Implementation of a comprehensive verification program for3D High Dose Rate Brachytherapy plans: "QA-Brachy"

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Background and Objective

The objective of this work is to design a pre-treatment software that not only performs an independent dosimetric calculation of the dwell times of the High Dose Rate Brachytherapy (HDR BQT) planner but also allows the verification of other important parameters involved in the process, such as: patient identification, applicator model, channels and catheters, medical prescription, treatment date and session, among others.

In order to provide a safe and quality treatment it is essential to establish control points in each of the stages of the HDR BQT workflow, to minimize possible errors in the process.

Methods

After the first year of experience with the HDR BQT 3D service using Flexitron (Elekta) as the treatment unit and the source of Co-60, the need to establish control points to avoid possible errors that could slow down the workflow and, above all, to increase security in the delivery of the treatment has become evident.

A program was designed in the numerical computer system MATLAB, in which fundamental data from the treatment plan were imported from the planner Oncentra Brachy (Elekta) in csv (comma-separated values) format and a template created in Excel in xlsx format. It performs the independent dosimetric calculation using the formalism defined by the TG-43 of the AAPM. In addition, it executes various controls on the administrative information of the plan concerning the above-mentioned parameters, which automatically detects if the user has omitted or made any error in the information management process in the planner.

Once all the parameters have been checked, the program will indicate the results and will allow the incorporation of the Dose Volume Histogram (DVH) extracted from the planner in txt format. Once the information has been processed, it will automatically return the structured report with a level 3 approach according to the recommendations of ICRU 89, in pdf format.

Results and Discussion

The program is used in the Brachytherapy clinic, and is performed with each patient before applying the treatment.

The impact of using the program was evident in the speed of detection of human errors during treatment planning that can impact the patient, not only in dose delivery but also in terms of pretreatment times. It is a simple and intuitive tool, which allows faster data processing and automatic reporting per treatment session.

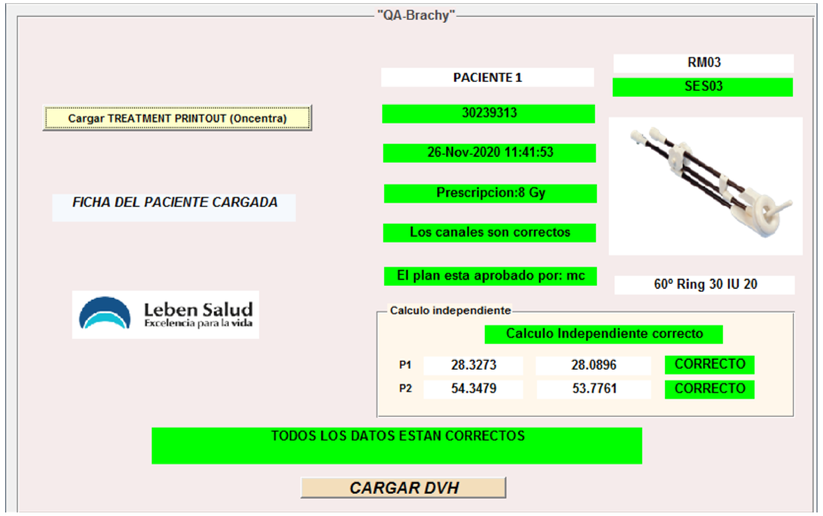

Figure 1: Graphical interface of the program "QA-Brachy"

Conclusions

- The automation of the comprehensive treatment verification by means of software is a guarantee of safety for the patient
- The incorporation of "QA-Brachy" allows to reduce time and to provide security to the patient, when verifying all the control points in the stages of the workflow.
- In addition, the program by avoiding errors and reducing time, allows redirecting all efforts in the process of optimizing the workflow, allowing continuous improvement in it.

References

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