DEPARTMENT-RELATED PARLIAMENTARY STANDING COMMITTEE ON SCIENCE AND TECHNOLOGY, ENVIRONMENT AND FORESTS

ONE HUNDRED SIXTY-THIRD REPORT

ON


(PRESENTED TO THE RAJYA SABHA ON THE 14TH DECEMBER, 2006)
(LAIRED ON THE TABLE OF THE LOK SABHA ON THE 14TH DECEMBER, 2006)

RAJYA SABHA SECRETARIAT
NEW DELHI
DECEMBER, 2006/AGRAHAYANA, 1928 (SAKA)
PARLIAMENT OF INDIA
RAJYA SABHA

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RAJYA SABHA SECRETARIAT
NEW DELHI

DECEMBER, 2006/AGRAHAYANA, 1928 (SAKA)
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COMPOSITION OF THE DEPARTMENT-RELATED PARLIAMENTARY STANDING COMMITTEE ON SCIENCE AND TECHNOLOGY, ENVIRONMENT AND FORESTS (2006-07)

1. Shri P.G. Narayanan ——— Chairman

RAJYA SABHA
2. Dr. Prabha Thakur
3. Vacant
4. Shri Suryakantbhai Acharya
5. Shri Bhagirathi Majhi
6. Shri Kamal Akhtar
7. Shri Saman Pathak
8. Shri Jabir Husain
9. Shri Ravula Chandra Sekar Reddy
10. Dr. Barun Mukherjee

LOK SABHA
11. Shri Jashubhai Dhanabhai Barad
12. Dr. Sujan Chakraborty
13. Shri Thupstan Chhewang
14. Shri Pankaj Choudhary
15. Shri Francis Fanthome
16. Shri Babubhai K. Katara
17. Shri A. Venkatesh Naik
18. Shri Brahimananda Panda
19. Smt. Neeta Pateriya
20. Shri Jaysingrao Gaikwad Patil
21. Shri Pratik Prakashbapu Patil
22. Shri Bachi Singh ‘Bachda’ Rawat
23. Shri K.C. Singh “Baba”
24. Shri Kirti Vardhan Singh
25. Shri Rakesh Singh
26. Shri Aruna Kumar Vundavalli
27. Smt. Javaben B. Thakkar
28. Shri Akhilesh Yadav
29. Shri Mitrasen Yadav
30. Shri Sita Ram Yadav
*31. Shri Rampal Singh

SECRETARIAT
Shri N.C. Joshi, Additional Secretary
Shri R.K. Singh, Officer on Special Duty
Shri Alok Kumar Chatterjee, Deputy Secretary
Shri Jagmohan Sundriyal, Under Secretary
Shri S. Rangarajan, Committee Officer

*Shrimati Viplove Thakur ceased to be a Member of the Committee w.e.f. 30th November, 2006.
*Shri Rampal Singh nominated to the Committee w.e.f. 8th December, 2006.
INTRODUCTION

I, the Chairman of the Department-related Parliamentary Standing Committee on Science and Technology, Environment and Forests, having been authorised by the Committee to present the Report on its behalf, present this One Hundred Sixty-third Report on the Action Taken by the Department of Atomic Energy on the recommendations contained in One Hundred Sixtieth Report of the Committee on Demands for Grants (2006-07) of the Department of Atomic Energy.


3. There were fifteen recommendations contained in the One Hundred Sixtieth Report of the Committee. Action Taken Notes on the recommendations of the Committee were received from the Department on 8th August, 2006 and 14th September, 2006, respectively.

4. In the meeting held on 12th December, 2006, the Committee considered the draft Action Taken Report and adopted the same.

