ORGANIZATION: **Los Angeles Radiological Society**
VENUE: **66th Annual Midwinter Radiology Conference**
DATE: **February 22-23, 2014**
TITLE: **Gynecologic Cancers Update: Cervical Cancer, Endometrial Cancer and IMRT/Brachytherapy Techniques**

Presenter:

Akila N. Viswanathan, MD, MPH *– Director, Gynecological Radiation Oncology, Brigham and Women's Hospital, Dana-Farber Cancer Institute*

ANSWER KEY

PRESENTATION 1: **Cervical Cancer**

QUESTION 1	DISCUSSION RE: ANSWER OPTIONS
What is the maximum recommended duration of time required to finish all radiation treatment based on retrospective studies showing a decrease in survival with prolongation of treatment? a. 5 weeks b. 6 weeks c. 7 weeks d. 8 weeks e. 9 weeks	Answer D. The recommended maximum duration of treatment is 56 days, beyond which survival decreases approximately 0.1%/day on average. Slide 36

REFERENCE FOR QUESTION 1

Petereit DG, Sarkaria JN, Hartmann TJ, et al. The adverse effect of treatment prolongation in cervical carcinoma. Int J Radiat Oncol Biol Phys 1995;32:1301-7.

QUESTION 2	DISCUSSION RE: ANSWER OPTIONS
When reviewing a plain radiograph of your tandem and ovoid implant, which of the following factors does NOT impact either disease-free survival or local recurrence? a. Appropriateness of packing b. Symmetry of ovoids to tandem c. Displacement of ovoids in relation to cervical os d. Position of Tandem in Mid- Pelvis on Lateral Film e. Placement of a tandem with ovoids	Answer: D Slides 37-40 The position of the tandem was not a significant predictor of LR or DFS while ovoid placement and appropriate packing, as well as placing a tandem are significant predictors of outcome.

REFERENCES FOR QUESTION 2

Viswanathan A, Moughan J, Small W, Levenback C, Iyer R, Hymes S, Dicker A, Miller B, Erickson B, Gaffney D. Quality of Cervical Cancer Brachytherapy Implantation in RTOG Prospective Trials . Int J Gyn Ca (in process)

Viswanathan AN, Cormack RC, Rawal B, Lee H. Increasing Brachytherapy Dose Predicts Survival for Interstitial and Tandem-Based Radiation For Stage IIIB Cervical Cancer. Int J Gynecol Cancer 2009 Nov;19(8):1402-6.

QUESTION 3	DISCUSSION RE: ANSWER OPTIONS
A prospective trial from France (STIC trial) has shown that CT-based contouring and treatment planning, when compared to plain radiographic film imaging for cervical cancer, has: a. Worse survival rates b. Increased the normal tissue doses surrounding the applicator c. Shorter time requirements for contouring and planning d. Broader lateral width dimensions of the cervix on MR compared to CT cervical contours e. Reduced normal tissue toxicity	Answer: E Slides 51, 53-54 T2 weighted MR provides good visualization of the gross tumor, whereas CT dose not. CT contours are wider than MR contours. The STIC trial, in patients that received chemoradiation, showed a reduction in normal tissue toxicity from 22% to 2.7%.

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ANSWER KEY

REFERENCES FOR QUESTION 3

Charra-Brunaud C, Harter V, Delannes M, Haie-Meder C, Quetin P, Kerr C, Castelain B, Thomas L, Peiffert D. Impact of 3D image-based PDR brachytherapy on outcome of patients treated for cervix carcinoma in France: Results of the French STIC prospective study. Radioth Oncol 2012;103:305-313.

Viswanathan AN, Dimopoulos J, Kirisits C, Berger D, Poetter R. CT- versus MR-based Contouring in Cervical Cancer Brachytherapy: Results of a Prospective Trial and Preliminary Guidelines for Standardized Contours. Int J Radiat Oncol Biol Phys 2007 Jun 1;68(2):491-8.

