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A way to perform a quality assurance control for head and neck treatments in a co-operative group of radiotherapy

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Abstract

In order to establish a clinical protocol for head and neck treatments for all centres that constitute the G.O.C.O.[†], a dosimetric intercomparison study was performed. The work described in this paper concerns the intercomparison of physical measurement data and dose distribution in an anthropomorphic phantom, for Co-60 gamma ray and 6 MV X-ray beams. This work was carried out at radiotherapy centres in Occitani (France) and in Catalunya (Spain).

The same physicist using the same measuring equipment visited the ten institutions constituting the G.O.C.O. Prescribed and measured, dose and dose rate values are compared. Moreover, calculated relative dose distributions are compared to measurements performed in a Machlett-Alderson Rando phantom using lithium fluoride as thermoluminescent material. The results obtained show that measurements on the beams present deviations < 3.5%, and for relative dose distributions the assessment of dose in all points is better than 5.3 % (except for special points). So, it can be concluded that an intercomparison of clinical results is allowed.

KEYWORDS: Quality assurance, dosimetric intercomparison, photon beams.

Java DICOM Programming Interface (jDPI): a simple tool to manage medical images through the network

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Abstract

The increasing interest in imaging both within and outside radiology and the general interest in electronic medical records requires the standardization of transmission and storage of medical images. Actually, DICOM 3.0 can be defined as a standard in the communication of medical images and the relevant information.

In this paper, we illustrate the project and an early implementation of a programming interface (jDPI - java DICOM Programming Interface) to develop applications that manage and communicate information across public and private computer networks in a DICOM conformant way.

The requirements of the project can be summarized as follows:

- conformance to the standard DICOM 3.0;
- independence from the chosen operating system;
- usability with respect to the complexity of the used standard.

The choice of Java as programming language ensures the independence from the used working platform and guarantees a real portability of the package.

KEYWORDS: DICOM, API, JAVA, PACS.

Precision, accuracy and cross-calibration measurements on dual X-ray absorptiometry systems using standard calibration phantoms

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Abstract

Dual-energy X-ray Absorptiometry (DXA) is considered the gold standard technique for clinical bone densitometry, but a general lack of standardisation in bone mineral measurements obtained with different scanners has been reported. The accuracy of DXA measurements is also influenced by the software version used for analysis. In this study we report on the comparison of the calibration results of the three absorptiometers routinely employed at S. Maugeri Foundation, a QDR-4500W Hologic and two XR-26 Norland, recently software upgraded. Calibration was made using the standard calibration phantoms provided by each manufactory. Both phantoms do not take into account vertebral morphology but through the Hologic one, consisting of four vertebral body-like structures with similar densities in each segment, a cross-calibration between the different systems could be established. The main result we achieved is that the differences in BMD values obtained with different scanners are less than 1.5% when using the Hologic phantom, despite the performance variability introduced by software and hardware upgrade.

KEYWORDS: Bone Densitometry; DXA Measurements.

Inhomogeneous dose distribution in a serial organ architecture

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Abstract

Some statistical assumptions and biophysical simplifications are essential in order to develop models to be used in clinical routine radiotherapy to compute Normal Tissue Complication Probability (NTCP). We focused on the assumption of binomial statistical description of cell radiation killing. We designed a basic tissue and organ architecture by means of serial combinations of functional subunits (FSU). NTCP calculations for our modelling procedure are shown. It is shown that when a fixed mean dose is delivered to the serially structured tissue the homogeneous dose distribution minimises NTCP.

KEYWORDS: NTCP, DVH, organ modelling.

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Abstracts