NEW DELHI;
December 12, 2006

P. G. NARAYANAN
Chairman,
Department-related Parliamentary Standing Committee
on Science & Technology, Environment & Forests.
REPORT

The report of the Committee deals with the Action Taken by the Department of Atomic Energy (DAE) on the recommendations contained in the One Hundred and Sixtieth Report of the Department-related Parliamentary Standing Committee on Science and Technology, Environment and Forests on the Demands for Grants (2006-07) of the Department of Atomic Energy, which was presented to both the Houses of Parliament on 18th May, 2006. There were 15 recommendations contained in the Report and the Department of Atomic Energy has furnished the Action Taken Note in respect of all the recommendations.

Action Taken Note on the recommendations of the Committee and subsequent clarifications were received from the Department of Atomic Energy on 8th August, 2006 and 14th September, 2006, respectively.

The Committee’s recommendations, Action Taken thereon and comments of the Committee on the Action Taken by the Department of Atomic Energy are set out in the succeeding paragraphs.

DEMAND NO. 6-NUCLEAR POWER SCHEMES

Recommendation

The Committee notes with concern that the Non-Plan allocation has been reduced considerably by an amount of Rs.312.89 crore which may affect the operational needs of the Heavy Water Plants, Nuclear Fuel Complex, Board of Radiation and Isotope Technology, Fuel Reprocessing Plants of the Bhabha Atomic Research Centre etc. The Committee feels that any curtailment of funds in a crucial sector like atomic energy could delay the endeavour of the Department to increase the contribution of Nuclear Power in the total power production and other important areas of the country. (Para 15)

Action Taken by the Department

As against the projected requirement of Rs. 2619.08 crore under Non-Plan Budget for the year 2006-07 under the Grant No.5 Atomic Energy, the allocation received from Ministry of Finance is Rs.2306.19 crore resulting in a shortfall of Rs.312.89 crore. Major portion of this is intended for Industries sector for operational needs of Heavy Water Plants, Nuclear Fuel Complex, Board of Radiation and Isotope Technology, Fuel Reprocessing Plants of Bhabha Atomic Research Centre etc. The Ministry of Finance is being approached with justification for additional requirement of funds to ensure that the activities in the critical areas of the Department is not affected.

The Department further clarified that while discussing the budget proposal for 2006-07 during November, 2005 with Ministry of Finance, it has been assured that the full requirement of funds for operational needs of the Department will be provided through Supplementary Grants during 2006-07. Department is critically reviewing the actual requirement of funds for its activities during the current year and Finance Ministry is being approached for additional funds in the Revised Estimates 2006-07 and the outcome will be known after the pre-budget discussions with the Finance Ministry, likely to be held during October/November 2006. The Standing Committee would be apprised about the outcome suitably thereafter.

Comments

The Committee notes the reply and hopes that in future the Department would impress upon the Ministry of Finance the fact that the curtailment of funds in crucial projects would slow down the sustained growth achieved by the country over the years in the field of Atomic Energy.

Recommendation

The Committee notes that the reason for the funds remaining unutilized in the projects have been attributed to the delay in receipt of equipments, delay in receipt of clearances and the longer time taken for obtaining sanctions for
projects undertaken in the Mid Term Appraisal. The Committee feels that an indepth analysis of various factors responsible for lack of funds utilization should be made by the Department and wherever necessary strict checks should be incorporated in the administrative machinery itself to avoid funds remaining unutilized. The Committee also feels that action should be taken against those vendors who were responsible for delayed or inadequate supplies of equipment and machinery. Wherever possible, a penalty clause should be incorporated in the tender/purchase agreement to ward off any delay or inadequate supply of critical equipment and machinery. The Committee recommends that such remedial measures should be in place for future projects. (Para 17)

