



Penn-Ohio Chapter
of the
American Association of Physicists in Medicine

2010 FALL SYMPOSIUM PROGRAM

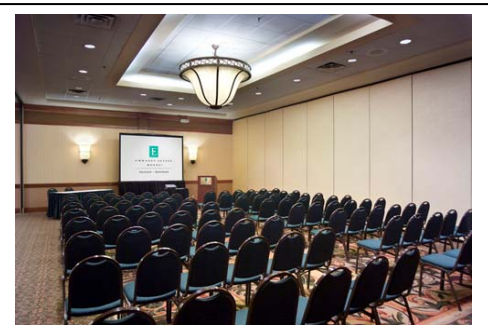
“Seeing a target, hitting a target – and keeping it safe”

Embassy Suites

**3775 Park East Drive, Beachwood, Ohio
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Friday, October 1, 2010

Saturday, October 2, 2010



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Penn-Ohio Chapter 2010 Fall Symposium

PROGRAM OF EVENTS (CAMPEP and MDCB approved credit pending)

Friday – 10/01/10 – Embassy Suites – Beachwood, Ohio

12:00 noon Registration and set-up
1:00 pm Welcoming remarks, Greg Bednarz and Barry Wessels

Proffered Abstracts - Session 1

- 1:15 FP1: Quality Assurance for HDR Treatment Planning: Use of Failure Modes and Effects Analysis. Allan Wilkinson, MD Kolar and JJ Juliano, CFF
- 1:30 FP2: Intraoperative Radiation for Treatment of Breast Cancer. Dan Pavord, Health Quest
- 1:45 FP3: New Developments in CyberKnife Planning and Treatment: Iris Collimator. Jeffrey Fabien, James Brindle, Yuxia Zhang, and Barry Wessels, UHCMC
- 2:00 FP4: Development of a Normal Tissue Dose-Tolerance Limit Reference for Hypo-Fractionated Radiotherapy as a Function of Alpha/Beta Ratio and Irradiated Volume. Raymond Wynn and Ravi Bhatnagar, UPMC
- 2:15 FP5: Isoeffective Dose Specification of Normal Liver in Yttrium-90 Microsphere Radioembolization. Yiran Zheng, A.G. Di Dia, M.Cremonesi, and Barry Wessels, UHCMC and European Inst of Oncol.
- 2:30 FP6: A Comparison of 2-Dimensional and 3-Dimensional Methods of Estimating Lung Dose in Therapeutic Patients. Naichang Yu, Ping Xia, and Allan Wilkinson, CCF
- 2:45 **Break** - 30 mins - **View Exhibits**

Exhibitor's Forum - Session 2

- 3:15 FE1: Brainlab Radiosurgery for Brain and Body. Jennifer Adams, M.S. Regional Marketing Manager, Oncology Solutions, Brain Lab Inc.
- 3:45 FE2: Elekta Advanced Technology. Ronald Gabianelli, Vice President of Sales Elekta, Inc

4:15 FE3: SuperDimension: A System used to place fiducial markers in the lung.
Tom Gildea, M.D., Dept. of Surgery, Cleveland Clinic Foundation

Proffered Abstracts - Session 3

4:45 FP7: Beam's-eye-view MV Fluoroscopy during SBRT for tumor tracking and treatment verification. James Christensen, Alexander Kirichenko, Athanasios Colonias and Olivier Gayou, WPAHS

5:00 FP8: Localizing a moving tumor with megavoltage cone beam CT. Olivier Gayou and Athanasios Colonias WPAHS

5:15 FP9: Composite Dose Calculation Using Shifting Dose Matrix Method for Prostate Movement. Guangshun Huang and Ping Xia, CCF

5:30 - Light Hors d'oeuvres and cash bar in exhibit area

Dinner starting at 6:45 pm at PF Chang's China Bistro, Beachwood, Ohio – First Seating

Saturday – 10/02/10

Invited Presentations - Session 4

8:00 SI01: Incorporation of Functional Imaging for RTP and Adaptive Therapy. John Bayouth, Ph.D, Univ. of Iowa

8:40 SI02: Designer Radiotherapy using Functional Imaging – Clinical Consideration. Peter Faulhaber, M.D., Univ Hospitals Case Medical Center

