

Cancer diagnosis in seconds

Pics: Dharmendra Khatke

RRCAT's Device Was Put To Clinical Use For The First Time

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Indore: Raja Ramanna Centre for Advanced Technology's (RRCAT) indigenous compact diagnostic tool for cancer was put to clinical use for the first time ever to detect cervical cancer among patients at a local hospital on Saturday.

The compact light emitting diode (LED) based optical spectroscopic diagnostic system, that can run from the USB port of a laptop computer, was also used to examine patients for oral cancer during a camp organised by Shanti Avedna Trust at Mahaveer Nursing Home and Research Centre.

RRCAT laser biomedical applications section head, Dr Shovan K Majumder, told TOI that the compact diagnostic tool has the potential to be a standalone automated tool for scree-

CAMP HELD AT LOCAL HOSPITAL IN CITY

ning people at risk of cervical or oral cancer in remote areas. "The tool was used for the very first time to detect cervical cancer in clinical settings on Saturday," Majumder said.

The method involves putting a fiber optic probe in contact with the suspected site into the patient's mouth or cervix, he said. Majumder added that the equipment attached to it reads the acquired spectra and gives the result on the computer's screen in real time. Majumder said that unlike biopsy results, that are qualitative and subjective as the results are interpreted looking at tissue slides, this diagnostic tool provides a quantitative diagnosis. The incidence of cervical and oral cancer is very high in India

'Revolutionary tech, results highly precise'

Indore: The fear of going under the knife for a painful biopsy test for suspected oral cancer brought a 70-year-old man with mouth ulcers to the cancer detection camp on Saturday.

The doctors put a probe in his mouth, and in real time the test results were out. Unfortunately, he was already in the third stage of oral cancer.

Oncologist Dr SS Nayyar said, "It took only five minutes to examine the patient. Now the treatment can be immediately started."

Senior oncologists termed it as a revolutionary technique towards getting nearer to real time results with high accuracy. He said the cost of a biopsy test is between Rs 5,000 and Rs 6,000. While it takes a whole day to complete the procedure, the report takes around three days. "The new sy-

TECH SOLUTION WAS YEARS IN THE MAKING

► Research and development for the early diagnosis of cancer through the optical spectroscopic diagnostic system was started at RRCAT back in the early 1990s

► First prototype system developed for in-vivo studies was a trolley-based setup

► In order to facilitate the use of the spectroscopic system by a hospital technician, it was necessary to automate and simplify each aspect of the spectral measurements in addition to the data analysis

► With that objective in mind, RRCAT recently developed an LED based, USB powered, compact and portable diagnostic system that was capable of giving automated diagnostic feedback

► The spectroscopic system is capable of sequentially acquiring fluorescence & diffuse reflectance signatures from a target tissue

► A graphic user interface software has been developed to provide necessary interface for the hardware control of the whole system and automation of data acquisition

► It controls the spectrometer, its synchronization with the electrical signal generated by the IC-based hardware system and sequential switching of the respective excitation LEDs

► An advantage of the software is that it can deliver online probabilistic diagnosis of the tissue site, based on an instant analysis of the spectra being acquired thereof



Doctor conducts check-up of a patient at the cancer camp at Footi Khothi road on Saturday

and is on the rise due to various factors. While the five-year survival rate for early stages of cancer is more than 80% it drops to about 20% in the late stage, emphasising the need for early diagnosis.

At present, the only definitive method for determining cancer is through histopathological examinations of the biopsied tissue from the suspected site. Biopsy is costly and invasive, subject to random sampling errors and is therefore not an ideal screening tool.

The transformation of tissue from a normal to malignant state results in several biochemical and morphological changes which can be sensitively monitored by optical spectroscopic techniques.

The use of optical spectroscopy for noninvasive screening of cancer is being actively pursued globally, said Dr Majumder. The LED based system was validated at Tata memorial Hospital, Mumbai. Two units of the system have recently been given to Raman Foundation Cancer Hospital and Research Centre, Indore.

With new system, patients will not need painful biopsy



TIMES NEWS NETWORK

Q & A

Dr Shovan K Majumder
sr scientist, RRCAT

■ How did you get the idea to invent this device?

We are aware that we can see an object after light reflects off it and reaches our eyes. Our brain deciphers the information in order to create the image.

We used the exact formula in developing an LED-based, USB powered compact and portable diagnostic system capable of providing automated diagnostic feedback.

■ How does it work?

The light reflected from tissues is deciphered by the diagnostic tool attached to a laptop, through specially designed software. There is an observed difference in the fluorescence from normal and malignant sites. The difference in the fluorescence enables the tool to differentiate between the normal and cancerous tissue.



The new system by which cancer can be detected is USB powered

■ What are the advantages of this method of detection?

The detection of cancerous tissue is fast and is near to real time. Patients don't have to opt for costly and painful biopsy tests to detect cancer. The compact nature of the diagnostic tool will help in carrying it to remote areas to conduct tests and reach a wider audience.

■ What is the present status of this invention?

The diagnostic system is on clinical trial at different hospitals to bu-

ild the data base of pre-cancerous and early cancer lesions.

■ What is the local administration's say on this invention?

The clinical trial is underway. We are receiving feedback from doctors and patients who used this device. Once these procedures are complete, we will approach the administration to use the device at a large scale to benefit people.

(Dr Majumder leads the optical spectroscopy and imaging by bio medical diagnosis at RRCAT)

CERVICAL CANCER

► Cervical cancer is ranked as the most frequent cancer in women in India

► India has approximately 365.71 million women above 15 years of age, who are at risk of developing cervical cancer

► Current estimates indicate approximately 132,000 new cases

diagnosed and 74,000 deaths annually in India, accounting to nearly 1/3rd of the global cervical cancer deaths

► At any given time, about 6.6% of women in the general population are estimated to harbour cervical human papilloma virus (HPV) infection

(SOURCE: Search Results Indian Journal of Medical and Paediatric Oncology)

ORAL CANCER

► Oral cancer is most common cancer in India amongst men (11.28% of all cancers), fifth most frequently occurring cancer amongst women (4.3% of all cancers) and the third most frequently occurring cancer in India amongst both men and women

► Around 80% of oral cancers are directly attributable to tobacco use

► The mean age of oral cancer is 50 years

► Rates for oral cancer among males are significantly higher than females and these rates increase with age

► Survival rate (5-year) - Patients with early stage oral cancer: 82%; Patients with advanced stages: 27%

(SOURCE: National Cancer Registry Programme)

“The device is very helpful to get close to real time results. When it comes to accuracy, the results are nearly comparable to histopathology

Dr SS Nayyar | ONCOLOGIST

stem is painless. Besides, people who were examined at the camp didn't have to wait. No one was hospitalised and there were no examination costs," Dr Naiyyar said. "While examining patients for oral cancer, we switch off the lights and ensure the room was dark as any light could disturb the procedure," he added. Out of 18 people examined, the doctor found 4 people with symptoms of the oral cancer. TNN