GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

LOK SABHA
STARRED QUESTION NO. 282
TO BE ANSWERED ON 12.07.2019

RESEARCH ON CANCER

***282. DR. SWAMI SAKSHIJI MAHARAJ :**
SHRI BHOLA SINGH :

Will the Minister of SCIENCE AND TECHNOLOGY विज्ञान एवं प्रौद्योगिकी मंत्री **be pleased to state:**

(a) whether the National Institute of Science, Technology and Development Studies of the Council of Scientific and Industrial Research is undertaking any research work to check damage to the normal cells of the body during cancer treatment;
(b) if so, the details and the outcome thereof;
(c) whether the Government is working on any other research works related to cancer; and
(d) if so, the details thereof?

ANSWER

MINISTER OF HEALTH AND FAMILY WELFARE; MINISTER OF SCIENCE AND TECHNOLOGY; AND MINISTER OF EARTH SCIENCES
(DR. HARSH VARDHAN)

स्वास्थ्य और परिवार कल्याण मंत्री; विज्ञान एवं प्रौद्योगिकी मंत्री; तथा पृथ्वी विज्ञान मंत्री
(डॉ. हर्ष वर्धन)

(a) to (d) : A statement is laid on the Table of the House.

STATEMENT REFERRED TO REPLY TO PARTS (a) TO (d) OF LOK SABHA STARRED QUESTION NO. 282 ON 12/07/2019 REGARDING RESEARCH ON CANCER.

(a)&(b) No, Sir. CSIR- National Institute of Science, Technology and Development Studies (CSIR- NISTADS) a constituent of Council of Scientific and Industrial Research has not undertaken any research work to check damage to the normal cells of the body during cancer treatment.

(c) Yes, Sir. In addition to CSIR other departments such as Department of Biotechnology (DBT), Indian Council of Medical Research (ICMR), Department of Science & Technology (DST), Ministry of AYUSH and Department of Atomic Energy (DAE) are working in the area of cancer.

(d) Details of research work being carried out by CSIR and other Departments are given below:

1. Council of Scientific & Industrial Research (CSIR) constituent laboratories namely Central Drug Research Institute (CSIR- CDRI), Lucknow; Centre for Cellular & Molecular Biology (CSIR- CCMB), Hyderabad; Indian Institute of Integrative Medicine (CSIR- IIIM), Jammu; Institute of Microbial Technology (CSIR- IMTECH), Chandigarh; Indian Institute of Chemical Biology (CSIR- IICB), Kolkata; Institute of Genomics and Integrative Biology (CSIR- IGIB), New Delhi; Indian Institute of Chemical Technology (CSIR- IICT), Hyderabad are pursuing research in the area of cancer.

The research activities are focused towards discovery of biomarker for early diagnosis, understanding genetic & epigenetic regulation of cancer, metabolic reprogramming involving heat shock proteins (Hsps), understanding molecular mechanism of the disease, discovery & development of therapeutics for cancer, chip based platform for blood based detection of cancer, targeted drug delivery etc. Brief about the few cancer research activities is as below:-

(i) CSIR- CCMB has identified signatures for breast cancer and paediatric Acute Lymphoblastic Leukemia (ALL). Translation of these signatures to make a lab on chip based platform for developing blood based detection of these types of cancer is under progress;

(ii) **CSIR- IIIM is developing an anti-cancer drug code named IIIM-290 which possess potent cytotoxicity in leukemia and pancreatic cancer cells (IC50 < 1 µM). The regulatory safety pharmacology (IND-enabling studies) of the lead has been completed and the IND dossier is being submitted to the DCG (I) for seeking clinical trial approval;**

(iii) **CSIR- IMTECH has developed a novel engineered cell penetrating peptide (CPP) based photosensitizer protein that can be produced economically through usage of bacterial expression system. Targeted delivery of this protein has been found to cause light assisted killing of cancer cells only. The work is still at experimental stage; and**

(iv) **CSIR- IICT has established glucocorticoid receptor (GR) as a broad target for developing therapeutics against aggressive, drug resistant and relapsing cancer malignancies. The technology importantly showed the possibility to develop viable therapeutics for cancer patients with relapse and at terminal stages by the reuse of existing drugs.**

2. **Department of Biotechnology (DBT) has been supporting cancer research in an integrated way to develop new methods to prevent and treat disease and conducts research especially in challenging areas pertaining to different types of cancer; Breast Cancer, Cervical Cancer, Lung Cancer, Prostate Cancer, Oral Cancer, Retinoblastoma, Multiple Myeloma, Head & Neck Cancer, Myeloid Luekemia, Chronic Myeloid Luekemia and Ovarian Cancer etc.**

Over the past decade, DBT's funding in cancer research has yielded a vastly improved understanding of the cancer disease including some of the genetic and environmental factors and biological mechanisms that cause or contribute to cancer development, progression and spread, identification of biomarkers for India specific cancer types, diagnostics & therapeutics, and clinical trials.