9:20 SI03: Clinical Experience with Arc Therapy. Jackie Wu, Ph.D., Duke University

10:00 SI04: Motion Management for Patients Undergoing Radiation Therapy. Touflk Djemil, Ph.D, Cleveland Clinic Foundation

10:40 **Break** – 30 mins. **View Exhibits**

Invited Presentations - Session 5

11:10 SI05: Evaluation of Patient Positioning Accuracy during Stereotactic Spinal Radiosurgery Using Cone Beam CT. Mubina Quader , Ph.D, Univ. of Pittsburgh Medical Center

11:50 SI06: Patient Safety Post New York Times. James Galvin, Ph.D, Thomas Jefferson University

12:30 SI07 **Lunch and Panel Discussion** – Invited speakers – The Impact of Functional Imaging on IGRT and SBRT – and is it safe? John Bayouth, Ph.D., Univ. of IOWA, Moderator

1:15 - 1:45 pm - **Chapter Business** – Barry Wessels and Greg Bednarz

Proffered Abstracts – Friday Session – Oct 1, 2010

FP1: QUALITY ASSURANCE FOR HDR TREATMENT PLANNING: USE OF FAILURE MODES AND EFFECTS ANALYSIS

DA Wilkinson, MD Kolar, and JJ Juliano
Radiation Oncology
Cleveland Clinic

Purpose: To apply Failure Modes and Effects Analysis (FMEA) to HDR treatment planning in order to identify the most likely and significant sources of error in the process.

Methods and Materials: We have made a list of 24 failure modes grouped into six categories (imaging, catheter reconstruction, dwell position activity, dose points/normalization, optimization/dose, and evaluation) based on our experience with the Nucletron Plato and Oncentra planning systems. Each mode was then rated on a 1-5 scale for severity, likelihood of occurrence, and probability of escaping detection. An overall ranking is formed from the product of the 3 scores (1-125). Severity was ranked according to potential harm to the patient (notably under dosing was not considered) and was based on the NCI Common Terminology Criteria for Adverse Events handbook v 4.0. The authors assigned scores independently and the resulting rankings were averaged. We have also analyzed 44 recent reported medical events related to HDR treatment planning listed on the NRC website and compared with our own rankings.

Results: Failure modes associated with image sets, catheter reconstruction, indexer length and incorrect dose points had the highest ranking in our analysis (scores > 20). The most often cited failure modes in the NRC reports examined were indexer length (20/44) and incorrect dose points (6/44). Several of our high-ranking modes are not associated with reported events.

Conclusion: It is a useful exercise to identify failure modes locally and analyze the efficacy of the local quality assurance program. Comparison with nationally reported failures can help direct the local analysis, but the absence or small number of reports for failure modes with a high score may be due to low detectability. Such modes obviously cannot be ignored.

FP2: Intraoperative Radiation for Treatment of Breast Cancer

Dan Pavord, Chief Medical Physicist, Vassar Brothers Medical Center

Purpose: Recent studies have shown the equivalence at 4 years follow up of a single dose of radiation delivered in the OR at the time of lumpectomy to the conventional 6 weeks of external beam radiation delivered post surgically. The treatment of a single large dose of radiation requires a strict safety program to ensure an accurate delivery. The process from acceptance of the equipment, calculation of treatment times, placement of the applicator within the patient, monitoring of the dose rate during the treatment, and verification of the delivered dose are discussed.

Methods and Materials: At our institution we use the Intrabeam system from Zeiss. The manufacturer's data for absolute dose rate and depth dose were verified using parallel plate and cylindrical chambers in water and in plastic water. Based on our institutions prescription of 600cGy at 1cm from the surface, independent treatment time tables were generated to confirm the console values for each treatment. The position of the applicator, tissue conformance, and proper skin distance is verified with ultrasound prior to treatment. One Dose mosfet detectors are placed at the closest point on the skin to the applicator and on the contralateral breast. During the treatment, the internal radiation monitor on the Intrabeam system tracks the dose rate to confirm accurate delivery.

Results: The manufacturer's data was confirmed to within 5%/1mm for dose rate and depth dose. The skin doses measured with the mosfet detectors agreed with calculated values within 20%. This is reasonable given the uncertainty in the exact placement of the device. The average contralateral breast dose was 2.4 cGy, minimum and maximum were 1.2 and 4.7 cGy.

