

Treatments For Skin Cancer: a Radiation Oncologist's Perspective

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A Brief History of Radiation

- Wilhelm Roentgen discovered *X-rays* on November 8, 1895, while experimenting with a gas-filled cathode tube
 - He noted an image of the bones of his hand projected on a screen when placed between the tube and the fluorescent screen
 - First Nobel prize in physics
- **He called this X-ray**



Early radiograph taken by Roentgen, January, 1896.

Brief History of Radiation Therapy

- The first patient was treated with radiation in 1896, two months after the discovery of the X-ray
- Rapid technology advances began in the early 1950s with cobalt units followed by linear accelerators a few years later
- Recent technology advances have made radiation more effective and precise

Role of Radiation Therapy in Management of Skin Cancer

Priority in Treatment Decisions

- Cure
- Functional result
- Cosmetic result
- Cost: both dollars and time

Priority in Treatment Decisions

- Surgery offers the most effective means for skin cancer cure
- For non-surgical candidates, radiation therapy can maintain function, cosmesis and may be preferred by many patients

Indications to Consider RT

- **Challenging anatomic locations**
 - larger, less well demarcated lesions of the nose, ears or lips
 - pre-tibial skin in patients with PVD
- **Patients with surgical contraindications**
 - co morbidities
 - blood thinners
 - lower extremities in diabetics

Indications to Consider RT

- Tumors on the eyelid, cheek, earlobe and nose
- Elderly individuals
- Treatment of involved lymph nodes
- Skin cancer that has recurred after surgery
- To relieve/control the symptoms of very large tumors
- For people who are unwilling or unable to undergo surgery

Indications to Consider RT

Used after surgery:

- Positive margins
- Perineural involvement
- Poorly differentiated subtypes (?)
- Infiltrative growth patterns (?)
- Fixation to underlying structures, i.e. cartilage or bone

Schulte et al. J Am Acad Dermatol 2005 Dec;53(6):993-1001

1267 with skin cancers were treated with RT

<u>Tumor size</u>	10 yrs		<u>Cosmetic result</u>	(%)
	<u>Local control (%)</u>			
	<u>BCC</u>	<u>SCCa</u>		
Less than 2 cm	95	98	Hypopigmentation	73
2-5 cm	92	86	Telangiectases	51
More than 5 cm	89	74	Hyperpigmentation	23

RT provides local control and good cosmetic outcome for small tumors, however for larger tumors planned surgical resection and post operative RT is recommended

Hernandez et al. Int J Dermatol 2007 May;46(5):453-9.

710 primary BCC and SCCa irradiated were analyzed for recurrence rates

<u>Tumor type</u>	<u>5 yrs Cure (%)</u>	<u>15 yrs Cure (%)</u>
BCC	94	85
SCCa	93	79

Radiation treatment is an effective treatment for BCC and SCCa, should be considered as a first option in many cases



Choice of Dose and Dose per Fraction

Prescribed dose is based on:

- Size of lesion
- Extent of local invasion
- Contiguous normal tissues
- Histology
 - BCC and SCC are very radiosensitive
 - Melanoma is less radiosensitive; requires higher dose

Standard recommended doses

<u>Dose per Fx</u>	<u>Total Dose</u>	<u># of Frac</u>	<u>Weeks</u>
333 cGy/fx	5000 cGy	15 fractions	(3 wks)
275 cGy/fx	5500 cGy	20 fractions	(4 wks)
200 cGy/fx	6000 cGy	30 fractions	(6 wks)
200 cGy/fx	6400 cGy	32 fractions	(6-6.4 wks)
200 cGy/fx	6600 cGy	33 fractions	(6-6.6 wks)