Action Taken by the Department

The procurement of materials and supplies, machinery and equipment is executed through Directorate of Purchase and Stores. Directorate of Purchase and Stores with its headquarters in Mumbai and regional offices at Chennai, Hyderabad, Kolkata and Indore takes appropriate action to ensure prompt receipt of materials required by the projects. In procurement of certain critical items, difficulties are experienced on account of embargo, lack of awareness in vendors about the strategic equipment and material required for atomic energy programme etc. Thus vendor development consumes time and resultant delay. Erection and commissioning of the plant and machineries, at times, face delay for want of Site readiness. Department puts its best endeavours to ensure that the time gap between receipt of equipment and machineries and their erection and commissioning is largely reduced by taking up with the users in various Project sites and the contractors. Further, the contracts entered into by the Department have built in provisions for levy of liquidated damages on those suppliers who delay supply of materials, machineries and equipments. Major contracts have also provision for the supplier to execute Security Deposit for due fulfillment of the terms and conditions of the contract. As part of a pre-contract activity, user Department also conducts factory evaluation of the prospective suppliers to ascertain their competence both financially and technically. Penalty clause is included in all the contracts and as suggested by Committee strict enforcement of the same will be strengthened to reduce delay in supply of equipment and machinery.

Comments

The Committee notes that one of the reasons for the difficulties in procurement of certain critical items, have been attributed to the lack of awareness in vendors about the strategic equipment and material required for Atomic Energy projects. The Committee feels that vendor awareness programmes should be started by the Department to educate the vendors about the strategieness of the programmes to ensure their full cooperation and simultaneously the Department should also ensure strict compliance of delivery schedules, agreed to in the contract.

Recommendation

The Committee by and large expresses satisfaction regarding the pace of expenditure, though not uniform in all the tour quarters. The Department’s endeavour should be to keep uniform pace of expenditure, throughout the year, to the extent possible. This will ensure that the plan allocation is fully utilized and surrender of funds in the last quarter of the financial year, is avoidable. (Para 19)

Action Taken by the Department

The expenditure for plan schemes is phased in a quarterly basis taking into account the likely receipt of material, machinery and completion of civil works etc. Apart from the review conducted at Unit level on the physical as well as financial progress of the plan projects, at headquarters. Secretary DAE reviews the progress of the projects quarterly. During these reviews, heads of all the Constituent Units. Autonomous Bodies, PSUs participate where remedial measures for smooth progress of projects are also discussed and implementation ensured. As far as Non-plan expenditure is concerned, the expenditure is more or less uniform in all the four quarters. All efforts are being made to ensure full utilization of plan allocation as recommended by the Committee and to avoid surrender of funds in the last quarter of financial year.
Comments

The Committee notes the reply and expects the Department to ensure that allotted funds are fully utilized for the allocated purpose.

NEW PROJECTS PROPOSED FOR 2006-2007

Recommendation

The Committee commends that the International nuclear science community has accepted Indian expertise in the fusion science and technology and accepted India as a full participating country in the ITER venture. The Committee feels that the technology being environmentally safe and the source essentially inexhaustible, the country will benefit a lot and can hope to increase its electricity requirements without any environmental degradation. (Para 23)

Action Taken by the Department

As a sequel to India joining ITER, large amount of related activities are accelerated. The project organizational structure has been finalized and the Project Director, ITER-INDIA project has been identified. Some of the other positions of immediate importance have also been filled up. Design verification of the inputs from ITER, detailed design and analysis of various work packages is under progress. Detailed planning and development of infrastructure, necessary for the project execution, is under progress. Industry meet is being organized in Aug., 2006 in search of capable vendors. Planning & search for consultant agencies initiated. to support the specialized design and other management services.

Comments

The Committee notes the reply. The Committee of the view that at the time of preparation of the detailed planning capable vendors should also be identified.

BHABHA ATOMIC RESEARCH CENTRE (BARC)

Recommendation

The Committee notes with satisfaction that the BARC has mastered and indigenously developed a host of highly complex technologies, particularly in the field of areas of advanced reactors, accelerators, laser and plasma technologies, waste management and nuclear recycle technologies. nuclear fuels and material technologies, electronics and control instrumentation which no country would share with India True to the visions of the founding fathers, envisaging the usage of Atomic Energy to make a difference to the society, the BARC should now strive to scale it up and take it to a much higher level. (Para 28)

