Assessment of Radiation Dose Received by Prostate Cancer and Critical Organs in 2D and 3D Treatment Planning

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Presentation outline

- Introduction
- Objectives
- Materials and Methods
- Results
- Conclusions

Introduction

- The goal of radiotherapy treatment planning is to design a beam configuration which will deliver a homogeneous dose to the specified planning target volume (PTV),
- ensuring that normal tissue receives a reasonably low dose and that critical organs receive less than their tolerance doses.

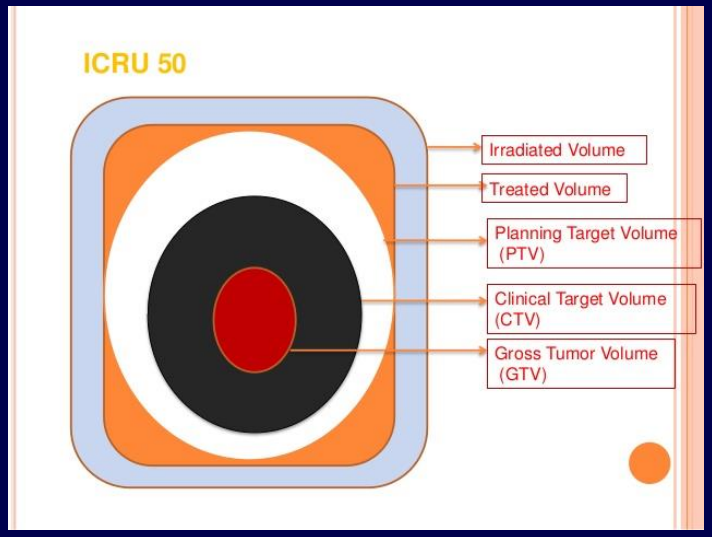
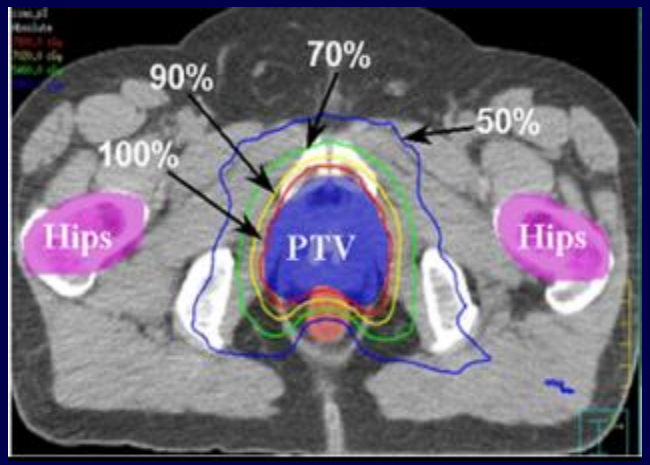


Figure 1: Treatment volumes

Objectives

- The purpose of this study was to compare between 2-dimensional and 3-dmensional techniques for external-beam radiation treatment for prostate cancer.

A



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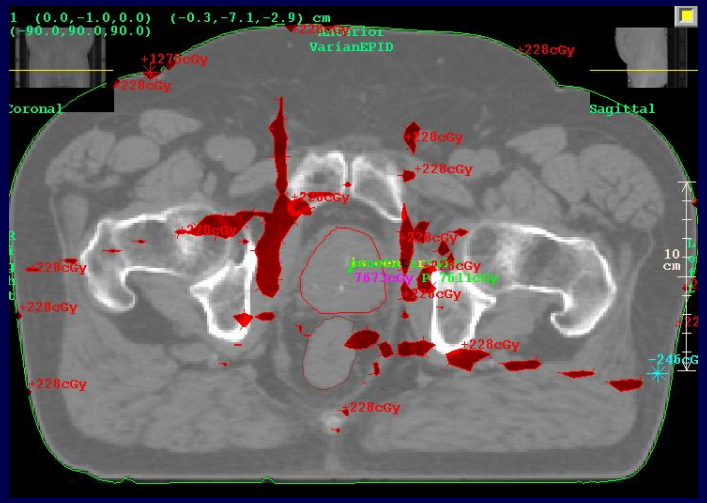


Figure 2 A &B: 3D and 2D Prostate treatment plan

Materials and Methods

- Dose homogeneity within the target volume and doses to critical organs, OAR were evaluated.
- CT scans of 30 patients with localized prostate cancer were acquired and transferred to the treatment planning systems (TPS).
- The target volume and uninvolved structures were contoured on axial CT slices throughout the volume of interest.
- A comparison of the two treatment techniques was performed using isodose distributions, and dose-volume histograms.).

Results

Table 1: The minimum, maximum, mean dose received in percent and total volume for the PTV and CTV.

