

## EVALUATION OF CYBERKNIFE TREATMENT PLANNING FOR PROSTATE CANCER USING THE CONFORMAL INDEX AND THE TUMOR CONTROL PROBABILITY

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**Purpose :** This study was to evaluate the feasibility of dose conformity and tumor control probability calculated for CyberKnife<sup>®</sup> hypofractionated planning for prostate cancer.

**Materials and Methods :** Six patients with early prostate cancer were included in this retrospective study. They received stereotactic hypofractionation radiotherapy by CyberKnife<sup>®</sup>. The dose prescriptions were 37.5 Gy in 5 fractions, 42 Gy in 5 fractions, or 32 Gy in 4 fractions. Dose conformity was calculated with three parameters: the conformity index (*CI*), the new conformity index (*nCI*) and the modified conformal index (*mCOIN*). A statistical analysis of the tumor control probability (TCP) was also calculated.

**Results :** The *CI* and *nCI* of the CyberKnife<sup>®</sup> treatment planning system are all under 1.483. All the calculated TCP values were greater than 98.3%. We added the factors pertaining to the critical organ and obtained the *mCOINs*. The *mCOIN* values were listed to compare the quality of treatment plans.

**Conclusion :** The conformity index value can be used to evaluate the quality of radio-surgery planning. The *mCOIN* values are also feasible to compare the plans.

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Key words: Conformity index, Tumor control probability, Stereotactic radiosurgery, CyberKnife

### INTRODUCTION

Prostate cancer is a slow growing cancer. Recent reports of its low  $\alpha/\beta$  ratio lead to the interest of treating prostate cancer with a short hypofractionated radiotherapy course [2]. Stereotactic radiotherapy (SRT) offers a means

of delivering large radiation doses with high accuracy.

CyberKnife<sup>®</sup> (CK) is a frameless, image-guided robotic radiosurgical delivery system. Real-time imaging tracking for patient position provides correction for patient movement during treatment through the use of skeletal