Action Taken by the Department

Continuing with the rich tradition of indigenous development of highly complex technologies, BARC embarked upon a number of programmes, which are being taken up during XI plan. BARC has designed and developed Advanced Heavy Water Reactor (AHWR) technology which produces much of its power from Thorium, which is available in India in sufficiently large quantities. The Reactor designs are undergoing regulatory reviews and detailed designs and drawings of various systems of 300 MWe AHWR would be taken up shortly. BARC has also taken up design of Compact High Temperature Reactor (CHTR) and development of materials and fuels for these high temperature operations. The technology demonstration of CHTR is planned during the XI plan period. Development of various technologies related to hydrogen production using the high temperature heat from these reactors and development of Hydrogen storage materials are also being taken up. BARC is continuously pursuing programmes to indigenize development of various high technology equipments/instruments/processes which no advanced country would like to share with India. BARC is scaling up its activities in nuclear recycle technologies, nuclear fuel and material development, accelerator, laser, plasma technologies, electronics and reactor control etc. A continuous effort is being
made to meet the demands of production and processing of isotopes and its applications in health care for the benefit of society at large.

BARC is also planning to expand its activities in the new BARC campus for which land has been acquired and infrastructure is being developed. In a few years time, the construction of multipurpose research reactors, isotope processing facilities, facilities for high temperature materials, accelerators programmes etc. would be taken up as an expansion of several activities of BARC in the new campus.

Comments

The Committee notes the reply and appreciates the proposed expansion plans of BARC.

Recommendation

The Committee appreciates the fact that BARC has installed Water Treatment Plants in the Tsunami affected areas of Tamil Nadu to provide potable water to the victims and others. The Committee feels that such Water Treatment Plants would go a long way in providing water for the areas which are perennially facing water shortage. The Committee recommends that after analyzing the commercial success of such Plants, the Department should go in for setting up more such plants in other parts of the country in collaboration with private agencies. In this direction, the Department should popularize the technology by holding demonstration programmes, seminars, etc. and strive towards further development of the technology. The Committee understands that some other Departments are also making efforts in this direction. It hopes, that there is proper coordination among them to achieve better results.

Action Taken by the Department

Based on the success of desalination plants set-up by BARC in Tsunami-affected areas. BARC proposed in the XI plan for setting up of eight state-of-the-art desalination/water purification plants in the rural areas at different locations with specific constraints. BARC has signed a Memorandum of Understanding (MoU) with BHEL for the large size Multi-Stage Flash (MSF) desalination plants where BARC Would provide technical consultancy on desalination. Under the MoU signed with National Institute of Ocean Technology (NIOT), BARC has provided technical consultancy on 100m³/day Low Temperature Desalination Plant utilising ocean thermal energy gradient. The plant was set-up at Kavaratti (Lakshadweep) by NIOT. BARC is providing consultancy to several other organisations in the field of desalination and water re-use.

As a part of the effort for popularizing the technology. BARC has organised a National level discussion meet on ‘Desalination and Water purification Technologies’ on 27.02.2006 in Mumbai as a follow up action of brain-storming session initiated by Dr. R. Chidambaram. Principal Scientific Advisor to Government of India on 23.08.2005 in his office at New Delhi. It is proposed to organise an international symposium on “Desalination and Water Re-use” during 7-9 February, 2007 at BARC for further development of the desalination and water reuse technologies and bringing together other departments. R&D Centres, academia, industries and user sectors working in this field for more synergy and coordination to achieve better results.

Comments

The Committee hopes that the Department would continue its efforts towards setting up of desalination plants in other parts of the country with emphasis on efficient delivery systems.

Recommendation

The Committee finds that the reason for the fluctuation in respect of the Uranium Corporation of India Ltd. was the delay in clearance of new projects at Andhra Pradesh and Meghalaya. The Committee feels that the Department should make accurate and realistic budget estimates and ensure that the procedural formalities regarding the projects are completed in time, so that the ongoing projects do not suffer. (Para 36)
**Action Taken by the Department**

The environmental clearance for mining was granted by the Ministry of Environment and Forests (MoEF) in 2005 for the Uranium Mining and Milling Project at Lambapur, A.P. But subsequently one NGO has filed writ petition against the above clearance. Now the matter is *sub-judice* in the High Court of A.P. at Hyderabad.

