Is the in-vivo dosimetry a red herring?

P.-A. Tercier[1], P. Bourgeois[1]
[1] Service de Radio-Oncologie, Hôpital de Fribourg, Site de Fribourg

mail: tercierpa@h-fr.ch

Introduction

There is apparent nominal consensus on the nature of the problem to be solved by in-vivo dosimetry[1]. Given a treatment of a patient, dose measurement at entry (and eventually exit) point(s) should provide enough information to ensure that the treatment of the patient is appropriately delivered. The provocative formulation of the title indicates that the authors propose at least another possibility.

Material and Methods

The authors having already implemented in-vivo dosimetry have experimented how time consuming is the in-vivo dosimetry given the small amount of detected cases. However some of the limitations of the in-vivo dosimetry let a feeling of frustration for loosing control on the efficacy. For instance, the inversion of wedged filter, a wrong setting of energy are not always detected, as well as the use of asymmetric field, the case of breast tangential fields bringing inaccuracies in the measurements and the case of radiosurgery (too small fields) and IMRT (too modulated fields) preventing the application of in-vivo dosimetry. Making an analyze of the wrong treatments detected by in-vivo dosimetry, one notes that they are always the results of a bad transfer from the treatment planning system (TPS) to the record and verify system (RVS). The proposed solution is to introduce a third place where the treatment plan are recorded to check the validity of the applied treatment plan on a daily basis. The TPS is Pinnacle (from Philips) and the RVS is ARIA (from Varian). The additional system is a Linux box with different open source tools mixed together to make all the glue between the three parts of that system.

Results

Each day all the session of the day are validated against the previously “saved” plan. Each modification (based on a medical decision or not) are highlighted early in the morning or as they occurred in the day. The physicist receive a warning. The screen presents the exact differences (leaves positions, jaws, energy, etc...) between the references and the “planned for that day” treatment. Two ways are then to follow: 1) accept the new planned treatment as the right one (replacing the TPS plan by that one) or 2) reject it and go to the RVS to correct the situation. Some examples and real cases will be presented as well as the superiority of that approach in respect to in-vivo dosimetry. This system is added to the normal data work flow so it is just an additional security.

Discussion

Asking in the title whether the in-vivo dosimetry is a red herring have been intentionally provocative. Our position is that it is not, but neither is it a panacea. Most importantly, solutions to improve the security of radio-oncology treatment exist. They should be further improved and applied.

References

[1] http://www.sfpm.fr/download/fichiers/presentations/2007_SFRO_dosi_in_vivo.pdf. Dosimétrie in-vivo et Record and Verify, Alain Noël, Albert Lisbonna, Thierry Sarrazin.