DETECTION & DIAGNOSIS OF MALIGNANCY BY SYNCHRONOU LUMINESCENCE SPECTROSCOPY

PRIYA S. DEOLE,

Dept. Of Physics, G. S. Tompe College, chandur Bazar, Dist, Amravati. (M.S.), India.

drpriyadeole@gmail.com.

Nachiket S. Deole,

Dept. Of Engineering Sciences and Humanities, Savitribai Phule University,Pune, India

nachiket.deole18@vit.edu.

Manasi V. Ghamande,

Dept. Of Engineering Sciences and Humanities, Savitribai Phule University,Pune, India.

manasi.ghamande@vit.edu.

Abstract

There are a lot of diseases in the world. Out of these some diseases are dreadful. Cancer is also one of the most dreadful diseases in India. It is one of the major causes of mortality in human being. Early diagnosis can increase the survival rate. Hence every researcher & clinician is concerned about its treatment. The genes which are responsible for uncontrollable growth of cell in the human body are known as oncogenes. A general method to diagnose a cancer is Biopsy, FNAC, Pop smear etc. But all these traditional methods are painful & required more time. In present work several samples of cancers were collected for the study, In the pathological laboratory the tissue from the Human were sliced and slides were prepared. The tumor cells usually resemble one another but they are often quite unlike the normal adult cell from which they spring.

KEY WORDS: Tumor, Cancer, Biopsy, FNAC, Pop smear oncogenes.

INTRODUCTION

The Synchronous Luminescence Spectroscopy is successfully employed by Vo-Dinh in 1981 for the study of the cancer cells in the human tissues. This system is widely used for the analysis of multi-component system. In this system the fluorescence signal is recorded by simultaneously scanning both excitation and emission wavelength. Since it takes the advantages of both the absorption as well as excitation properties of a given compound, it leads to considerable simplification in the fluorescence

spectral profile. The SL spectra reveal a more resolved structure from a composite system in contrast to generally featureless and broadband appearance of the conventional fluorescence spectra.

Sample Preparation

We have collected a part of the malignant tissue as well as some part of the non- malignant tissue from the neighboring portion of the malignant portion of different organs of human body. All the samples are collected from the hospitals in Aurangabad, Amravati (M.S) and Indore (M.P.). The collected samples are from the patients of different ages. The samples were collected with the help of doctors. The collected samples are cleaned and blood was completely removed using distilled water. The samples were confirmed histo-pathologically. After performing surgical operation, the samples were preserved in icebox immediately to carry to laboratory for recording synchronous luminescence spectra of these tissues.

Results and Discussion

The synchronous luminescence spectra of many cancer tissues have been recorded using SPEX, USA Fluorolog-II spectro-fluorometer and all the spectra recorded by us exhibit novel structure difference. The number of peaks observed in the spectra and intensity of peaks differ from tissue to tissue.

The SL spectra of all the samples were recorded by simultaneously scanning both the emission and excitation wavelengths with a fixed interval between them and the emission was scanned in the 250-700 nm range. The SL spectra from Breast &Buccal Mucosa cancerous samples and corresponding normal samples are shown in figures 1& 2.

Difference in the spectra may arise due to biochemical or morphological changes between the tissue types. In all the spectra the peak around 295 nm is due to amino acid mainly the tyrosine emission. The peak around 350 nm is due to tryptophan and structural proteins. The broadband around 460 nm may be due to the presence of pyrodixal phosphate, carotenes and lipo-pigments which is observed in some samples. Few samples show the fine structure in the wavelength range 450-500nm which is due to stray xenon light reaching the exit slit of the excitation monochromator. There can be contribution from NADH to the total intensity around 430 nm. The peak around 510 nm is due to FAD or Flavin.

Figures:

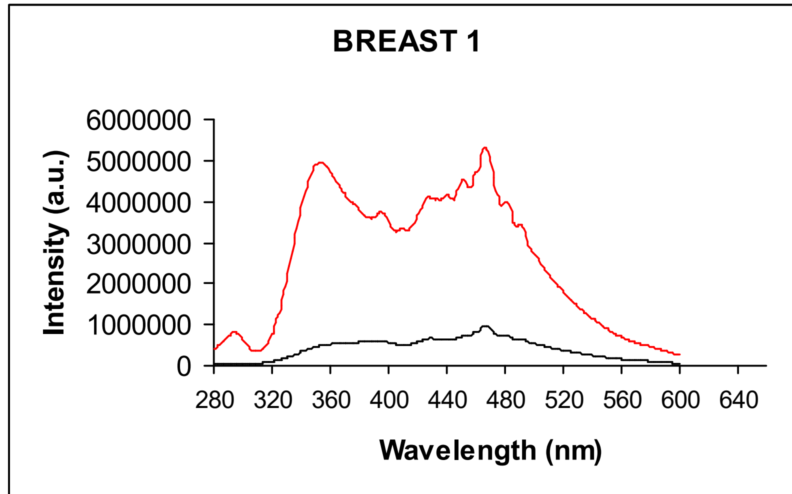

Figure 1: SL spectra of cancer and normal tissue of Breast 1 cancer.

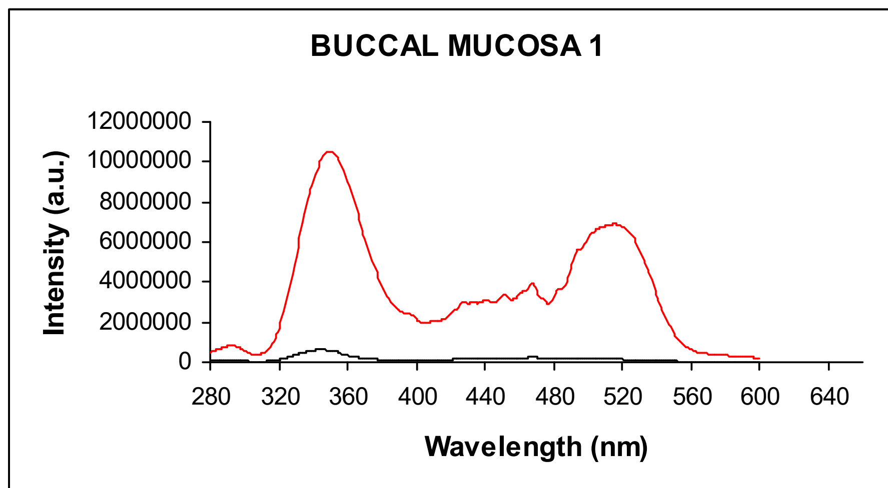

Figure 2: SL spectra of cancer and normal tissue of B. Mucosa 1 cancer.

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Conclusions

It is observed that the SL spectra provide a more efficient tool for the characterizing a highly heterogeneous media like tissues. All the SL spectra show that the intensity of cancerous tissues is more than the normal tissue.

From the study of SLS it is clear that there is increasing in the emission of NADH and Flavin as the tissue progresses from normal to malignant on the other hand the emission of tryptophan, tyrosine, collagen and elastin decreases as the normal tissues are transformed in to malignant. The information with regard to all the key fluorophores present in the tissues can be analyzed in a single SL spectrum.

From the statistical analysis it is observed that SLS technique achieved better classification accuracy than that of conventional spectroscopy.

It is obvious that SL spectra can give more information than emission spectrum at single excitation wavelength and absorption spectrum at various wavelengths and therefore it can be used as a more efficient tool for the early diagnosis of cancer.

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