Statutory clearances for the Kylleng Pyndengsohiong Uranium Mining and Milling Project at Mawathbah, Meghalaya has yet to be granted by the concerned authorities under the Govt. of Meghalaya.

**Comments**

The Committee notes the reply and would like the Department to pursue clearance in Meghalaya.

**Recommendation**

The Committee notes with satisfaction that the Unit-4 of the Tarapur Atomic Power Project attained criticality on 6th March, 2005 and started commercial operation from September, 2005, which was five months ahead of the approved date of commercial operation. The Committee appreciates the maturity and capabilities of the nuclear scientists specially in view of the fact that the unit is fully indigenous with design matching international standards. The Committee also appreciates the progress of work for the Kaiga Atomic Power Project Units - 3&4, Kudankulam Nuclear Power Project Units - 1&2, Rajasthan Atomic Power Project Units - 5&6, Prototype fast Breeder Reactor, BHAVINI, Kalpakkam, which are keeping up with the approved date of commercial operation and are being regularly monitored.

(Para 39)

**Action Taken by the Government**

It is NPCIL’s endeavour to further improve on its achievements and set higher benchmarks in nuclear power project construction. The progress of works is being monitored periodically at different levels to ensure timely completion of Prototype Fast Breeder Reactor by BHAVINI.

**Comments**

The Committee notes the reply and would like to see that the present pace of work is maintained for future projects.

**Recommendation**

The Committee hopes that the agreement will take care to protect the indigenous progress made by India in this field that there would be no infringement upon our independent ability to do further research and develop technologies in the field of nuclear science. The Committee also hopes that the commitments from the United States regarding supply of nuclear fuel will lead to increase in nuclear power which will eventually solve the acute power crisis faced by the country. The Committee also hope that in future the country will not be constrained to build future nuclear facilities whether civilian or military as per our national requirements.

(Para 43)

**Action Taken by the Government**

Department fully shares the views expressed by the Department-related Parliamentary Standing Committee and would work towards realisation of stated objectives.

The Ministry further clarified that the separation plan that has been worked out and placed in the Parliament on 07.03.06 takes care of the aspects of our autonomy to pursue research and development and also ensure integrity of our three stage nuclear programme development. The apprehensions expressed by some senior scientists on the Indo-US deal have been specifically responded to in the statement made by Hon. Prime Minister in his reply to debate in Rajya Sabha on the subject on 17.08.06. Prime Minister has also met the group of scientists on this issue.

**Comments**
The Committee notes the reply and would like to see that independent research to develop new technologies in the nuclear power sector.

Recommendations

Since cancer had long been a challenging disease before the medical science, particularly its curative aspects, the Committee desired to know about the unexplored areas of research which TMC felt is very important and requires immediate attention. TMC informed that some newer areas had been identified by TMC where research needed to be developed as per its opinion. One such area which they pointed out was the exploration of the nano medicine. The Management stated that this was an unexplored area of research of the Institute and it has initiated preliminary work in the field. It was working on nano particles as vectors to deliver genes into the tumour cells and also to make cancer cells more sensitive to treatment. The projects on nano medicines were being developed in collaboration with the scientists in France and in India at National Chemical Laboratory in Pune. (Para 44)

Keeping the aforesaid in the background, the Committee would like to highlight the importance of nanotechnology in the treatment of this dreaded disease. Since detection of cancer at an early stage is a critical issue in designing cancer treatment, the detection and diagnosis of the disease usually depends on changes in cells and tissues which are extremely important to be understood at a preliminary stage. Nanotechnology as per the information given to the Committee is uniquely promising tool for early detection of cancer for many reasons. Nanotechnology enables the screening of the disease faster and is cost efficient. Nano tubes also help in identifying earlier DNA changes associated with cancer. (Para 46)