* Protracted fractionation is associated with improved cosmetic results

Ref: NCCN Practice Guidelines in Oncology v.1.2008

Electron treatment for Skin Ca

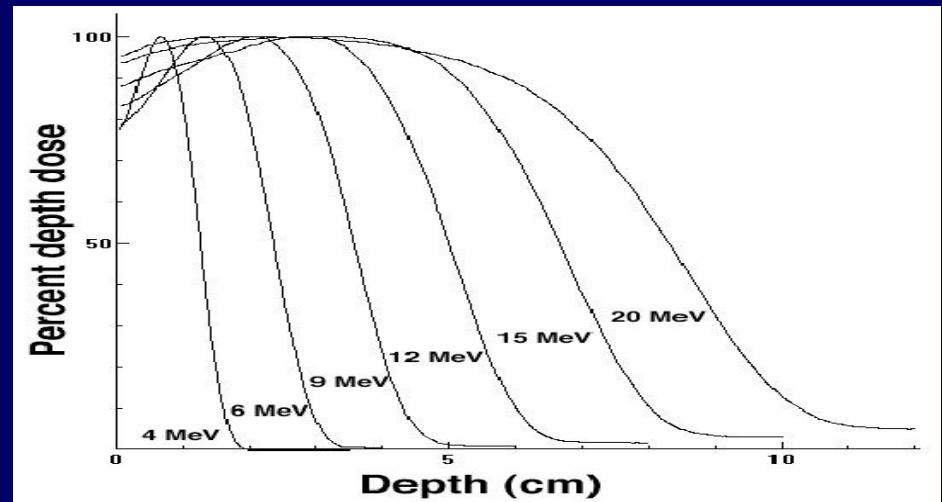


**Bay Medical
Linear accelerator**

**ELECTRON BEAM THERAPY IS NOT INFERIOR TO SUPERFICIAL X-RAY
THERAPY IN THE TREATMENT OF SKIN CARCINOMA**

CORNELIS GRIEP, M.D., JACOB DAVELAAR, PH.D., ASTRID N. SCHOLTEN, B.Sc.,
ALIM CHIN, M.D. AND JAN-WILLEM H. LEER, M.D., PH.D.

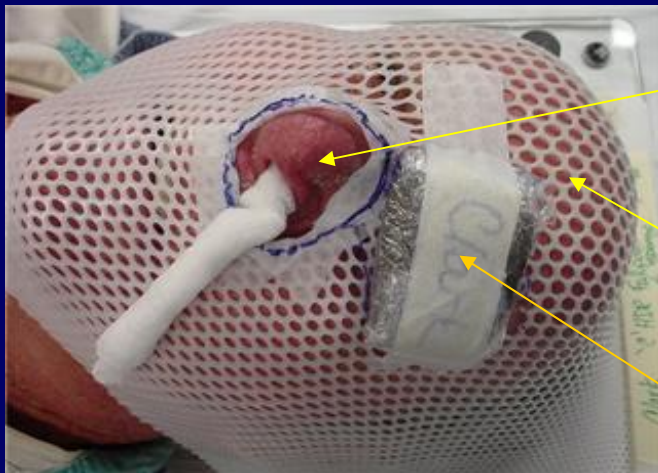
Department of Clinical Oncology, University Hospital, Rijnsburgerweg 10, 2300 RC Leiden, The Netherlands



Cases and Setup



Electron treatment for Skin Ca

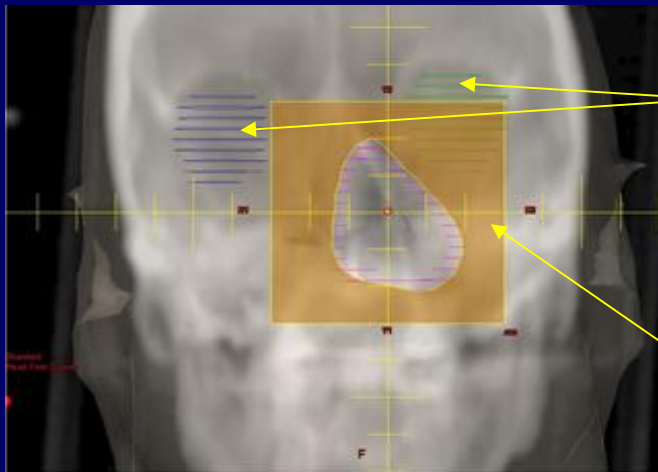
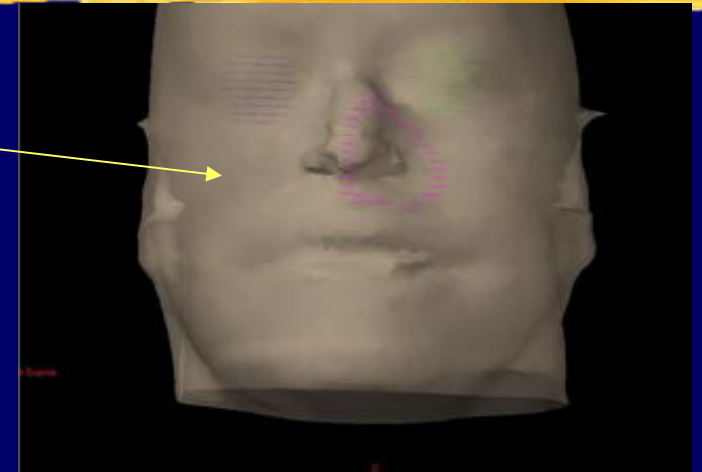


