



IN VIVO TLD DOSIMETRY TO MYCOSIS FUNGOIDES CANCER TREATMENT WITH TOTAL SKIN ELECTRON BEAM IRRADIATION

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Introduction: Treatment against skin cancer of the *mycosis fungoides* type can be carried out with total body irradiation by an electron beam. In the present work, a total skin electron therapy technique¹ was applied for the first time in Uruguay, to the entire skin of an oncology patient with this condition.

The 45-year-old female patient had previously been treated for 2 years with UV light, without appreciable improvement. In order to determine the accuracy of the planning, the homogeneity of the dose, the total dose delivered and the areas to be protected, a “blind test” was devised for in-vivo dosimetry with 16 TLD-100s, located over interest points of the patient skin.

Material and method: Following the protocol, to obtain a homogeneous dose throughout the body, the 6 MeV electron beam of the Clinac Varian 2100 CD was moderated with a 0,01x2x2 m PMMA plate.

The beam was split into 2 symmetrical and partially overlapping shots. The total dose was equally divided into several sessions.

Using electrometers and ionization chambers, the planned doses were verified with full-body phantoms.

The TLDs were first calibrated in the SSDL in terms of $D_w=0,5$ Gy in a Co-60 reference beam, using El Dorado 6 irradiator and a water phantom. Finally they were irradiated in solid water with the electron clinic beam.

TLDs were placed on various parts of the skin for the first session. Dosimetrists reported their readings without knowing the delivered dose, which were compared with the planned dose for that session. Once the doses were confirmed, the patient was given the entire dose indicated by the treating oncologist.

To protect the lens of the eye, the patient was given leaded glasses. One of the TLDs was located under these to assess the received dose in the eye.

In some moment during the blind test, one of the TLDs peeled off the skin, falling out of the beam.

Results: The blind test dosimetry gave an average skin dose of 1,93 Gy while the planned dose was

2,00 Gy. The relative difference (between 0,3% and 21%) of the measured dose in each interest point arises from the irregular distances from the skin to the PMMA moderator plate (Fig.1).

The dose in the TLD close to the lens of the eye was very low, as planned for that protected area. The dose in the TLD that was dropped in the middle of the test was about 25%, as expected.

It was clinically verified by monitoring the patient for the next 3 months that the symptoms disappeared, a clear improvement in the dermal disease was achieved, without any type of systemic, haematological or dermatological complications.

Conclusions: The in vivo TLD dosimetry is a valuable method for verifying the dose homogeneity in complex radiotherapy treatments as the total skin electron irradiation and for the dose assessment of critical organs. The applied protocol had satisfactory results in this mycosis fungoides skin cancer treatment.

Dose (mGy)	Diff.	Point	Place
1759,73	-12%	neck	back
1783,14	-11%	right cheek	front
2286,35	14%	left thigh	back
2433,30	22%	right calf	back
1724,17	-14%	left hand	back
1857,31	-7%	right pectoral	front
1789,65	-11%	right kidney	back
524,79	-74%	peeled off!	front
1720,43	-14%	left forearm	front
2076,41	4%	left shoulder blade	back
2132,37	7%	right arm	back
1625,47	-19%	right leg	front
2159,04	8%	left pectoral	front
1590,33	-20%	right forearm	front
2005,93	0%	forehead	front
298,60	-85%	left eye	front

Figure 1: TLD doses and relative differences to 2,0 Gy.

References: 1. AAPM, Report No. 23 Total Skin Electron Therapy: Technique and Dosimetry, New York: American Association of Physicists in Medicine, 1987.