The Committee therefore, strongly recommends that TMC in collaboration with NCL, and other important Scientific Institutes in the country like Agarkar Research Institute, Sree Chitra Memorial Institute and Bose Institute can frame an extensive treatment plan in nano medicines for cancer and can develop projects that may help oncologists to design earliest detection and precision treatment mechanism for delivery of nano medicines with precision in the field of cancer so that this dreaded disease could be controlled to a large extent which is currently a challenge with the conventional therapy and treatment before medical science. (Para 47)

Action Taken by the Government

The work which is on hand with reference to nanotechnology and cancer is as stated below:

(1) Targeted gene delivery to cancer cells using nanometric DNA

Human gene therapy trials for cancer point towards further improvement in gene delivery systems. Most cancer gene therapy trials have failed because of the inability to target maximum cancer cells in the body. Viruses, though efficient in delivering the gene into the nucleus, have their limitations. Adenoviruses are immunogenic, Retroviral titres are low using packaging cell lines. Also the commonly used mouse virus gets inactivated in the presence of human complement in a very short time. They are also sometimes pathogenic. Non-viral vectors such as cationic liposomes have been used which are loaded with hundreds of DNA molecules and are 0.2-1nm in size. These are good for in vitro studies where sedimentation of microprecipitates is necessary for efficient transfection into the cells. However, in vivo large size of the liposomes restrict diffusion and thereby hamper delivery into the target cells. A major limitation of gene therapy approaches, especially when non-viral vectors are used, is the poor efficiency of DNA delivery to the nucleus; a crucial step to ensure ultimate expression of the therapeutic gene product.

With various groups working in the field of nanotechnology, Dr. G. Zuber’s group at CNRS/ULP, Strasbourg, France, has successfully developed a novel synthetic DNA supramolecular assembly with key viral properties, such as diffusion and cell recognition. They have developed a method for condensation of genes to from stable monodisperse particles 30nm in size. In this technique DNA (eg. one plasmid molecule) is condensed by a cationic cysteine-based detergent. The monomolecular DNA particles are coated with a PEG-folate envelope. PEG prevents opsonization and capture by macrophages; whereas folic acid helps in targeting the particle to cancer cells which normally over express
folic acid receptors. In order to help release DNA from PEG coat into cell nucleus they introduced reducible disulphide bonds which can be broken by intracellular glutathione. Initial studies using pCMV-Luc plasmid have shown specific transfection of the DNA into folic acid receptor-expressing KB cells.

In the gene therapy preclinical trials, undertaken by Dr Rita Mulherkar and her group, it is proposed to deliver RNAi (against DNA repair genes e.g. ATM or cell regulation genes e.g. CCND1) to tumour cells in vitro and in vivo in order to confer chemo-sensitivity or radio-sensitivity to the cells. We will first establish that the HNSCC cell line - NT8e, over expresses CCND1 and is resistant to chemotherapy and radiotherapy. Sequences for the RNAi construct against the target genes will be designed and tested by transfection of the cell line. Then the sequences will be ligated to the vector - pSHAG (or any other suitable vector) and will be tested to establish its capability of conferring sensitivity to the cells. Once this is established, it will be used to construct and characterize nanometric DNA particles which will target genes to cancer cells.

The nanometric particles carrying the RNAi will ultimately be tested in vitro and in vivo in the xenograft HNSCC NT8e nude mouse model.

(2) Use of gold nanoparticles to kill tumour cells as well as serve as vectors to transfer DNA to tumour cells:

There was a proposal from National Chemical Laboratory, Pune, to test their nano-gold particles in vitro as well as in vivo. NCL had devised a simple chemical reaction by which they could obtain uniform gold nano-triangles. The gold nanoparticles could absorb in near-infra red light and heat up. This principle was proposed to be used in vitro by introducing cells to gold nanoparticles and exposing them to infra-red light. This was expected to kill cells which had the nanoparticles within them.

