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**PROPOSED REGIMES FOR HIGH DOSE RATE (HDR) TREATMENTS  
FOR CANCER OF THE CERVIX BASED ON  
LINEAR QUADRATIC MODEL**

A PROJECT REPORT PRESENTED

BY

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**ABSTRACT**

Title of the report : Proposed Regimes for High Dose Rate (HDR) treatments for Cancer of the Cervix based on Linear Quadratic Model

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The Linear quadratic (LQ) dose effect formalism is currently providing a new perspectives into the ways in which alteration in the treatment regimes in radiotherapy may be used to bring about improved results with respect to early or late normal tissue reactions. In this report LQ equations are used to obtain a suitable treatment regime in the treatment of Gynecological cancers using the HDR technique.

Using the LQ formalism, mathematical expression for Biological Effective Doses (BED) were obtained for fractionated and protracted treatments. By using this equations, BED's of External Beam Therapy(EBT), Low Dose Rate (LDR) and High Dose Rate (HDR) brachytherapy treatments were calculated . The tumor and normal tissue  $\alpha/\beta$  ratio were assumed as 10 Gy and 3 Gy respectively.

The aim was to keep the biological effect of EBT and HDR intracavitary insertion in the same ratio as used with EBT and LDR. This means keeping the same EBT scheme and finding HDR doses for different fraction numbers (N= 2,3,4,5 ) which are biologically

equivalent to the LDR therapy. Four EBT protocols were selected and the BED's were calculated for the combination of EBT+LDR & EBT+HDR, used to give a physical dose of 90,80,70 Gy's to Point A. Results are used to estimate the %increase in normal tissue complication for HDR over LDR. Treatments regimes were selected when the normal tissue complication rate is less than 5%. On this basis 600 cGy in three fractions can be used as the HDR brachytherapy dose in conjunction with external beam therapy.

At present in our country the cancer institute where I am attached to is the only institute that treats the patients with the remote after loading HDR brachytherapy. The purpose of this study is to obtain a treatment regime for the carcinoma of the cervix to my institute so as to deliver the necessary dose for tumor control with normal tissue complication reduced to acceptable limits with few fractions of HDR brachytherapy dose. The selected regime of 600 cGy in three fractions may help us to reduce the late complications and will help the patients to undergo the intracavitary treatment within the given period after the completion of external beam therapy.