Conclusion: All results have agreed well with calculated values.

FP3: New Developments in CyberKnife Planning & Treatment: Iris Collimator

Jeffrey Fabien, MS, James Brindle, Ph.D, Yuxia Zhang, MS, Barry Wessels, Ph.D

Purpose:

To disseminate recent advancements in the CyberKnife radiosurgery system from Accuray including the Iris variable aperture collimator and Xchange robotic collimator exchange table and to explain the benefits and commissioning process of the upgrades at University Hospitals, along with the challenges encountered as a result.

Method and Materials:

The CyberKnife installation at University Hospitals was upgraded during the first quarter of 2010. New equipment included the Iris variable aperture collimator, the required Xchange table and changes to the linear accelerator components and software components of the system. Information was compiled from the collective experiences of

the authors and other key individuals assisting in the commissioning and use of the new CyberKnife components at University Hospitals. Additional background and supporting information was collected from documentation and training materials provided by Accuray.

Results:

The Iris collimator allows the use of up to twelve collimator sizes on a single path in a treatment plan; using more than two or three fixed collimators previously would have made for an unreasonably time-consuming treatment. The upgrades to the physical components of the linear accelerator allowed an increase of the dose rate from 600 MU/min to 800 MU/min. The changes to the software included path optimization which allows the treatment head to skip over zero-dose nodes of a treatment path which further reduces treatment time.

Conclusion:

The upgrades installed and commissioned will allow a much more conformal treatment plan due to the use of up to twelve different collimator sizes. Additionally, all the sizes can be utilized on a single, optimized treatment path and increased dose rate that greatly reduce treatment times of even very complex plans.

FP 4: Development of a Normal Tissue Dose-Tolerance Limit Reference for Hypo-Fractionated Radiotherapy as a Function of Alpha/Beta (α/β) Ratio and Irradiated Volume

Raymond B. Wynn, M.D., FACR^{*}, Ravi Bhatnagar, Ph.D.*

The Regional Cancer Center- (A University of Pittsburgh Medical Center Affiliated Cancer Center)
2500 W, 12th St., Erie, PA 16505.

Purpose/Objective(s): The goal of this study is to develop normal tissue dose-tolerance limits based on a range of α/β ratios (0.01 - 10.0) and irradiated volumes for clinically acceptable end points. Converting doses used in conventionally fractionated radiation therapy, we will obtain values to be used in hypo-fractionated treatment regimens intended for Brain/Head & Neck, Thorax, Abdomen and Pelvic sites for use by clinicians as a reference.

Materials/Methods: Recent technical advances have created a need for better understanding the correlation of α/β ratio and conventional normal tissue tolerance dose limits for various fractionation schemes as dose escalation and hypo-fractionation schemes have been attempted. The Linear-Quadratic (LQ) Model was used to determine equivalent prescription dose for hypo-fractionated schemes assuming α/β ratio of 3 and 10 for cancerous and normal tissues respectively. Recent publications have raised valid questions on the assumption of α/β ratio of 3 for cancerous tissue. This provokes additional questions on the validity of hypo-fractionation and dose escalation regimens currently used. Keshwar(1), Milano(2) and Timmerman (3) have compiled extensive data from published literature as well as RTOG protocols on α/β ratio, percentage of volume irradiated, total dose delivered and clinical end points for a variety of organs.

In this study, the (Linear Quadratic) LQ model has been used to calculate and create equivalent hypo-fractionated dose for a range of α/β from 0.01 to 10.0 and total dose of 20 Gy to 120 Gy delivered in one (1) to five (5) fractions. The Biologically Equivalent Dose (BED) is equal to $nd [(1 + d / (\alpha/\beta))]$ where n is the number of fractions, d is dose per fraction. These equivalent doses have been combined with clinically accepted and published dose limits used in various RTOG protocols.

Results: Figures 1 and 2 represent hypo-fractionated dose for Biologically Equivalent dose of 45 Gy, 80 Gy and 120 Gy. The resulting data has also been tabulated for various clinically relevant organs in four body regions: Brain/Head & Neck, Thorax, Abdomen and Pelvis. Convenient, user-friendly, reference tables for normal tissue tolerance doses have been created for clinical use.