After initial experiments to determine whether the gold-nanoparticles were taken up by the cells, it was proposed to wrap plasmid DNA around the nanoparticles so that they could act as vehicles to carry DNA into the cell. Experiments were started where the gold nanoparticles were added to cells in culture. However, there were problems with sterilization and quantitation of the gold nanoparticles. The project has been kept on hold for various reasons one of which is that main team from NCL has moved to industry. Appropriate partners will be identified to continue this work.

Comments

The Committee while noting the reply of the Department feels that expeditious efforts should be made to continue the project, which is presently on hold for various reasons. Continuity in such projects is very important.

Recommendation

In pursuance of the TIFR’s indication that proper understanding of mis-folding of protein can help in designing strategic therapies for controlling many types of incurable brain diseases, the Committee strongly advocates that the greater chunk of R&D resources by TIFR needs to be targeted towards researches in the protein mis-folding and protein chemistry so that in near future, a suitable answer towards incurable neuro-degenerative diseases could be found. The Committee has been told in response to a written query before a meeting with the scientists on 5th February, 2005, regarding the analysis of crystals structure of protein by the scientists of the Bose Institute, Kolkata that the Institute has developed protein data bank and through which they have analysed physico-chemical features of different proteins.

(Para 51)

Action Taken by the Government

The recommendations by the Committee on dedicating greater resources for the understanding of the neurodegenerative diseases is highly appreciated. The research now has led to a clearer understanding of the relative
stabilities of different species of aggregates under different conditions. Based on such understanding, selective disruption of the toxic subspecies of protein aggregates have been achieved in vitro. The effect of this strategy has also been tested on isolated neurons. TIFR have also developed optical techniques for possible detection of these aggregates in vivo. These studies now need to be taken to the level of whole organisms, for example in mouse model of Alzheimer’s disease. Adequate funding for this research has been requested in the proposals for the XI Five Year Plan.

Comments

The Committee notes the reply and would like to be updated regarding the developments.

Recommendation

The Committee, therefore, recommends that TIFR in collaboration with other important Neuro Research Centres under the control of Ministry of Science and Technology like Brain Research Institute, Gurgaon, etc. Bose Institute, Kolkata can jointly undertake research in the field to develop strategic treatment design for controlling such type of diseases.

Action Taken by the Government

TIFR plan to start collaborations with the Bose Institute (Kolkata), the National Brain Research Centre in Gurgaon and the Centre for Cellular & Molecular Biology (CCMB), Hyderabad on this project. The different abilities of various laboratories in these places should help us make faster progress towards a better understanding of these diseases. However, while some of the early results show definite scientific promise, progress to a cure of these complex diseases would necessarily require tortuous steps.

Comments

The Committee hopes that the TIFR would expeditiously implement its plan to collaborate with agencies mentioned above for finding cures to complex diseases.

Recommendation

The Committee feels that Haffkine Institute of Mumbai which is mainly researching in scorpion poison can also advise ACTREC research wing in the matter by supplying scorpions so that by effectively managing chlorotoxin most difficult form of cancer, i.e. cancer of brain could be treated with large amount of success. The Committee feels that unless such new drugs are ventured into, no permanent solution to the successful treatment of cancer of the brain could be achieved in the near future. The Committee, therefore, recommends TMH to consider its suggestions and collaborate functionally with Haffkine Institute to design an effective drug against brain cancers.

Action Taken by the Government

Conjugation of various types of toxins with recombinant antibody has been proven to be an effective measure for targeted therapy in cancers. Plant toxins like Ricin can be as effective as bacterial toxins such as, Pseudomonas exotoxin A and Diphtheria toxin. Plant toxins are either holotoxins - composed of catalytic ‘A-chains’ disulfide bonded to ‘B-chains’, which bind the cell surface - or catalytic chains alone (hemitoxins). The bacterial toxins Pseudomonas exotoxin (PE) and diphtheria toxin (DT) are single-chain proteins containing both binding and catalytic domains. The common features of plant and bacterial toxins, are binding to the cell surface, internalization into an endosome, translocation to the cytosol and then catalytic inhibition of protein synthesis, leading to cell death.

