BIOPHYSICAL INVESTIGATIONS ON BLOOD OF CANCER PATIENTS

ABSTRACT

The present investigation of the thesis concentrates on the biophysical parameters of laser diffraction, viscosity, surface tension, volume flow rate, and pH, and refractive index, electrical conductivity of blood of various types of cancer patients before and after completion of the radiation treatment along with a few normal humans. The dielectric nature of cancerous erythrocytes as well as healthy persons is also studied.

Cancer cells are different from normal cells in some aspects. They penetrate and infiltrate into the adjoining tissues and dislocate their functions. They infiltrate the body through the fluid connective tissue – blood. It provides one of the methods of communication between the cells of different parts of the body.

In this thesis a study has been done on conceptual points on cancer such as types of cancer, histology and pathology of cancer, biochemistry of cancer, radiation effects on cancer, treatment of cancer-physical approach, chemical approach, and surgical approach. It includes literature survey on pathological, biochemical, histological and radiation aspects of cancer.
The cells, whether, normal or cancerous, are possessed with natural, intrinsic oscillating electric fields. Cells killed by radiation, do not spin when subjected to high frequency electric fields, A.C or pulsed D.C. An effort is made to study theoretical aspects of cellular oscillations, theoretical models on cancer, radiation dose & dosimetry and target theory.

When the cancer cells are subjected to radiation it may result in the damage to DNA, which is the critical target in the cell. Any form of radiation, either x or gamma rays, charged or uncharged particles, is absorbed in biological material and will directly interact with DNA and ends up with biological change which may reflect in the biological medium like blood, hence the different clinical and biophysical parameters of blood are taken up for the investigation.

For the above investigation, samples from different types of cancer patients are collected and their measurements of hemoglobin content, ESR, RBC, WBC, platelet counts, pH, size of erythrocytes by laser diffraction, viscometric studies such as viscosity, surface tension and volume flow rate, refractive index, electrical conductivity and dielectrophoresis of erythrocytes are done along with blood of normal persons. The measurements related to the above mentioned factors on different types and stages of cancer patients pre and post treatment were taken.
The results of the above investigations are presented in the form of tables. Conclusions are drawn based on the different experimental data obtained and the data is presented in form of bar graphs for clear analysis. This research also enabled us to examine whether there are any adverse effects of the ionizing radiations on blood so as to take necessary remedial steps. The biophysical parameters such as viscosity and electrical conductivity rule out the effects of ionizing radiation on the blood. Because the results of viscosity and electrical conductivity prove that the composition of blood has not changed even after high dose of radiation or else the blood may coagulate and cause cardiovascular problems to the patient.

Finally according to the observations drawn from the data collected from normal and cancer patients, it is concluded and verified that biophysical examinations can be complimentary to biochemical approach in the diagnostic process.

It may also be concluded that blood and its parameters form the most important fluid connective tissue of the body, that indicates any change whatsoever that occurs in the blood. This may be a very important pathway for the diagnostic measures which may help in identification and treatment procedures.