Conclusions: This development of concise tables of data that include clinically relevant, interconnected parameters in one place will enable clinicians to customize hypo-fractionated treatment schemes. By converting well-known conventional normal tissue tolerances to a convenient, user-friendly, digital reference, this data can facilitate further testing of the α/β hypothesis and safe utilization of hypo-fractionated treatments in clinical radiotherapy. These reference data tables may also influence developing consensus for hypo-fractionation schemes intended for various clinical sites.

FP 5: Isoeffective Dose Specification of Normal Liver in Yttrium-90 Microsphere Radioembolization

Authors: Yiran Zheng¹, A.G. Di Dia², M. Cremonesi², Barry W. Wessels¹,

Institution: ¹University Hospitals Case Medical Center, Cleveland, Ohio, USA
²Unit of Medical Physics, European Institute of Oncology, Milan, Italy

Purpose: Yttrium-90 microsphere radioembolization (RE) treatment delivers heterogeneous dose to normal liver with exponentially decaying dose-rate. In this work, the Isoeffective Dose Model was used to estimate the equivalent dose of Yttrium-90 radioembolization in 2 Gy daily fractionated scheme.

Method and Materials: Isoeffective Dose Model relates the biological effect of one radiation given at various dose-rates, non-uniformity of deposition and/or particle type to a standard uniform photon irradiation given in daily 2 Gy fractions. The biological effect of the absorbed dose compared to the reference irradiation would be scaled by the introduction of dimensionless weighting factors (e.g. W_{BED} , W_{EUD} , and W_{RBE}). As a first approximation, weighting factors were assumed to be linearly related, resulting in the BED (Biological Effective Dose) and EUD (Equivalent Uniform Dose) weighting factors to be calculated separately and expressed as:

$$W_{BED} = \frac{\text{Equivalent dose to NL in 2 Gy daily fractions}}{\text{Mean Absorbed dose to the NL}} \quad (1)$$

$$W_{EUD} = \frac{\text{EUD for DVH data of absorbed dose}}{\text{Mean Absorbed dose to the NL}} \quad (2)$$

The weighting factor W_{RBE} is taken as simply the RBE. Finally, the isoeffective dose was computed as:

$$D_{IsoE} = W_{BED} \times W_{EUD} \times W_{RBE} \times \text{Mean Absorbed dose to the NL} \quad (3)$$

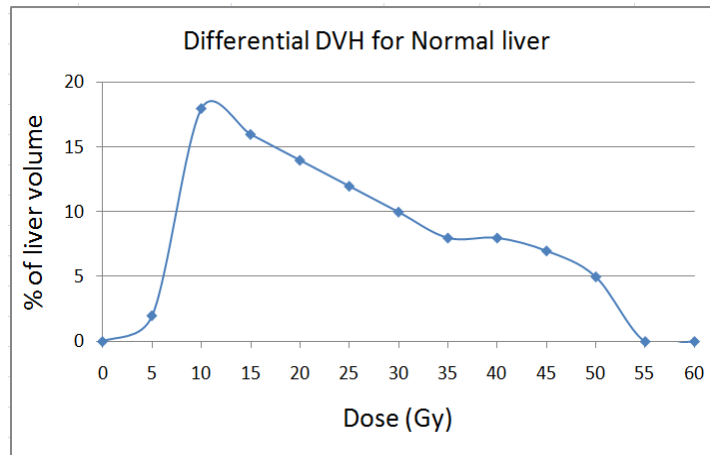


Fig. 1. DVH for normal liver

Results: As an illustrative example, a typical DVH of normal liver after Y-90 radioembolization obtained from ^{99m}Tc -MAA SPECT images is shown in Fig. 1 with α of 0.3 Gy^{-1} , α/β ratio of 2.5 Gy, and $T_{1/2 \text{ repair}}$ of 1.5 h were used in the BED model and basic EUD model. A mean absorbed dose to the NL was computed to be 27.4 Gy. W_{BED} , W_{EUD} , W_{RBE} were calculated as 0.72, 0.62, 1.0, respectively. Final D_{IsoE} was 12.2 Gy.