At ACTREC, Psedomonas exotoxin A has been explored extensively with MUCI-single chain antibody (scFv) as a targeted molecule to selectively kill MUC1 producing breast cancers cells. The immunotoxin scFv(MUC1)-ETA (exotoxin A) is near ready for Phase I trial at TMC. The scFv(MUC1 )-ETA has also been found effective in cervical cancer, head and neck cancer and esophageal cancer. The phase I trial in these cancers will follow soon.
The feasibilities of conjugating several protein molecules, drugs and activated nano particles to single chain antibodies have been exploited for targeted delivery to tumours both for cytotoxic effects as well as for immunoscintigraphy. Besides, bacterial exotoxin, other proteins with selective cytostatic properties is also being tested for therapeutic use.

Venoms from scorpion and snake have potential for therapeutic use. The chlorotoxin isolated from African scorpion venom specifically binds to glioma cells has enormous potential for targeted therapy in brain tumours that can also be conjugated with other chemotherapeutic formulation for improving efficacy. Since ACTREC has the expertise in handling and appropriately utilizing toxins with targeting proteins, the suggestion made by the Committee to interact with Haffkine Institute will be pursued. Further, the chlorotoxin molecule can also be generated by recombinant technologies in vitro without resorting to isolating it from the scorpion.

It is also possible to fuse nano-particle with recombinant antibody for targeted delivery of cytotoxic drugs, gene specific DNA formulations to cancer cells. Nanotubes are also being considered for improving effective delivery of therapeutic drugs.

The Antibody-Dependent Enzyme-Prodrug-Therapy (ADEPT) is also being developed wherein the target specific recombinant antibody-enzyme cleaves the administered prodrug into active cytotoxic agent in the target cancer cells.

These technologies are currently being used at ACTREC and can be extended, to a multidisciplinary and multicentric collaboration for developing effective therapeutic agents for cancer.

Comments

The Committee notes the reply and would like that the action taken by Haffkine Institute be reported.
MINUTES
V
FIFTH MEETING

The Committee met at 3.00 P.M. on Tuesday, the 12th December, 2006 in Room No. '63', First Floor, Parliament House, New Delhi.

PRESENT
1. Shri P.G. Narayanan ——— Chairman
2. Shri Bhagirathi Majhi
3. Shri Saman Pathak
4. Shri Ravula Chandra Sekar Reddy
5. Dr. Barun Mukherjee

RAJYA SABHA
6. Shri Francis Fanthome
7. Shri Brahmananda Panda
8. Shri Aruna Kumar Vundavalli
9. Shrimati Jayaben B. Thakkar
10. Shri Mitrasen Yadav
11. Shri Sita Ram Yadav

LOK SABHA

SECRETARIAT
12. Shri R.K. Singh, Officer on Special Duty
13. Shri Alok Chatterjee, Deputy Secretary
14. Shri J. Sundriyal, Under Secretary
15. Shri S. Rangarajan, Committee Officer

2. The Committee took-up for consideration its draft 163rd, ***, ***, ***, ***, *** and *** Reports on the Action taken by the Government on the recommendations contained in its 160th, ***, ***, ***, ***, *** and *** Reports on Demands for Grants (2006-07) pertaining to the Department of Atomic Energy; ***, ***, ***, ***, *** and ***. The Committee adopted all the Reports with some minor changes.

3. The Committee decided to present all the seven Reports (163rd to 169th) *** which was adopted by it in its meeting held on 6th November, 2006. The Committee authorized its Chairman and in his absence Shri Ravula Chandra Sekar Reddy to present the Reports in Rajya Sabha and to lay the copies of the Reports on the Table of Lok Sabha by Shri Francis Fanthome and in his absence by Shri Brahmananda Panda.

4. *
5. The Committee then adjourned at 3.40 P.M.