

# ANALYSIS OF POINT A DOSE IN PATIENTS WITH CERVICAL CANCER TREATED WITH HIGH DOSE RATE BRACHYTHERAPY.

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## Abstract

**Purpose :** To compare the prescribing dose at point A using total reference air Kerma in patients with cervical cancer who were treated with fractionated Iridium -192 High dose rate brachytherapy.

**Materials and Methods :** Thirty-two patients with cervical cancer , stage IIB -IIIB were treated with conventional external radiation and Iridium-192 High dose rate brachytherapy 5 Gy per fraction , 5 fractions weekly. Treatment planning of brachytherapy were done at the first and fourth fraction. Dose rate at point A from 2 plannings were compared, using total reference air Kerma.

**Results :** Mean of the percentage of difference between 2 plannings was 0.365312 with SD. 0.046202.

**Conclusion :** For roughly planning , with dose rate of 5 Gy per fraction at point A , TRAK<sup>2</sup> about 0.37 cGy at 1 meter can be used with satisfactory.

## Introduction

Carcinoma of uterine cervix is the most common cancer in Thai Women.<sup>1</sup> Most of the patients presented with stage IIB-IIIB disease. The conventional treatment is Radiation Therapy, combining external radiation and brachytherapy. Before 1985, Radium-226 tube with after loading Fletcher suits were used for brachytherapy. Because of the radiation hazard of Radium-226 to medical personnel , remote control after loading Cs-137 , medium dose rate (Selectron) was installed in 1985. The dose rate of Selectron is about 0.8 - 1.4 Gy per hr. and loading time for prescribing dose of 14 - 20 Gy at point A is about 9 - 14 hour. The patients must be admitted for one night for this treatment protocol, because of aiming to increase number of patients treated for brachytherapy and to decrease cost of in patient service. Iridium-192 High dose rate was installed in January 1997 in National Cancer Institute.

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2 TRAK : total reference air Kerma

## Materials and Methods

From January 1997 to June 1997 , thirty-two patients with carcinoma of uterine cervix, stage IIB , IIIB were treated with combined external radiation and brachytherapy. External radiation using either Co-60 Teletherapy or Linac 6 MV. , to whole pelvis , TD 36 - 40 Gy, daily dose 2 Gy , 5 fractions per week. The parametrias were boosted in additional 6 - 10 Gy with the same daily dose.

Iridium-192 High dose rate with remote control system were used for brachytherapy. Every patient was treated with 5 fractions of HDR , weekly during external radiation , TD 5 Gy per fraction at point A. Applicators of Fletcher standard suits or Henschke's suits were used. Each patient was treated by the same radiation oncologist to ensured the same technique of applications and loading .

Plato computer treatment planning system was used for planning on the first and later applications. Simulation films were checked before each planning. The total reference air Kerma for the prescribing dose at point A from 2 plannings were analyzed.

## Results

Patient Number	TRAK planning I	TRAK Planning II	Percentage of difference
1	0.33	0.33	0
2	0.44	0.44	0
3	0.41	0.40	2.40
4	0.40	0.41	2.50
5	0.37	0.39	5.40
6	0.40	0.40	0
7	0.40	0.40	0
8	0.38	0.39	2.60
9	0.36	0.37	2.80
10	0.36	0.38	5.60

11	0.33	0.33	0
12	0.34	0.32	5.90
13	0.32	0.31	3.10
14	0.36	0.38	5.60
15	0.45	0.42	6.70
16	0.37	0.36	2.70
17	0.30	0.31	3.30
18	0.39	0.38	2.60
19	0.33	0.31	6.10
20	0.43	0.42	2.30
21	0.41	0.40	2.50
22	0.34	0.36	5.90
23	0.38	0.37	5.60
24	0.36	0.36	0
25	0.28	0.28	0
26	0.42	0.42	0
27	0.38	0.40	5.30
28	0.33	0.33	0
29	0.36	0.38	5.60
30	0.28	0.28	0
31	0.37	0.37	0
32	0.32	0.33	3.10

Mean = 0.365625 0.366562 0.365312

Median = 0.365000 0.375000 0.365000

S.D. = 0.043325 0.042321 0.046202

From The table above , the mean of difference of total reference air Kerma (TRAK) from planning 1, and 2 is 0.365312 , the median is 0.365000 , the SD. is 0.046202 and shows with no significant difference.

Ten of thirty-two patients , whose percentage of difference from 2 plannings were more than 5, all of these had either difference size of uterine tandem or size of calpostats for each insertion. Twenty-two patients, whose had the same size of uterine and calpostats, had almost the same TRAK from 2 plannings (percentage of difference less than 3.30)

## Discussion

For HDR brachytherapy, measurement of source strength is determined by air Kerma rate.<sup>2,3,4,5</sup> With Ir-192 HDR remote control, using stepping source. The dose calculation was planned by using Plato-Computer Treatment Planning System.

Major advantage of HDR are short treatment time and out patients service. Other advantage is less opportunity for the applicator to move during treatment. To achieve the same normal tissue and tumor tissue cell surviving fractions the proper dose per fraction and number of fraction are necessary. From literatures, dose per fraction in the range of 6 to 9 Gy at point A are safe and effective to replace LDR in the range of 0.35 to 0.85 Gy per hr.<sup>6,7,8,9</sup> In our study we used dose rate of 5 Gy at point A in 5 fractions to replace LDR of 0.8 - 1.4 Gy per hr.

With prescribed dose rate of 5 Gy at

point A for each treatment, the TRAK from the planning at first and fourth treatment were compared, and we found that in the same patients who were treated the same uterine tandem and colpostats (uterine size 6 cm., with small colpostats) had almost the same TRAK with error less than 5 percent. In otherhand, patients who were treated with difference uterine tandem and/or colpastats would had the difference TRAK, and planning for each treatment in these patients were recommended.

## Conclusion

Fractionated HDR brachytherapy is safe and effective to replace LDR brachytherapy. For 5 Gy at point A with uterine size 6 cm. and small colpostats. The TRAK about 0.37 cGy at 1 meter is recommended for roughly planning, with value of error less than 5 percent.

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