

A new evaluation method of target volume coverage and homogeneity for IMRT treatment planning

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Abstract

Based on the functional approximation of a target volume DVH (TV-DVH) to a modified step function, we propose a new index that indicates the degrees of dose coverage and homogeneity for target volume reached in clinical routines. Forty-seven IMRT patient plans are included in the analysis to explore the efficiency of the proposed method. The new index, named *s*-index, was defined to vary from 0 to 5 for clinically acceptable TV-DVH at our institution and showed the ability to give the user an idea whether the degree of dose coverage and homogeneity for target volume were adequate when the user-defined criteria had been in place. The result shows that the lower value of *s*-index indicates the higher dose coverage for the tumor volume and/or the higher dose homogeneity showing the faster fall-off rate at the percentage dose higher than 100%. In addition to the quantification of dose coverage and homogeneity, it has been also shown that *s*-index is more accurate in evaluating the dose homogeneity in tumor volume than the conventional method. The proposed method has demonstrated the effectiveness in evaluating TV-DVH in terms of simple index and supplements currently used indices by providing complete information of a DVH curve in a treatment plan.

KEYWORDS: DVH, Step function, Coverage index, Homogeneity.

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Exoemission Instrument and Technology to Explore Gamma Radiation Influence on Bones

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Abstract

This article aims at developing a new technology and instrument to explore the effect of gamma radiation on bone material. Exoelectron emission (EEE) phenomenon underlies a new electron spectroscopy to explore alteration of the electronic structurally dependence properties of bone material. The development of EEE technology for exploring the gamma radiation effects on bones is of high importance. Moreover, the influence of gamma radiation with different energies on the bone structure is discussed. It was found that the changes in EEE vary with radiation energy and radiation dose and that the response is non-linear.

KEYWORDS: Gamma radiation, Bones, Exoelectron emission, Technology.

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Monitoring of whole body cryotherapy effects by thermal imaging: preliminary report

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Abstract

In whole body cryotherapy the whole human body is exposed to low temperature below -100°C in a special room called cryogenic chamber for a very short period of time (2-3 minutes). The impact of cold can cause many different biochemical and physiological reactions of the organism.

The skin temperature response due to whole body cryotherapy was studied by means of infrared measurements. The thermograms of chosen body parts of patients suffering from low back pain were performed before and after whole body cooling on the 1st, 5th and the last (10th) day of medical treatment. Infrared imaging performed after cold impact owing to the enhancement of the skin temperature profile may reveal a slight decrease of the inflammatory states as a result of the 10 sessions of cryotherapy.

KEYWORDS : infrared measurements, whole body cryotherapy, thermovision diagnostic.