

## THERMORADIOTHERAPY FOR PROSTATE CANCER

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### Introduction

Results of radiotherapy for prostatic carcinoma have been excellent with mostly acceptable side effects, (1,2,3). Can they be improved with the addition of hyperthermia? Published comparison studies on tumors at other sites show a thermal enhancement ratio (TER) of 1.88 with no increase in toxicity, except for occasional thermal burns (4). It has been our general impression that toxicity may actually be less with the addition of hyperthermia than might be anticipated from the same dose of radiation alone.

Herein our preliminary results using thermoradiotherapy for prostate cancer are presented.

### Method and Materials

Thirteen patients with prostatic cancer were treated with thermoradiotherapy between 1/92 and 10/94. These men ranged in age from 61 to 78. Eight patients had disease probably confined to the prostate gland. Five had invasion beyond the gland and/or metastatic disease. Radiotherapy was delivered through opposing anterior and posterior portals, 90 cGy to each daily using a MV linear accelerator. The pelvis received 45 Gy and the prostate was boosted to 65 Gy in 8 weeks on average.

Hyperthermia was delivered within one hour before or after each radiotherapy fraction using ultrasound or 300 MHz Microwave equipment alternately. Ultrasound was directed to the gland and mid pelvis, microwave to the prostate.

### Results

Eight of the thirteen patients treated had disease in a comparably early stage, with local and/or regional involvement but no disseminated metastatic disease. In this group of patients we experienced a complete response (CR) rate of 100%. There was no local recurrence or metastatic dissemination. All these patients experienced a decrease in PSA results, disappearance or significant improvement of local symptoms and preservation or improvement of sexual function (see table).

Another group of five patients presented with more advanced disease. In this group we experienced a local response rate as follows: 80% complete response (CR), and 20% partial response (PR). However all these patient presented with or developed later distant metastatic disease. A decrease in the PSA was observed in 40% of these patients, and local symptoms improved significantly or disappeared in all cases.

During the course of therapy patients experienced no major side-effects, except minor symptoms of bowel irritation and some degree of skin reaction in the perineal region.

**LOCAL PROSTATE CANCER PATIENTS**  
**TREATED WITH RADIATION ● 65 Gy ● + HYPERTHERMIA**  
**( PERIOD FROM 1992 TO 1995 )**

TOTAL # OF TREATED PATIENTS: 13		EARLY DISEASE: 8 # (%)		ADVANCED DISEASE: 5 # (%)	
COMPLETE RESPONSE		8	(100)	4	(80)
PARTIAL RESPONSE		0	(0)	1	(20)
LOCAL RECURRENCE		0	(0)	0	(0)
DISTANT METASTASIS		0	(0)	5	(100)
SEXUAL FUNCTION	▲	6	(75)	NO FOLLOW UP	
	▼	0	(0)		
	NO CHANGE	2	(25)		
PSA AFTER TREATMENT (FOLLOW UP UNTIL 1995 OR UNTIL PATIENT EXPIRED)	▲	0	(0)	3	(60)
	▼	8	(100)	0	(0)
	NO CHANGE	0	(0)	2	(40)
PATIENTS ALIVE AT PRESENT TIME (LENGTH OF FOLLOW UP: 1 TO 3 YEARS)		8	(100)	0	(0)
SYMPTOMS IMPROVED AFTER TREATMENT	COMPLETE	7	(87)	5	(100)
	PARTIAL	1	(13)	0	(0)

**Discussion**

This study confirms the value of hyperthermia in conjunction with radiation therapy to control locally advanced prostate cancer, especially in its early stages.

Thermoradiotherapy proves to be useful in later stages to improve local symptomatology, especially pain and urinary retention, without significant side-effects. Tumor grade has also not shown any correlation. It was of interest that the one patient who had distant metastasis was the only patient who failed to have complete local tumor regression.

Survival has been short in all five patients with advanced disease, but 2 deaths were unrelated to cancer. Survival of the others cannot, of course, be predicted; however, the improvement in their sex lives is striking. Radiotherapy has never been reported to improve sexual function. A recent report on 53 men given radiotherapy for prostate cancer found 77% had decreased sexual desire as well as function ( 5 ).

## References

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### THERMORADIOTHERAPY FOR PROSTATE CANCER

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From January 1989 to June 1990, nine men have received hyperthermia combined with irradiation for locoregional prostatic adenocarcinoma. Hyperthermia was given by two 300 MHz applicators operated in phase, directed to the prostate at the perineum and posteriorly, and to the pelvis from anterior and posterior aspects. Hyperthermia was given for at least five weeks on each day of radiation.

One patient died suddenly two weeks into treatment. Two patients previously untreated and with no evidence of metastasis received 60 Gy, both free of disease 18 and 6 months following treatment. Four patients with no previous radiotherapy to the pelvis but bone metastasis received 40 Gy, all with complete response but with one recurrence at 11 months. Two previously irradiated patients received 20 Gy in 100 cGy fractions, both with partial tumor response and complete palliation.

Treatment was universally well tolerated. One patient had a small perineal blister that healed normally. Toxicity was otherwise no greater than anticipated from the same radiation dose without hyperthermia.

In this preliminary series, Thermoradiotherapy, with hyperthermia delivered by external microwave applicators, has proved remarkably effective for control of prostate cancer.

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