

## Dosimetric Comparison of Conventional Plans versus Three Dimensional Conformal Simultaneously Integrated Boost Plans

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**Abstract :** Radiotherapy plays an important role in the management of cancer patients. Approximately 50% of the cancer patients receive radiotherapy at one point or another during the course of treatment. The entire radiotherapy treatment of curative intent is divided into different phases, depending on the histology of the tumor. The established protocols are useful in deciding the total dose, fraction size, and numbers of phases. The objective of this study was to evaluate the dosimetric differences between the conventional treatment protocols and the three-dimensional conformal simultaneously integrated boost (SIB) plans for three different tumors sites (i.e. bladder, breast, and brain). A total of 30 patients with brain, breast and bladder cancers were selected in this retrospective study. All the patients were CT simulated initially. The primary physician contoured PTV1 and PTV2 in the axial slices. The conventional doses prescribed for brain and breast is 60Gy/30 fractions, and 64.8Gy/36 fractions for bladder treatment. For the SIB plans biological effective doses (BED) were calculated for 25 fractions. The two conventional (Phase I and Phase II) and a single SIB plan for each patient were generated on Eclipse™ treatment planning system. Treatment plans were compared and analyzed for coverage index, conformity index, homogeneity index, dose gradient and organs at risk doses. In both plans 95% of PTV volume received a minimum of 95% of the prescribe dose. Dose deviation in the optic chiasm was found to be less than 0.5%. There is no significant difference in lung V20 and heart V30 in the breast plans. In the rectum plans V75%, V50% and V25% were found to be less than 1.2% different. Deviation in the tumor coverage, conformity and homogeneity indices were found to be less than 1%. SIB plans with three dimensional conformal radiotherapy technique reduce the overall treatment time without compromising the target coverage and without increasing dose to the organs at risk. The higher dose per fraction may increase the late effects to some extent. Further studies are required to evaluate the late effects with the intention of standardizing the SIB technique for practical implementation.

**Keywords :** coverage index, conformity index, dose gradient, homogeneity index, simultaneously integrated boost

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