

QUALITY ASSURANCE IN MODERN SOPHISTICATED LINAC RADIOTHERAPY

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The tremendous developments in radiation therapy technology open a new prospect for improvements in local tumor control. Quality assurance in radiation treatment attempts to monitor and improve the quality of cancer patient therapy. The major quality assurance programs include radiation protection of personnel and patients, safe operations, maintenance of the medical accelerator, and an accurate dose delivery to the target volume. Three dimensional conformal therapy puts greater attention in the treatment delivery precision, and hence greater efforts should be made in quality assurance to ensure uniformity between the radiation treatment prescription and the actual treatment delivered. With the increasingly complex treatment planning systems and treatment machines, extra and more stringent quality assurance programs are needed to ensure safety of the patients and personnel, and the accuracy of the dose delivery.

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INTRODUCTION

Significant progress has been made in the physics of radiation dosimetry, computer-assisted radiation treatment, and the technology of external beam radiation machines over the past several years. More sophisticated computer-controlled machine and beam control techniques, including automatic machine setting, treatment monitoring as well as recording, have become available. The new techniques of programmable multileaf collimators for dynamic treatment offer not only new possibilities, but also new

risks and responsibilities for radiation oncologists, physicists, and therapy staff.

In recent years, a large amount of computer-controlled three-dimensional (3-D) conformal treatment techniques have been developed. The availability of 3-D treatment planning, multileaf collimator, and new generation of computer-controlled treatment machines have begun to make possible the treatment of cancer using 3-D conformal therapy. Studies of 3-D conformal treatments have shown promising results. During the computer-controlled conformal treatment, the computer is programmed to control many machine movements with the radiations on,