PTV				CTV			
3D		2D		3D		2D	
Dose% (**Mean-** max.-min)	**Mean Total Volume (cc)**	**Dose%** (**Mean-** max.-min)	**Mean Total Volume (cc)**	**Dose%** (**Mean-** max.-min)	**Mean Total Volume (cc)**	**Dose%** (**Mean-** max.-min)	**Mean Total Volume (cc)**
92.35 (107.7-77.7)	193.54	97.5 (106.2-88.8)	193.54	100.95 (107.2-94.7)	89.96	99.2 (106.1-92.3)	89.96

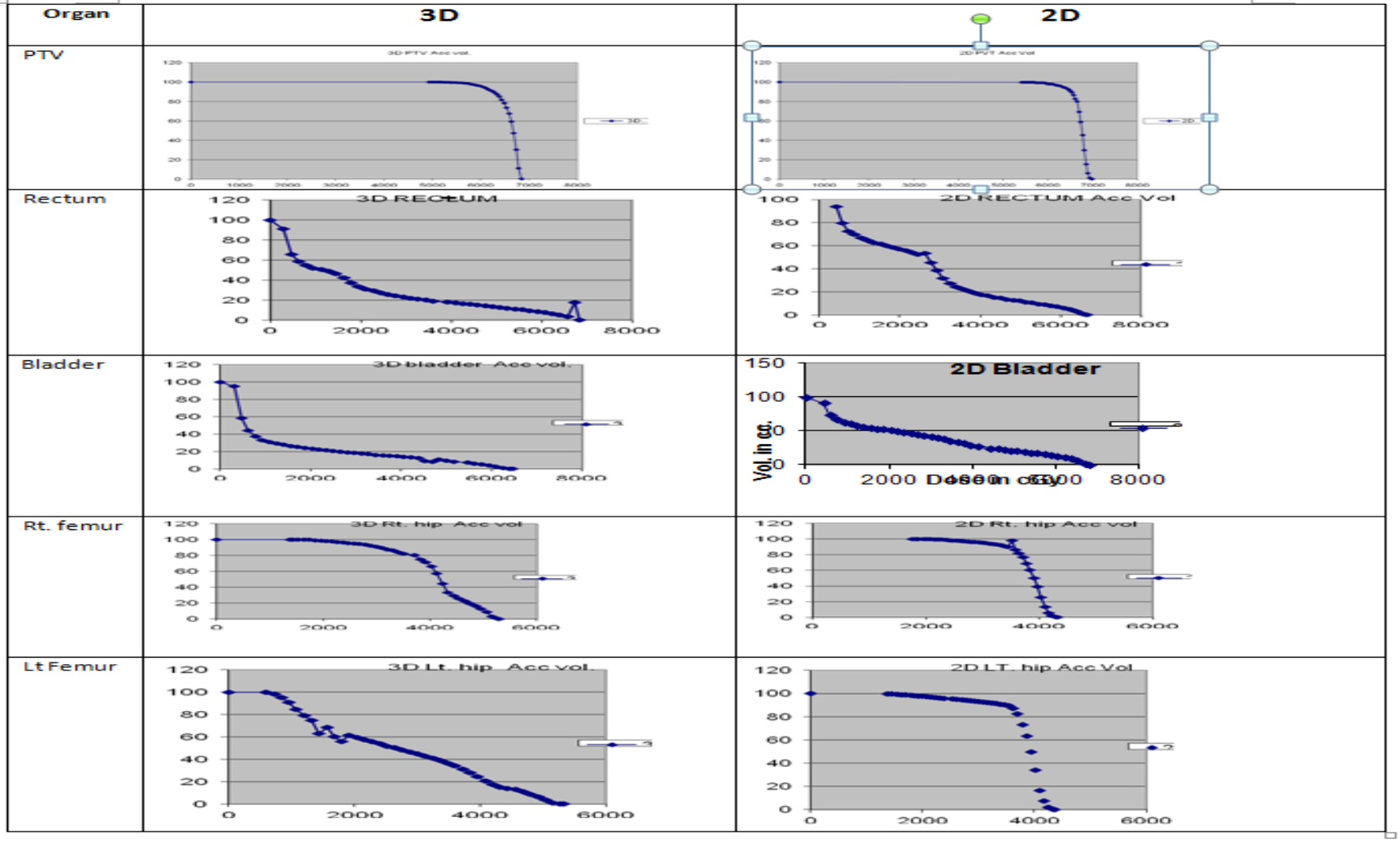
Results

Table 2: the average dose delivered to PTV for 2D and 3D

PTV (95%)		PTV (107%)		PTV (105%)	
3D	2D	3D	2D	3D	2D
94.9	97.1	3.8	6.1	11.8	26.22

Results

Figure 3 The mean DVH for: PTV, Rectum, Bladder, right and left femur using 2D technique and 3D technique



Conclusions

- 3D conformal radiotherapy is more effective than 2D conventional radiotherapy in decreasing dose to rectum, bladder and both hip but dose distribution, homogeneity and dose coverage to PTV the same.

- There were no statistical difference between 2D and 3D radiotherapy in terms of V95% or V107% keeping a minimum of 95% dose coverage for PTV and a maximum dose below 107% as recommended by the ICRU planning guidelines.

Thank you for your kind attention