



## QUALITY CONTROL PROGRAMME FOR RADIOTHERAPY

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It's a 3 years pilot programme started in January 2000 with 33 philanthropic cancer institutions that provides medical services to 60% of the patients from the national social security system. Brazil has today 161 radiotherapy services (144 operating with megavoltage equipments). These 33 institutions are distributed over 19 Brazilian states.

The aim of this programme is:

- To create conditions to allow the participants to apply the radiotherapy with quality and efficacy.
- To promote updating courses for the physicians, physicists and technicians of these 33 Institutions.

With the following objectives:

- To recommend dosimetric and radiological protection procedures in order to guarantee the tumor prescribed dose and safe working conditions.
- To help in establishing and implementing these procedures.

The main activities are: local quality control evaluations, postal TLD audits in reference conditions, postal TLD audits in off axis conditions and training.

The local quality control program has already evaluated 22 institutions with 43 machines (25 Co-60 and 18 linear accelerators). In these visits we perform dosimetric, electrical, mechanical and safety tests. As foreseen, we found more problems among the old Co-60 machines i.e., field flatness, size, symmetry and relative output factors; lasers positioning system alignment; optical distance indicator; radiation and light field coincidence; optical and mechanical distance indicators agreement, than among the linear accelerators i.e., field flatness and size; lasers positioning system alignment; tray interlocking and wedge filter factors.

We just completed the 4<sup>th</sup> postal TLD audit in reference conditions. They are promoted every 3 months. In Table I we can see how many institutions have participated in each one, the number of Co-60 and linear accelerators photon beams evaluated and their results.

Table I  
Results of 4 Evaluations in Reference Conditions - Relative Percentual Deviations

Evaluation	Institution	Beams (Co-60 / L.A.)	Optimum	Tolerance	Investigation	Emergency
1	32	70 ( 37 / 33 )	77,1	7,1	10,0	5,7
2	29	60 ( 34 / 26 )	83,3	15,0	1,7	0
3	33	68 ( 34 / 34 )	79,4	19,1	1,5	0
4	33	67 ( 35 / 32 )	74,6	25,4	0	0

Note:

The considered "percentual relative deviation ranges" in between the measured and stated values ( $D_m/D_s$ ) have been:

**Optimum:**  $D_m/D_s \leq \pm 3\%$

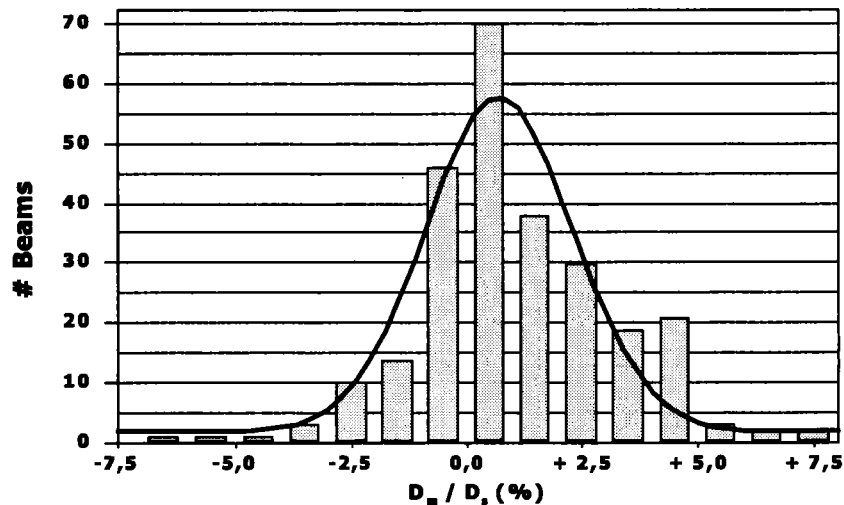
**Tolerance:**  $\pm 3\% < D_m/D_s \leq \pm 5\%$

**Investigation:**  $\pm 5\% < D_m/D_s \leq \pm 10\%$

**Emergency:**  $D_m/D_s > \pm 10\%$

All the evaluated beams with deviations in investigation and emergency ranges are re-evaluated. When these results remain out of the acceptable range ( $D_m/D_s \leq \pm 5\%$ ), a local investigation is immediately done. Figure I shows the number of evaluated beams in function of its relative measurement deviations ( $D_m / D_s$ ).

Figure 1. 4 Evaluations in Reference Conditions



We'd like to point out that we found a remarkable decrease in the deviations in between the 1<sup>st</sup> and the 2<sup>nd</sup> audit as well as in the TLDs returning time.

The postal TLD audit in off axis conditions program started later, with the development of a special TLD holder and all the inherent tests. The TLD kit has been sent to all the participants, to be irradiated in a standard water phantom at SSD or SAD, depending of the local calibration or the clinical practice procedure. The dose to be delivery at each TLD, as been defined as 2 Gy. This TLD audit for photons beams checks also: reference beam output, depth dose data, beam output variations with field size, wedge transmission factor, field simetry and flatness and dose calculation with a angled incidence. For electrons beams we will check the reference beam output at different depths.

In 2000 the training has been through two seminars for physicians, physicists and technicians. In 2001 we hold only very practical courses, full time, for small groups, in order to have everybody using the equipments and working with all machines. We offered in our Radiotherapy Service in the National Cancer Institute (Rio) four up dating courses for thechnicians (33) and another four for physicians (34). Together with Varian we hold one course on Commissioning, Acceptance and Quality Control in regard to a Clinac-2100 / Varian linear accelerator (8 physicists) and one course on CAD PLAN Planning System and Somavision (17 physicists).

## REFERENCES

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