Artículo Especial

Dynamic Targeting™ - Image Guided Radio Therapy#

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Introduction

Volumetric imaging and planning in radiation therapy (3-D conformal RT and IMRT) have pressured the oncology community to better understand the geometric uncertainties inherent in the RT delivery process, including both set-up error and organ motion (interfraction motion) as well as organ motion while the beam is on (intrafraction motionj. The goal of the presented work is to reduce the volume of normul tissue in the CTV-to-PTV margin by reducing the uncertainties associated with1 interfraction motion and intrafraction motion.

Materials and Methods

We have developed a new class of kV on-board imaging tools allowing real Image-Guided Motion-Management™ for setup corrections. The core of this development is a Varian Clinac equipped with on-board kV imaging technology. This system consists of 4 main components:

- X-ray Source
- a-Si kV Image Detector
- 2 robotic arms for independent positioning of the mX-ray source and the a-Si image detector
- On-Board Imaging application software

The Image-Guided Motion-Management system supports the following image modalities

- kV Planar Radiographic Imaging for Patient Repositioning
- kV Volumetric Imaging Cone Beam CT for Patient 3-D Repositioning
- kV Planar Fluoroscopic Imaging for Gating and Tracking
- MV Portal Imaging

Results

We will present clinical use cases using the newly developed tools and images of the modalities explained above. Image acquisition and image quality can be expected as the same as with the Varian Acuity™ treatment simulator. The Cone Beam CT mode allows the acquisition of a volumetric CT data set with one revolution of the Gantry. The application software includes tools for the 3D patient repositioning based on the data sets acquired with the On-Board Imaging system.

Conclusions

The new Clinac kV on-bocrd kV imagin system provide the clinicians with new powerful and easy to use tools for better, more accurate patient setup and motion management.

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