PRESENTATION 2: **Endometrial Cancer**

QUESTION 4	DISCUSSION RE: ANSWER OPTIONS
The PORTEC-2 trial demonstrated: a. Pelvic RT reduced the rate of vaginal recurrence when compared with pelvic radiation therapy. b. The survival rate of women with deeply invasive grade three endometrial cancer was the same for women treated with pelvic radiation therapy or vaginal brachytherapy. c. Pelvic RT reduced the rate of pelvic recurrence when compared with pelvic radiation therapy. d. Vaginal brachytherapy increased the risk of bowel toxicity	Answer C The PORTEC-2 trial was a randomized trial comparing postoperative pelvic radiation therapy versus vaginal cuff brachytherapy in 427 women who had "high intermediate-risk" endometrial cancer found at hysterectomy. The authors reported a decreased rate of pelvic recurrence but no differences in the rates of vaginal recurrence or survival. Patients who had deeply invasive grade 3 disease were not eligible for the trial. Slides 13-18

REFERENCE FOR QUESTION 4

Nout RA, Smit VT, Putter H, et al. Vaginal brachytherapy versus pelvic external beam radiotherapy for patients with endometrial cancer of high-intermediate risk (PORTEC-2): an open-label, non-inferiority, randomised trial. Lancet 2010;375:816-823.

QUESTION 5	DISCUSSION RE: ANSWER OPTIONS
The MRC ASTEC trial demonstrated that a routine lymphadenectomy a. Did not improve survival b. Improved distant control c. Did not add morbidity d. Shortened the operating time e. Did improve relapse free survival	Answer A Slide numbers 24-25 The MRC ASTEC trial was a randomized trial of 1408 patients with intermediate to high risk Stage I endometrial carcinoma with the primary objective to see if lymphadenectomy improved survival. There was no benefit found in overall or relapse free survival although morbidity was increased.

REFERENCE FOR QUESTION 5

MRC ASTEC study group, Kitchener H, Swart AM, Qian Q, Amos C, Parmar MK.
Efficacy of systematic pelvic lymphadenectomy in endometrial cancer (MRC ASTEC trial): a randomised study. Lancet. 2009 Jan 10;373(9658):125-36. Epub 2008 Dec 16. Erratum in: Lancet. 2009 May 23;373(9677):1764.

QUESTION 6	DISCUSSION RE: ANSWER OPTIONS
GOG 122, which randomized Stage III and IV patients between whole abdominal radiation therapy and chemotherapy, demonstrated that a. There is role for chemotherapy in advanced uterine carcinoma b. That whole abdominal radiation is more toxic	Answer A Slide 47 GOG 122 was a study that randomized Stage II and IV endometrial carcinoma patients to whole abdominal radiotherapy or adriamycin/cisplatin chemotherapy. Survival

ANSWER KEY

than chemotherapy c. That survival was improved in the radiation arm d. That radiation had a lower pelvic control rate than chemotherapy e. That taxol, adriamycin and platinum were more efficacious than carboplatin and taxol	and progression free survival was improved with chemotherapy but pelvic control was better in the radiotherapy arm (21% vs 26% any pelvic failure). Gastrointestinal toxicity was worse in the chemotherapy arm (20% chemotherapy vs 13% RT).

REFERENCE FOR QUESTION 6

Randall ME, Filiaci VL, Muss H, Spirtos NM, Mannel RS, Fowler J, Thigpen JT, Benda JA; Gynecologic Oncology Group Study. Randomized phase III trial of whole-abdominal irradiation versus doxorubicin and cisplatin chemotherapy in advanced endometrial carcinoma: a Gynecologic Oncology Group Study. J Clin Oncol. 2006 Jan 1;24(1):36-44.

