AbstractID: 10342 Title: The Impact of Prolonged Fraction Delivery Time in Advanced Radiotherapy Techniques on Cell Survival and DNA Damage

Purpose: Currently, the advanced radiotherapy techniques such as Stereotactic radiotherapy (SRT) and Intensity modulated radiotherapy (IMRT) have been implemented in radiotherapy centers to improve the efficiency of cancer treatment. Due to their complexity, these techniques require the longer fraction delivery time comparing to conventional technique. This study aimed to prove a hypothesis that prolonged treatment time had a significant impact on cell sterilizing effect due to an increasing in DNA damage repair. **Method and Materials:** HeLa cells were irradiated by 6 MV linear accelerator using 3 different protocols simulated the advanced radiotherapy techniques. The absorbed dose of 200 cGy were given in 15, 30 and 45 min. Colony formation assay was used to determine cell survival while DNA damages were detected by Comet assay. The results were then compared to that of conventional technique with 5 min delivery time and analyzed by student T-test. The Linear-Quadratic model with α/β ratio and repair half-time taken into account was used to calculate the dose compensating for prolonged time. **Results:** It revealed that, the relative percentage DNA in tail of cervical cancer cell line observed in comet assay were significantly decreased to 0.724 – 0.905 ($p < 0.05$) while relative surviving fraction increased to 1.02 – 1.17 to that of conventional technique. Although the surviving fraction tended to increase with increasing delivery time, only the surviving fraction at 30 min delivery time was statistical different. The absorbed dose of 204 cGy calculated by LQ model should be used to compensate for this impact.
Conclusions: Prolonging treatment time allowed sublethal damage repair to take place during irradiation demonstrated by decreasing in DNA damage and subsequently increasing in cell survival. Therefore, biological effective dose should be compensated in advanced radiotherapy techniques which delivery time longer or close to repair half-time of tumor cell.