Tumor

Mask

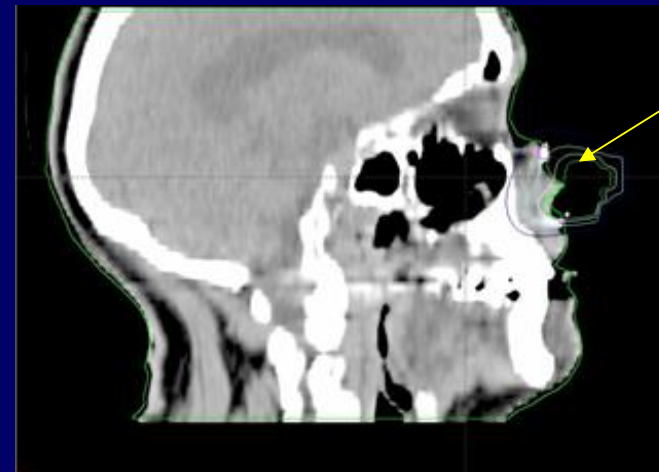
Eye shield

Computer generated 3D View



Eyes

Lead shield



Radiation dose distribution

Electron treatment for Skin Ca

- Electron cutout to protect the surrounding normal structure from high doses of Radiation



Radiation therapy is painless, last for less 5 mins, given daily

Radiation treatment for skin cancer



(a)



(b)

Fig. 5. Result obtained in a patient: (a) Before treatment. Squamous cell carcinoma recurred after surgery with perineural invasion. (b) Result at 5 years after treatment with 6500 cGy, 3 weeks rest, and 1500 cGy boost. No recurrence; no late effects; complete remission was obtained with excellent cosmesis.



Fig. 5. Resulto obtenido en un paciente: A) Antes de comenzar el tratamiento. Carcinoma basocelular de 3 cm de diámetro, únicamente biopsiado. B) Al finalizar el tratamiento, tras 6.500 cGy, 3 semanas de descanso y 1.500 cGy de sobreimpresión. Eritema en la zona tratada y radiodermitis húmeda en el centro de la lesión. C) Resultado 5 años después del tratamiento. No recidivas. No secuelas. Remisión completa. Estética y funcionalidad excelentes.
Result obtained on a patient: A) Before starting the treatment. Basal-cell carcinoma of 3 centimeters of diameter, with biopsy. B) to end the treatment, after 6500 cGy, 3 weeks of rest and 1500 cGy of overimpression. Eritema on the treated region and humid radiodermithys in the center of the injurie. C) Result 5 years after the treatment. There are not realpses either sequels. Complete remission. Excellent aesthetic and functionality.

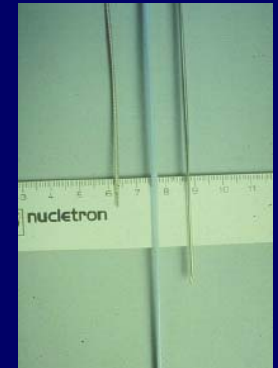
HDR Brachytherapy for Skin Ca

Kohler-Brock A, Prager W, Pohlmann S, Kunze S.

Klinik und Poliklinik für Strahlentherapie und Radioonkologie, Universität Leipzig.

BACKGROUND: In our department we have developed a standardized applicator for HDR brachytherapy of surface lesions, the so called Leipzig-applicator. We have used this method since September 1987, initially with a Decatron remote afterloading machine, but more recently from November 1990 with a microSelectron-HDR. We report about our experience of 10 years. **PATIENTS AND METHOD:** Since 1987 we treated **520 patients in 3,026 fractions** with this method. In most of the cases we irradiated tumors of the skin of the face, but we also treated tumors of the mouth, of the tongue, of the perianal region and the external genitalia. The histological types were in most of the cases squamous cell carcinomas and basal cell carcinomas, but we also treated tumors like Kaposi-sarcomas, melanomas and skin manifestations of lymphomas and solid organ tumors. We also irradiated benign lesions like keloids after excision. We use single doses between 5 and 10 Gy once to twice a week. The isodose distribution was depending of the tissue infiltration of the tumor. The total dose was 30 to 40 Gy. **RESULTS:** In 91% of the cases we obtained a complete remission of the tumor, in 6% a partial remission. Recurrences appeared in 8% of the patients. In most cases the reason of the recurrence was a lower brachytherapy dose because of a prior radiotherapy. We didn't observe any severe late radiation reaction. **CONCLUSION:** We consider that our series of patients treated with HDR brachytherapy and a range of standardized applicators demonstrates that this is a **successful method of treating surface lesions.**

PMID: 10230459 [PubMed - indexed for MEDLINE]



