for about 2 weeks. He had hunger pangs even after full meal. He felt nauseous and vomited few times. A repeat endoscopy and biopsy showed severe inflammation of gastric mucosa and large number of bacteria in its vicinity. A short course of antibiotics enabled him to recover completely. It is now established that *H. pylori* cause more than 90% of duodenal ulcers and upto 80% of gastric ulcers. The risk of stomach cancer is also increased. '*For their discovery of the bacterium Helicobacter pylori and its role in gastritis and peptic ulcer disease*', Berry J. Marshall and J. Robin

Warren were awarded the Nobel Prize in 2005.

If a 23 years old young intern, Berry Marshall, could be *transmitted love of research* (in the words of Dr. S. Radhakrishana) by his mentor Robin Warren, why do our fellows, our faculties, our teachers, lack this motivating force? How many of us spend a few minutes in prefacing our lectures with these and similar inspiring milestones in the history of medicine when we teach about neurotransmitters, insulin, or peptic ulcer. This is a matter of deep concern requiring introspection by all of us.

*“The fault, dear Brutus, is not in our stars,
But in ourselves”*

Shakespeare in *Julius Caesar*

On the Golden Jubilee of Dr. S. Radhakrishnan's Convocation Address let us rededicate ourselves to his exhortation and become mentors who inspire young minds for research.

My heartiest felicitations to the recipients of medals, awards, fellowship, and membership today. May they continue to enrich the glorious traditions of our Academy! As the great Tamilian, Tiruvalluvar, emphasized in Kural more than 2000 years ago :

*Those who continue to work hard
On right lines and without any decline in commitment
Will vanquish even fate*

This wisdom should continue to guide and inspire all of us in our future endeavours.

Once again I thank the Chief Guest, Dr. R. Chidambaram for accepting my invitation, and the organizers Dr. Sanjeev Misra and Dr. Kuldeep Singh for the opportunity to address the Convocation.

Thank you all for a patient hearing.

metabolism, Mathematical models of insulin kinetics in health and disease, Endocrinal and Metabolic Profile of Protein-energy malnutrition, and Hormonal control of fertility regulation.

He has published five books on Insulin and Metabolism, Diabetes mellitus and Glucagon, has contributed chapters in several national and international text books, and has more than 240 publications and research communications to his credit. As a leading research investigator in diabetes, he created around himself a laboratory environment which has provided academic stimulation for many young investigators, some of whom are now holding responsible positions in institutions in India and abroad. Professor Bajaj has delivered more than 50 prestigious national and international academic orations and guest lectures – eminent being Banting Oration, Hodgkin-Sanger Oration, Sir A. Lakshmanaswami Mudaliar Centenary Oration, National Academy Oration, Sir Edward Mellanby Memorial Lecture, and Radhakrishnan Memorial Lecture. Professor Bajaj was the leader of the Indian delegation to the World Health Assembly, Geneva in 1993. He has served the World Health Organization on several occasions; as the Vice-Chairman of the WHO Expert Committee on Diabetes in 1979; Co-Chairman of WHO Study Group in Diabetes in 1986; Chairman of WHO/IDF Steering Committee in 1986; Chairman of the WHO Consultation on Efficacy and Effectiveness of Integrated programme for Community Health in Non-communicable Disease, Geneva, 1987, and Co-Chairman of the WHO Meeting for Implementing National Diabetes Programmes, Geneva, 1994. As WHO Consultant to the Govt. of Bangladesh in 1977 and 1978, and Consultant to the Govt. of Sri Lanka in 1987, Prof. Bajaj developed plans for integrated development of health care with major emphasis on chronic degenerative diseases especially diabetes. At its Golden Jubilee in 2006, Bangladesh Diabetic Association has conferred on him life-time honour as Patron. Professor Bajaj has held offices of distinction in several national and international speciality and research organizations. He is Honorary President, Diabetic Association of India and Past President, Endocrine Society of India. He was the first scientist from outside Europe and the USA to have been elected in 1985 as the President of the International Diabetes Federation (IDF) for a three year term, at the completion of which he had the singular distinction of having been unanimously elected as Honorary President (for life) of the Federation.

Professor Bajaj has been the recipient of many academic distinctions and awards which include Fellowship of the Royal College of Physicians of London (FRCP Lond.), and of Edinburgh (FRCP Ed); Fellowship of National Academy of Medical Sciences (FAMS); Founder Fellowship of Indian College of Physicians (FICP); honorary Doctorate in Medicine (DM) from Karolinska Institute, Stockholm (1985); and honorary Doctorates in Science (DSc. h.c.) from Tamil Nadu Dr. MGR Medical University; GND University, Punjab; Madras University; University of Health Sciences, Andhra Pradesh, Punjabi University and Banaras Hindu University. For his distinguished achievements as a Medical Educationist, Prof. Bajaj received the coveted Dr. B.C. Roy National Award in the category of 'Eminent Medicalman' for the year 1992. He is also the recipient of several medals and scrolls of honour including Gifted Teacher scroll, Master Teacher plaque, Taro Takemi Memorial Oration Medal, JRD Tata



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