Purpose: Different fractionation schemas are used for the treatment of prostate with IMRT. Due to the low α/β of prostate hypofractionated schemas are achieving more importance. The purpose of this study is to compare two IMRT techniques from a radiobiological point of view in the treatment of high risk prostate cancer, the sequential IMRT technique (SIMRT) and a simultaneous integrated boost IMRT treatment (SIBIMRT).

Methods: 20 patients were selected and planned using both treatment strategies to give an EQD2 of 82 Gy to prostate, 70 Gy to vesicles and 46 Gy to lymph nodes, using the linear quadratic model LQ supposing an α/β prostate=1.5 Gy. Dose volume histograms of prostate, rectum and bladder were calculated. Tumour Control Probabilities (TCP) and Normal Tissue Complication Probabilities (NTCP) were also calculated. As the prostate α/β is not known exactly the TCP has been calculated for different a/bprostate values ranging from 1.5 to 10 Gy. NTCPs of bladder and rectum were calculated also for a/oar values ranging between 1 to 15 Gy.

Results: Both treatment strategies were found to be equivalent in terms of prostate ptv TCP and EQD2 for low α/β prostate=1.5 Gy. In the case of high α/β prostate values, 3 Gy and 10 Gy, EQD2 and TCP for prostate ptv are lower for the SIBIMRT technique. For rectum and bladder, if a/oar ranges between 2 and 15 Gy EQD2 values are higher for the SIMRT treatment schema. NTCP for bladder and rectum is higher for the SIMRT technique when α/β OAR >= 2-3 Gy.

Conclusions: In this study a comparison between two treatments strategies have been done. Our results show that a hypofractionated technique for high risk prostate cancer reduces, or equals, EQD2 and NTCP for bladder and rectum while maintaining the TCP of prostate for the typical values in use.