**Bay Medical is
procuring a HDR machine**

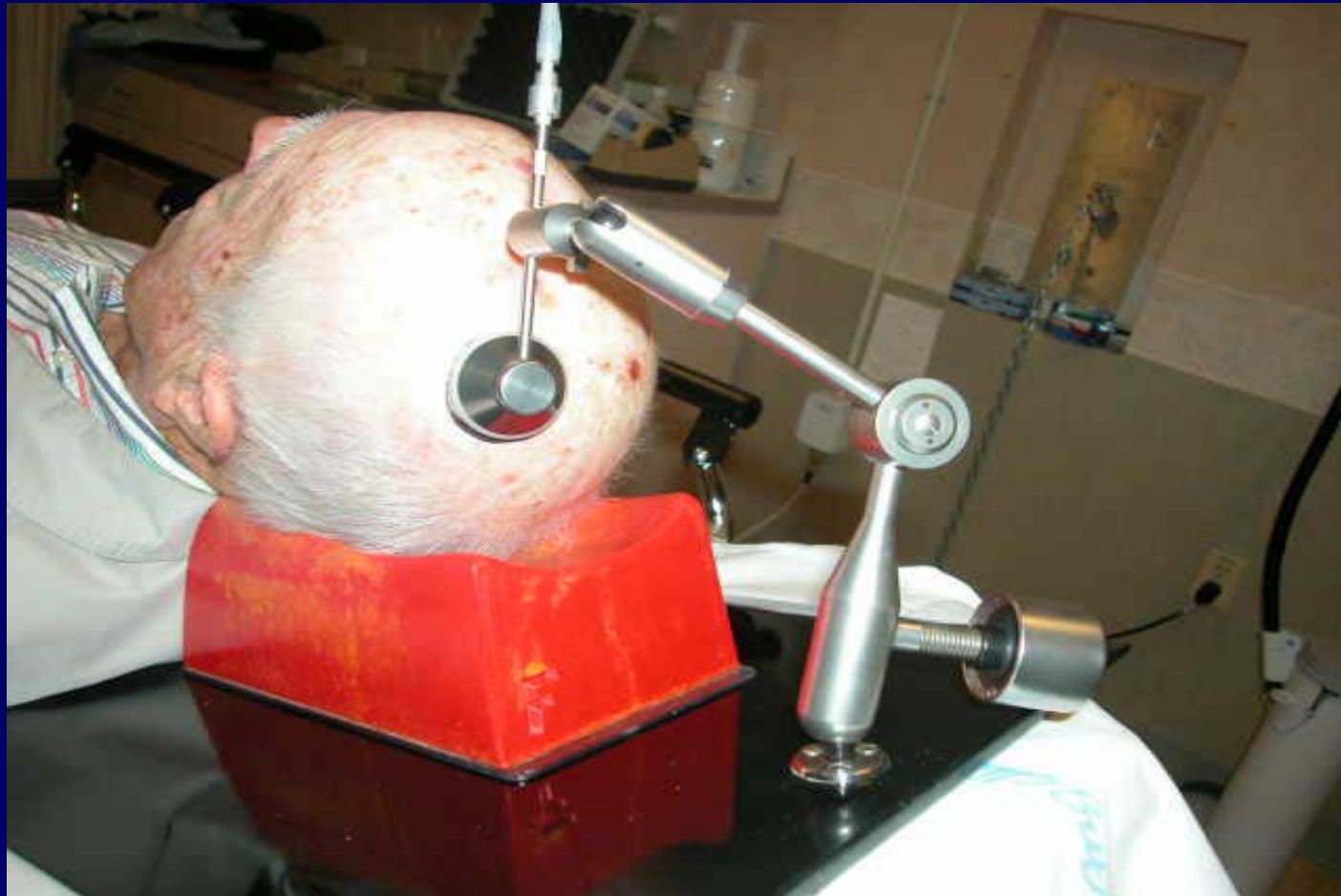
Leipzig Dose Prescription

Modality	Dose/fx (Gy)	#Fractions	Total Dose (Gy)	BED
Superficial	2.5	20	50	74
Electron	2.5	23	57.5	71.9
HDR 1	7	6	42	71.4
HDR 2	4.85	10	48.5	72
HDR 3	3.0	18	54	70.2
HDR 4	3.5	15	52.5	70.9

SCC SCALP



IMMOBILIZATION



FIVE MONTHS POST TREATMENT



Freiburg Flap



- For bigger lesion
- Conform to slopes and curvatures
- Provide an unmatched dose distribution for target with curvature and steep slope



Step 1



Step 2



Step 3



Step 4

SCC of Palm



2 wks s/p 42Gy/7 fx

Conclusion

- Radiation therapy with electron is effective and can be used safely to treat skin cancers
- Radiation therapy preserves structure and function, and may be preferred for the elderly with comorbidity or on anticoagulant

Conclusion

- New HDR brachytherapy for skin cancer is available and easy to use
- Early results show that this is a successful method to treat skin lesions (when choice of dose is appropriate, plan and dose delivery are done correctly)
- Short treatment time suitable for elderly

Conclusion

- Multidisciplinary Consultation involving dermatologists, radiation oncologists and plastic surgeon is advantageous for complicated cases
- Optimum patient management occurs when specialists are co-operative colleagues