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TIME BOUND
PARLIAMENT QUESTION

Sub: Request for inputs i.r.o Lok Sabha admitted Unstarred Question No. 2134 (Dy. No. 6644) for 29.07.2022 regarding "Super Speciality Cancer Institute in Khandwa"-reg.

Point-wise inputs submitted by Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum (SCTIMST).

(a) **Whether any research has been conducted by the Government on the causes of increasing cancer disease in the country;**

Yes, Cancer related R&D Activities are being carried out in the Biomedical Technology Wing of SCTIMST.

(b) **If so, the details thereof;**

Cancer related R&D activities carried out in the Division of Biophotonics and Imaging Division of Department of Biomaterials Science and Technology, Bomedical Technology Wing, SCTIMST.

Cancer diagnosis/Theranostics

1. Developed a prototype for the detection of circulating tumor cells from the blood for the diagnosis and prognosis of metastatic breast cancer (*ACS Sustainable Chem. Eng.* 2021, 9, 46, 15496–15505)
2. Graphene-gold nanomaterials with cancer target ability and cancer site specific release of drugs have been developed for the simultaneous diagnosis and therapy of cancer (Theranostic agents) using multiple models to increase the efficiency (*ACS Appl. Bio Mater.* 2021, 4, 7, 5742–5752, *Biomaterials Science*, 2020, 8 (12), 3381-3391)
3. Several iron based nano formulations have been developed for MRI imaging of cancer and therapy by magnetic hyperthermia (Patent No. 80/CHE/2012, 09/01/2012)(*Sci Rep* 11, 18324 (2021).
4. Near infrared emitting few atom gold cluster with photoporphyrin IV is 60% more efficient than the FDA approved photoporphyrin for photodynamic therapy of cancer (*ACS Nano*, 2015, 9, 5825–5832)
5. Quantum dots and carbon nanotube were used to image cancer cells and treat using the technique of photothermal therapy(*Small* 2014, 10, 2771–2775)
6. Luminescent Gold Nanorod conjugated with Photosensitizer developed for Targeted Cancer Imaging and Dual therapy (*Chem.: Eur. J.*, 26, 2826–2836) (*Faraday Discuss.*, 2018, 207, 423-435).
7. Red fluorescent gold nanoclusters designed for its entry through blood brain barrier for brain imaging and drug release for brain tumors (*J. Mater. Chem. B*, 2017, 5, 8314-8321)
8. Fractal analysis of MRI images developed for differentiating the grades of glioma (*Phys Med Biol.* 2015, 60, 6937-47).
9. Relative percentage signal intensity recovery of perfusion metrics as an efficient tool for differentiating grades of glioma. (*Br J Radiol* 2015, 88, 20140784)
10. Fluorescence spectroscopy to discriminate neoplastic human brain lesions (*Laser Phys.*, 2014, 24, 025602)

(c) *Whether US-like technology is being utilized in the country for the treatment of cancer disease;*

At the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum and a host of medical Institutions run by the Government of India, state of the art technology is being used to treat cancers of the brain.

These include high resolution MRI scans, CT scans to diagnose the cancers affecting the brain and spine, anesthesia including awake anesthetic techniques to reduce surgical damage of brain around a tumor, operating rooms equipped with microscopes, endoscopes and machinery for stimulating the brain for finding safe surgical corridors, intra-operative ultrasound systems, neuro-navigation systems, bone-drills to access the brain inside the skull etc. Also the strong intensive care resources we have including ventilators are a reason for great scientific and national pride.

We have trained neurosurgeons, anesthetists, intensivists, nursing and rehabilitative personnel required in addressing the uphill task of postoperative care of patients subjected to surgeries for brain cancers and associated conditions.

The follow up treatment of brain-cancers with radiation and chemotherapeutic strategies are indeed available across the country.

Our attempts to prolong life by using the technology has found great respect and relevance to India and we stand tall among the fraternity of health personnel as we deliver sophisticated care for patients subjected to surgeries for cancers of the brain and spinal cord.