Conclusions: The novel application of the Isoeffective Dose Model was shown to provide a direct association between RE dosimetry and external beam normal organ dose toxicity data through the use of BED, EUD and RBE weighting factors. The non-linear relationship between BED and EUD weighting factors over a practical range of clinically relevant parameters (e.g. $T_{1/2 \text{ rep}}$, $T_{1/2}$, absolute dose rate, and tissue radiosensitivity) warrants further study.

FP6:

A Comparison of 2-Dimensional and 3-Dimensional Methods of Estimating Lung Dose in Therasphere Patients

Naichang Yu, Ping Xia, Allan Wilkinson
Department of Radiation Oncology
Cleveland Clinic

Background

- Radioembolization is a treatment for liver cancer in which radioactive ^{90}Y seeds are permanently placed in and around the lesion.
- This type of treatment has the advantage of concentrating on the tumor and therefore minimizing the risk of damaging nearby normal tissues.
- The primary concern during the planning process of the treatment is to estimate the shunt to the lung; a significant amount of shunting to the lungs can cause radiation pneumonitis.
- The current approach is to estimate the lung dose using a 2-dimensional method (2-D).
- It has been repeatedly noticed that the actual lung dose is much less than the estimated one from the 2-D method, thus suggesting that it is an ineffective method. A 3-dimensional method (3-D) of estimating lung dose has been suggested, but it is yet inconclusive on its effectiveness.

Background

- The current approach is to estimate the lung dose using a 2-dimensional method (2-D).
- Lack of attenuation correction and motion correction suggests that 2D method may not be accurate.
- Clinical outcome suggests the clinical method used overestimates the actual dose to the lung (50 Gy to the lung in 2 sessions leads to no pneumonitis in 50 patients).
- 3D SPECT based on MAA is routinely acquired for each patient treated before treatment.

 Cleveland Clinic

Purpose

- The purpose of this project was to determine if the 2-D method or one of the 3-D methods of estimating the lung dose is more effective.

 Cleveland Clinic

Methodology

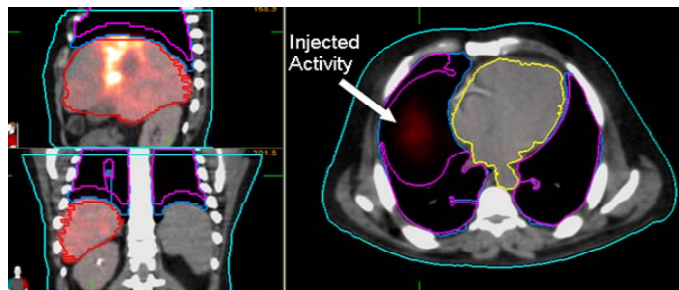
- Images of 73 patients who had CT scan prior to radioembolization were analyzed retrospectively.
- MIMVista 4.4 was used to:
 - Contour the body and lung volumes on attenuation correction CT slices
 - Re-contour the lungs by excluding the lung region within 2 cm of the diaphragm to account for breathing-related misregistration
 - Collect dosimetry data of each contour

 Cleveland Clinic

Methodology

- For the 2-D estimate, the lung dose was calculated assuming a lung mass of 1 kg and 50 Gy per GBq of injected activity shunted to the lungs.
- For the 3-D estimate, the lung dose was calculated with the injected activity, the volumes of the region, and an assumed lung density of 0.3 g/cm³. The lung dose was calculated using four different data to delineate the effect of attenuation correction (AC) and border exclusion (BE):
 - SPECT with attenuation correction SPECT
 - SPECT with attenuation correction and border exclusion
 - SPECT without attenuation correction (NC)
 - SPECT without attenuation correction and with border exclusion

Methodology



Graphs not shown here

Conclusions

- The 3-D method predicts significantly smaller lung dose than the conventional 2-D method.
- Border exclusion for breathing motion correction and attenuation correction are important effects to consider for accurate estimation of the lung shunt.

	2D Dose (Gy)	AC & BE Dose (Gy)
Range	0.31- 37.65	0.15 – 21.81
Mean	7.96	3.37
Median	4.94	1.80

FP7: Beam's-eye-view MV fluoroscopy during SBRT for tumor tracking and treatment verification

AUTHORS: James Christensen, Alexander Kirichenko, Athanasios Colonias and Olivier Gayou
 INSTITUTION: Allegheny General Hospital, Department of Radiation Oncology, Pittsburgh, PA

Purpose The radiotherapy treatment beam captured in megavoltage fluoroscopy (MVF) mode contains a record of tumor motion during treatment. This study's objectives were to use MVF to: 1) verify whether a tumor remains fully within the treatment beam; and 2) assess the reduction of tumor motion during the beam-on period by respiratory gating.