PRESENTATION 3: **Techniques: IMRT / Brachytherapy**

QUESTION 7	DISCUSSION RE: ANSWER OPTIONS
Brachytherapy is significantly better than IMRT or SBRT for a boost for cervical cancer for the following reasons except: a. IMRT increases the integral dose given to the surrounding normal tissues b. IMRT requires continual replanning c. SBRT provides as much desired inhomogeneity, with the highest regions of dose in the center of the tumor, as brachytherapy d. Brachytherapy moves with the patient e. Brachytherapy provides high regions of dose in the center of the tumor	Answer C. SBRT does not provide the high regions of dose (up to 500% of prescription) as brachytherapy does in the center of the tumor. Slide 36-39

REFERENCE FOR QUESTION 7

Georg D, Kirisits C, Hillbrand M, Dimopoulos J, Pötter R. Image-guided radiotherapy for cervix cancer: high-tech external beam therapy versus high-tech brachytherapy. Int J Radiat Oncol Biol Phys. 2008 Jul 15;71(4):1272-8. Epub 2008 May 19.

QUESTION 8	DISCUSSION RE: ANSWER OPTIONS
Which of the following applicators is not routinely used for locally advanced cervical cancer brachytherapy: a. Tandem and ovoid b. Tandem and ring c. Tandem and cylinder d. Tandem and interstitial e. Vaginal cylinder	Answer: E Slides 44-47

REFERENCE FOR QUESTION 8

Petereit DG, Eifel PJ, Thomas GM. Cervical cancer. In: Gunderson LL, Tepper JE, editors. Clinical radiation oncology. Philadelphia, Pa: Churchill Livingstone, 2000:886–907.

QUESTION 9	DISCUSSION RE: ANSWER OPTIONS
What are some of the standard indications for interstitial brachytherapy? a. Vaginal extension of cervical cancer	Answer D Slide 48

ANSWER KEY

b. Large cervical mass with no evident cervical os c. Fistulization into bladder or bowel due to stage IVA cervical cancer d. post-operative vaginal cuff treatment for stage IA disease e. recurrent vaginal disease after a hysterectomy	Post-operative vaginal cylinder brachytherapy may be indicated for early stage disease, but interstitial brachytherapy is not.

REFERENCE FOR QUESTION 9

Petereit DG, Eifel PJ, Thomas GM. Cervical cancer. In: Gunderson LL, Tepper JE, editors. Clinical radiation oncology. Philadelphia, Pa: Churchill Livingstone, 2000:886–907.

QUESTION 10	DISCUSSION RE: ANSWER OPTIONS
The difference between CT and MR-based contouring of the cervix in 3D planned image-guided tandem/ring brachytherapy is most pronounced when contouring the: a. cervix b. bladder c. rectum d. sigmoid e. femoral heads	Answer: A Slide 64-67

REFERENCE FOR QUESTION 10

Viswanathan AN, Dimopoulos J, Kirisits C, Berger D, Poetter R. CT- versus MR-based Contouring in Cervical Cancer Brachytherapy: Results of a Prospective Trial and Preliminary Guidelines for Standardized Contours. Int J Radiat Oncol Biol Phys 2007 Jun 1;68(2):491-8.

QUESTION 11	DISCUSSION RE: ANSWER OPTIONS
When utilizing 3D imaging to optimize treatment planning to the cervix, one will notice the following about reporting point A: a. point A lies outside of the contoured cervix when the cervix is greater than 5 cm b. point A lies outside of the contoured cervix when the cervix is less than 3 cm c. point A lies inside the contoured cervix when the cervix is less than 3cm wide d. the dose to point A remains a constant regardless of where the prescription line surrounding the cervix lies e. the dose to point A will vary based on the number of days between fractions	Answer: B Slide 70 When contouring, the physician will delineate the cervix based on its visualized dimensions. If the cervix is greater than 4cm, point A will lie inside the contours. If the cervix is less than 4cm, point A will lie outside of the contours. If one utilizes the D90, the prescription line will cover the cervical contour, and the dose to point A will vary. The dose to point A will not vary based on the number of days between fractions.

REFERENCE FOR QUESTION 11

Petereit DG, Eifel PJ, Thomas GM. Cervical cancer. In: Gunderson LL, Tepper JE, editors. Clinical radiation oncology. Philadelphia, Pa: Churchill Livingstone, 2000:886–907.