ANALYSIS OF PATIENT INTEGRAL RADIATION DOSE USING IONIZATION CHAMBER AND THERMOLUMINESCENCE DOSIMETER FOR EXTERNAL BEAM RADIATION THERAPY

A PROJECT REPORT PRESENTED BY

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to the Board of Study in Physics of the

POSTGRADUATE INSTITUTE OF SCIENCE

in partial fulfillment of the requirement
for the award of the degree of

MASTER OF SCIENCE IN MEDICAL PHYSICS

of the

UNIVERSITY OF PERADENIYA
SRI LANKA
2009

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In radiation therapy, the beam of radiation enters the patient, energy is absorbed not only in the tumour region, but also in the adjacent locations that are exposed to the radiation. The total energy absorbed from the beam by a patient is known as "the energy imparted" and is defined as "Integral Dose". The energy imparted to a mass of the tissues is named, "the total energy imparted". It is the product of mass of the tissues and the dose it receives.

In this project, Ion-Chamber Electrometer system and TLD (Thermo Luminescence Dosimeter) chips were used experimentally to determine the integral dose. As test case, a group of Ca-Rectum and Ca-Cervix patients who are undergoing treatment by Co-60 radioisotope were taken. The particular reason for selecting both these types of cancer patients was, that they were irradiated with large fields and high dose of radiation. Furthermore Mayneord theories have shown that there was no advantage in finding out the energy imparted when irradiated by small doses and fields.

A patient was prepared for normal treatment procedure and pencil-Ion Chamber was placed in the mid point of the treatment field with the build-up cap. The Ion Chamber was connected with Unidose Electrometer. The Electrometer reading was recorded when the patient was irradiated.

This method was used to obtain Entrance Dose, and after 180 degree rotate of the treatment machine head, next reading was taken for posterior irradiation, which was called Exit Dose. Same strategy was followed for the TLD exposure too.

Energy Imparted was estimated using experimental method and Mayneord (M11) theories. However, results obtained from the experiment were slightly lower than the theoretical values. Therefore a Water Phantom was exposed to the Gamma Radiation with same conditions to simulate the patient. The experimental findings for the patients were agreeable with the results obtained from the studies done on the Water Phantom. Therefore, in the case of Ca-Rectum and Ca-Cervix treatments, typically patients have absorbed 27% to 30% Joules of energy in a single treatment session.

It can be clearly seen that this experiment method can be utilized effectively to obtain Energy Imparted in other Cancer treatments and could be used to get a clear perception about their Integral Doses. On the other hand if this method is adapted further, a patient's dose calculation and amount of delivered too can be cross checked. In addition this could be extended as a vivo dosimetry method. If a follow-up study is done, the further treatment can be adjusted much favorably for the patients. Also this could be led to positive developments in treatment of Carcinomic Diseases.