Current projects on brain tumors:

One of the areas where we have made some good strides is the research into genesis and treatment of cancers of the brain.

Our research includes the following:

1. Understanding the effects of shock waves on meningiomas, tumours that arise from the protective layers of the brain.
2. Recent research efforts on brain cancers to find the signals that lead to uncontrolled cell multiplication and genesis of cancers of the brain

a.b. Bhavya Bharathan, H V Easwer, George C Vilanilam, Sreelakshmi K, Anand CR, Madhusoodanan UK, Leena Issac, Padmakrishnan CJ, Girish R Menon, Krishnakumar K, Rajalakshmi, Deepti AN, Srinivas Gopala, MutT Homolog 1 has multifaceted role in glioma and is under the apparent orchestration by Hypoxia Inducible Factor1 alpha., **Life Sciences**, 2021, 264:

c. Padmakrishnan CJ, Easwer HV, Girish Menon R, Krishna Kumar K, Suresh Nair, Bhavya Bharathan, Neelima Radhakrishnan and Srinivas Gopala, In vitro neurosphere formation correlates with poor survival in glioma, **IUBMB Life**, 2019, 71: 244-253

d. Padmakrishnan CJ, Easwer HV, Vinod Vijayakurup, Girish Menon R, Suresh Nair, Srinivas Gopala, High LC3/Beclin expression correlates with poor survival in glioma: a definitive role for autophagy as evidenced by, **Pathology Oncology Research**, 2017.

Bhavya Bharathan, Anand CR, Madhusoodanan UK, Rajalakshmi P, Krishnakumar K, H V Easwer, Deepti AN, Srinivas Gopala. , To be Wild or Mutant: Role of Isocitrate Dehydrogenase 1 and 2-Hydroxy Glutarate in Gliomagenesis and Treatment Outcome in Glioma., **Cellular and Molecular Neurobiology**, 2020, 40: 53-63.

3. Research in the area of pituitary tumours has focussed on clinical and basic research. Basic research projects include a study looking into “real time assessment of shift of ICA during extended endoscopic skull base surgery using intraoperative doppler and the role of tumour consistency in causing ICA displacement which has been funded by SERB (DST) for Rs 18.6 Lakhs.

Research looking into the development of the skullbase in children using CT scan images was published in Neurology India, we are looking into the anatomy of the internal carotid artery in the paediatric population using CT angiogram images.

The outcomes of patients undergoing endoscopic resection of skull base lesions is being studied to assess the impact of the procedure on the quality of life and surgical outcomes using various questionnaires.

We have completed studying the role of copeptin in the sodium homeostasis following endonasal resection of pituitary tumours. The study shows the utility of serum copeptin levels in predicting post-operative hyponatremia as well as post-operative hypernatremia following pituitary surgery.

A study of landscape of genomic alterations in pituitary adenomas and their clinical manifestations is being initiated to understand the genomic alterations that determine the clinical behaviour of pituitary adenomas.

The clinical research is focused at understanding the outcomes of surgical interventions, we have completed a study on the surgical outcomes in large pituitary adenomas using extended endoscopic approaches. Our experience with pituitary adenomas extending into the third ventricle was published in World Neurosurgery.

We have described endoscopic endonasal resection of a ventral exophytic brainstem glioma which is one of the first time this procedure has been reported. Currently undergoing research is also looking into the surgical results of endoscopic endonasal surgery for craniopharyngioma. We also propose to study the genomic profile of craniopharyngiomas to identify genomic markers that may predict clinical behavior.

- (d) If so, the details thereof and if not, the reasons therefore;**

Not applicable

- (e) Whether there is any proposal with the Government to set up a Super Speciality Cancer Institute in Khandwa Parliamentary Constituency for the convenience of the Tribal Community; and**

Not applicable

- (f) If so, the details thereof?**

Not applicable

Date: 27.07.2022




DIRECTOR

27/7/2022