Method and Materials Electronic portal imaging was used to capture beam's-eye-view fluoroscopic movies of target movement within the treatment beam during SBRT. Dose rate was 300 MU/min; no imaging dose beyond the treatment dose was required. Images were captured at 7-13 frames/sec. Three lung cancer and 2 liver cancer patients were studied over 5 fractions each; 2 were respiratory gated. For liver tumors, implanted gold fiducial markers and surgical clips provided surrogates of tumor motion. Custom image analysis and tracking software was written using MeVisLab/VTK/ITK. Deformable registration between image frames was used to warp tumor contours and compute the tumor center of mass and tumor borders relative to the ITV/PTV as a function of time.

Results MVF tumor tracking yielded tumor range-of-motion measurements of 4-10 mm in the lung cancer patients, and liver fiducial tracking yielded motion measurements of 14mm and 11mm in the liver cancer patients. Large tumor motions due to infrequent large inspirations were reduced by respiratory gating with 75% inspiration threshold. Ungated motion was measured

from pre-treatment cone-beam projection data. Gating reduced the tumor range of motion from 14mm to 9mm for the lung patient and from 17mm to 14mm for liver patient.

Conclusions Motion measured via MV fluoroscopy during SBRT can be used to verify whether planned margins are adequate and evaluate the effectiveness of respiratory gating. Future work towards real-time processing could provide control signals for gating or dynamic multi-leaf collimators.

FP8: Localizing a moving tumor with megavoltage cone beam CT

Olivier Gayou and Athanasios Colonias
Allegheny General Hospital

Purpose: To evaluate mega-voltage cone-beam computed tomography (MV-CBCT) imaging of moving tumors. **Method and Materials:** Twelve patients treated for early stage non-small cell lung cancer using stereotactic body radiation therapy (SBRT) were analyzed. Simulation images were obtained with a Siemens Sensation Open 4D-CT scanner. The Internal Target Volume (ITV) comprised of the tumor in each phase of the 4D-CT was created. The GTV was also contoured on a fast free-breathing CT. Daily localization was performed with MV-CBCT on a Siemens Artiste linear accelerator with the imaging beam line system. The tumor was contoured on each daily CB image. The size of the planning ITV and GTV contours were compared in the anterior-posterior (AP), left-right (LR) and superior-inferior (SI) directions, to the size of the tumor contour on the MC-CBCT images. **Results:** In the majority of cases the standard deviation of the MV-CBCT contour size from day to day was less than 2 mm. The average difference between 4D-CT ITV and CBCT contour size was -2.5 ± 3.9 mm, -3.1 ± 3.3 mm and -2.7 ± 4.8 mm in the AP, LR and SI direction, respectively. The difference between the free-breathing GTV and CBCT contour size was 0.9 ± 1.9 mm, 0.4 ± 1.8 mm and 2.7 ± 4.9 mm, respectively. **Conclusion:** In the AP and LR directions, the free-breathing GTV is closer to what is identified as tumor on the MV-CBCT image. However in the SI direction, which is typically more affected by respiratory motion, the 4D-CT ITV is larger than the CBCT contour and the free-breathing GTV is smaller. Further analysis of the correlation between these differences and tumor size and motion amplitude is underway. A careful interpretation of how a moving tumor appears on a CBCT image is necessary to avoid any patient misalignment and to derive appropriate setup and motion margins. Research partially supported by Siemens Medical Solutions.

FP9:

Composite Dose Calculation Using Shifting Dose Matrix Method for Prostate Movement

G.S. Huang, P. Xia

Department of Radiation Oncology, Cleveland Clinic, Cleveland, OH 44195

Purpose: To evaluate the dose variation due to prostate motion in intensity-modulated radiotherapy (IMRT) treatment fraction using shifting dose matrix method.