The outcomes in the area of Oral Cancer, Acute Promyelocytic Leukemia (APL) and Anti-Cancer Nano medicine are as below:

(i) **DBT has funded the Indian participation in the International Cancer Genome Consortium for understanding genomic underpinnings of oral cancer, in which the Indian project was spearheaded by the**

National Institute of Biomedical Genomics National Institute of Biomedical Genomics (NIBMG - a DBT- funded institution);

(ii) NIBMG has identified 10 genes, mutations in which predispose to oral cancer and identified that there are distinct molecular genetic profiles that are predictive of survival after treatment;

(iii) Specific biological pathway has been identified, so that the repurposing of common drugs could be done for management of oral cancer in India;

(iv) One of the worst indications of oral cancer is if the cancer spreads to the lymph nodes near the oral cavity. Some success has been achieved in identification of molecular genetic patterns that could help to identify spread to the lymph node, technically known as lymph node metastasis;

(v) Established low cost effective care using arsenic trioxide (ATO) in acute promyelocytic leukemia (APL), and the same was instrumental in moving this therapy to front line therapy in the management of APL in the world;

(vi) Anti-Cancer Nano medicine: A novel protein Nano medicine platform technology for the oral delivery of chemo drugs for treating liver cancer and leukemia is being developed. Nanotechnology based Sorafenib capsules developed under this platform technology will give much better therapeutic effects at half-dose and will greatly reduce the toxicity effects and cost burden. Clinical trials are expected to started within next two years; and

(vii) Nanotechnology based Contrast Agent for Early Diagnosis: A novel biocompatible calcium phosphate based contrast agent has been developed, which can detect both liver tumor and cirrhotic nodule at very small size of <0.25cm. Clinical trials for this product are expected to start within next two years.

3. Drugs and Pharmaceuticals Research Programme (DPRP) under DST has supported "National facility on community based cancer tissue bio bank for drug targets" at Indian Institute of Technology, Chennai to carry out research on identification of tumor specific biomarkers for early detection, development of polymer based drug delivery system. The research carried out under this project is as below:

(i) More than 3000 cancer tissue samples and blood samples with patient information has been collected;

(ii) Whole genome exome and transcriptome sequencing for 250 breast cancer tissue samples and identification of specific markers for Indian breast cancer patients;

(iii) Whole genome transcriptome for 120 oral cancers samples were completed and biomarkers for Indian oral cancer patients using proteomics have been identified;

(iv) The facility is in the process of establishing India's specific breast cancer genome data base; and

(v) Whole genome transcriptome sequencing was performed for 30 Biliary atresia (liver problem in infants) samples and identified specific gene signature for Biliary atresia to understand the treatment outcome.

4. Indian Council of Medical Research (ICMR) has been undertaking the following multi-disciplinary research on various aspects of cancer:

(i) The data generated under National Cancer Registry Program (NCRP) formed the basis that only one type of cancer i.e. cervical cancer, has shown decline over the years;

(ii) ICMR-National Institute of Cancer Prevention and Research (NICPR) developed the screening modules for oral, breast and cervical cancers for the National program;

(iii) ICMR has formulated the Guidelines for management of 13 cancers (including breast, cervix, lung, tongue, oral, lymphomas, etc) and the same are available in public domain;

(iv) Pattern of care and survival studies on cervical, breast and head and neck cancers has been completed by ICMR-National Centre for Disease Informatics and Research (NCDIR); and

(v) HPV vaccine indigenous strains have been identified by ICMR.

5. Department of Atomic Energy (DAE) contributions and ongoing activities in the area of cancer research are as below:

(i) Human Papilloma Virus (HPV) Vaccine trial of two dose versus three dose of indigenously developed vaccine is being conducted

by Serum Institute Pune in collaboration with Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram;

(ii) The mutational landscape of gingivobuccal cancers unraveled by NIBMG and Advanced Centre Treatment, Research and Education in Cancer (ACTREC);

(iii) Dendritic cell vaccine for cervix cancer developed by National Institute of Immunology (NII) and Adyar Cancer Institute, Chennai are under clinical trials;

(iv) Diagnostic test for molecular classification of medulloblastomas based on miRNA profiling was developed at Tata Memorial Centre (TMC), Mumbai, and introduced into routine clinical practice;

(v) Animal model of graft versus host disease (GVHD) and radiation induced pneumonitis was established and drugs in preclinical development are being tested in collaboration with Bhaba Atomic Research Centre (BARC);

(vi) The National Cancer Grid, an initiative of TMC, Mumbai, a network of major cancer centres, research institutes, patient groups and charitable institutions across India with the mandate of establishing uniform standards of patient care for prevention, diagnosis, and treatment of cancer, providing specialized training and education in oncology and facilitating collaborative basic, translational and clinical research in cancer has been established; and

(vii) Practice changing Clinical trial in patients with early-stage oral squamous-cell cancer showed that elective neck dissection resulted in higher rates of overall and disease-free survival than did therapeutic neck dissection.

6. The Research Councils i.e. Central Council for Research in Ayurvedic Science (CCRAS)/ Central Council for Research in Unani Medicine (CCRUM)/ Central Council for Research in Homoeopathy (CCRH) and Central Council for Research in Siddha (CCRS) under the Ministry of AYUSH have been undertaking the following research activities on cancer:

(i) CCRAS has developed of a coded drug AYUSH QOL-2C for improving the quality of life in cancer patients. The clinical studies were conducted at St. John's Medical College, Bengaluru and All

India Institute of Medical Science (AIIMS), New Delhi on breast cancer patients and at Bhagwan Mahaveer Cancer Hospital and Research Centre, Jaipur in lung cancer patients;

(ii) CCRH has studied the role of homoeopathic medicines in cancer regression and rejuvenation of depressed immune system;

(iii) The study concluded that homoeopathic medicines act through P53 gene and induces apoptosis (cell death) and have immuno-modulatory effect;

(iv) CCRH has evaluated the role of homoeopathy on side effects of chemotherapy in cancer patients, at Kolkata;

(v) The results indicated that homoeopathy play an important role in preventing/minimize the side effects/complications and management during and after surgery, radiation, chemotherapy by strengthening the immune system; and

(vi) Delineating the anti-cancer potential and the mechanism of action of Unani medicinal formulation Itrifal-e-aftimoon in Chronic Myelogenous Leukemia is under study with AIIMS, New Delhi.

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