Methods and Materials: A method was developed to translate the dose space distribution according to measured shifts. The code was written in MATLAB and based on the Computational Environment for Radiotherapy Research (CERR) software, and performs the dose matrix translation and dose recalculation. This shifting dose matrix method was applied to 20 prostate cancer patients treated at Cleveland Clinic with daily cone-beam computed tomography (CBCT) shift data. The composite dose was calculated with the shifted dose matrix and compared to the static dose for the prostate and the planning target volume (PTV).

Results: For the 20 cases examined, the difference in prostate dose is typically within 0.5%, with an exception of 3.5%; for PTV it is mostly within 5%, with an exception up to 11.2%. The rectal and bladder toxicities change less than 20%.

Conclusion: The overall dose change due to prostate motion is small. This is an indication that the planning margin can be reduced.

Conflict of interest: none.

Exhibitor's Forum – Please see Sponsor's table display for more details and literature regarding presentation

Invited Speakers – Saturday – 10/2/10

SI 01 :

Title: Incorporation of Functional Imaging for RTP and Adaptive Therapy

Speaker: John Bayouth, Ph.D., University of Iowa

Educational Objectives:

1. Understand the types of imaging modalities used to guide RTP.
2. Discuss how functional and anatomic target contours affect adaptive therapy planning.

Outline

- I. Introduction to Functional Imaging methodology
- II. Image segmentation
- III. Defining the Target PTV and CTV
- IV. Motion management and Adaptive Therapy planning

SI 02:

Title: Designer Radiotherapy using Functional Imaging - Clinical Consideration

Speaker: Peter Faulhaber, M.D., University Hospitals Case Medical Center

Educational Objectives_- Participant should be able to:

1. Ascertain the role of MR and radioactive tracers studies in target definition
2. Discuss how functional and anatomic information affect adaptive therapy planning.

Outline

- I. Introduction to Functional Imaging methodology – Clinical perspective
- II. How does the clinician ascertain “viability” of target and normal structures
- III. Comparison of multiple readers target definition on quality of RTP
- IV. The role functional imaging in clinical trial design for radiation therapy

SI 03:

Title: Clinical Experience with ARC Therapy

Speaker: Jackie WU Ph.D., Duke University

Educational Objectives - Participant should be able to:

1. Understand the principles of Arc therapy
2. Compare ARC therapy accuracy and efficiency to other forms of treatment

Outline

- I. Introduction the concept of ARC therapy
- II. Discuss how ARC therapy has been used in the past for radiation therapy
- III. Present improvements in hardware and computer controlled MLC therapy for ARC therapy
- IV. Review the evidence-based reports on clinical efficacy compared to other forms of RT

SI 04:

Title:

Motion Management for Patients Undergoing Radiation Therapy

Speaker:

Toufik Djemil, Ph. D, Cleveland Clinic Foundation

Educational Objectives: - Participant should be able to:

1. Identify sources of uncertainty in patient positioning
2. Discuss how to track patient respiratory motion during RT

Outline

- I. Introduction to patient positioning methods
- II. Review the role of immobilization devices
- III. Accounting for random and systemic motion
- IV. Motion management and Adaptive Therapy planning

SI 05:**Title:**

Evaluation of Patient Positioning Accuracy during Stereotactic Spinal Radiosurgery Using Cone Beam CT

Speaker:

Mubina Quader, Ph. D, Univ. of Pittsburg Medical Center

Educational Objectives:- Participant should be able to:

1. Understand the problems associated with motion management for SBRT patients
2. Compare Cone Beam CT positioning accuracy with other localization mechanisms

Outline

- I. Introduction to patient positioning methods for SBRT
- II. Review the role of Cone Beam CT in target and normal organ localization
- III. Size and shape of target – role of 6 D couch adjustments
- IV. Verification of delivered dose – Post plan analysis

SI 06:**Title:**

Patient Safety Post New York Times

Speaker:

James Galvin, Ph. D, Thomas Jefferson University

Educational Objectives: Participant should be able to:

1. Understand the regulatory environment after the publishing of the New Times articles
2. Discuss the risk/benefit analysis of the radiation incidents cited by the articles and potential impact to practice of medical physics

Outline

- I. Review the main points brought up the NY times series of articles
- II. What are the corrective actions taken to date
- III. Discuss whether the cited claims are evidenced based in terms of risk benefit analysis?
Implications for patient safety
- IV. Moving forward, extrapolate how the regulatory environment may change