Issue 30: September 2015

AccuBoost®
for image guided breast irradiation

BOOSTER CLUB
NEWSLETTER

CEO'S CORNER

The news that Theragenics has been selected as the sales and distribution partner for AccuBoost dominates this issue. Theragenics is a well-recognized force in the brachytherapy market and their contribution is expected to expand awareness and accelerate broader adoption of the technology. Other topics covered in this issue include the plan to exhibit at this year's ASTRO and AccuBoost media coverage. The issue highlights a recent featured article from the cover of the Journal of Contemporary Brachytherapy. It describes the 3D dosimetry of AccuBoost based on biomechanical modeling of breast tissue deformation using a finite element analysis model and Monte Carlo simulation data.

INSIDE THIS ISSUE:

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ACCUBOOST SELECTS THERAGENICS FOR SALES AND DISTRIBUTION IN THE US

The Theragenics/AccuBoost team at the kick-off celebration dinner

AccuBoost has selected Theragenics Corporation®, an established and well-respected company in the radiation therapy market, for sales and distribution. Under the terms of the agreement, Theragenics will engage its sales force and considerable marketing expertise in radiation oncology to increase AccuBoost presence in the marketplace.

"Theragenics has a demonstrated history of providing life-saving treatment options for early stage cancer patients. Additionally, their ability to communicate directly to patients is unparalleled in the industry. We are excited to be working with Theragenics!" stated Piran Sioshansi, Ph.D. President and CEO of Advanced Radiation Therapy, in the news release announcing the relationship.

"This is an exciting step in our history," stated Frank J. Tarallo, Chief Executive Officer of Theragenics Corporation. "For over 30 years we have supported the radiation oncology community with our brachytherapy products for the treatment of men with early stage prostate cancer, and we will continue to do so. AccuBoost allows us to utilize our expertise to provide an excellent brachytherapy treatment option for women with early stage breast cancer. Throughout our history our message to men with prostate cancer has been to know the treatment options. We intend to deliver the same message to breast cancer patients. AccuBoost underscores our mission of supporting

Continued...

VISIT ACCUBOOST DURING ASTRO
TARGETING CANCER CARE

October 18-20, San Antonio

AccuBoost® : Booth 486
for image guided breast irradiation

THERAGENICS CORPORATION® : Booth 471

ACCUBOOST IN THE NEWS

The AccuBoost launch in the Denver market was featured recently as part of the ABC Evening News. On July 14, 2015 Channel 7 news anchors interviewed David Schreiber, MD and Pam McCance, the first patient in Colorado treated with AccuBoost. In the exchange, Dr. Schreiber points out the attractive features the technology while the patient, Pam McCance, retells her personal experience and total satisfaction with the procedure.

The news segment is viewable from the AccuBoost website *www.accuboost.com* by accessing the News tab.

Catheryn Yashar, MD
Chief of Gynecological & Breast Radiation Services at Moores Cancer Center, UC San Diego

"I am amazed at how easy it was to bring the technology on board. The launch of AccuBoost was so easy, with practically no disruption in our day-to-day activities."

ACCUBOOST SELECTS THERAGENICS *(cont.)*

Frank J. Tarallo, CEO of Theragenics & Piran Sioshansi, President and CEO of AccuBoost

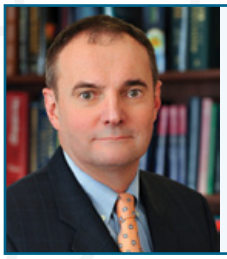
the cure of cancer and expands on our longtime commitment to the radiation oncology community."

Mr. Tarallo continued, "Our established distribution channels in the radiation oncology market segment will make AccuBoost more widely available and expand treatment choices, a well-deserved break for breast cancer patients."

ASTRO TARGETING CANCER CARE — ACCUBOOST TO EXHIBIT AT ASTRO 2015

This is the 9th consecutive year that AccuBoost is participating in the annual American Society of Therapeutic Radiology and Oncology conference. This year's ASTRO meeting, October 18-21, is in San Antonio. A major focus at this year's exhibit will be the introduction of Theragenics, the sales and distribution partner for AccuBoost. A number of events, focusing on this partnership, are planned during ASTRO.

In addition to exhibiting the latest developments and hardware, AccuBoost will have a "Meet the Expert" Q&A session at the booth. This session provides the opportunity for present and pending AccuBoost users to meet, exchange ideas and share the latest findings. The in-booth presentation details are shown below.



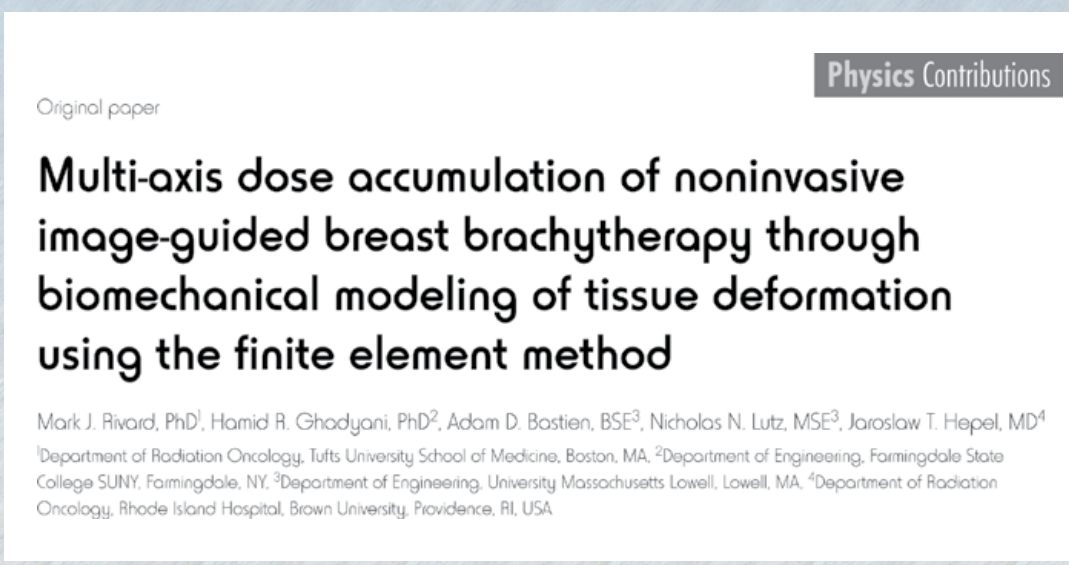
Sunday, October 18th, 3:00-4:00 pm in Booth 486

"What I find compelling about AccuBoost"

David Wazer, MD

Radiation Oncologist-in-Chief; Chairman, Department of Radiation Oncology, Rhode Island Hospital; Chairman and Professor, Tufts University School of Medicine

ACCUBOOST DOSIMETRY DISPLAYED ON THE COVER OF CONTEMPORARY BRACHYTHERAPY


Physics Contributions

Original paper

Multi-axis dose accumulation of noninvasive image-guided breast brachytherapy through biomechanical modeling of tissue deformation using the finite element method

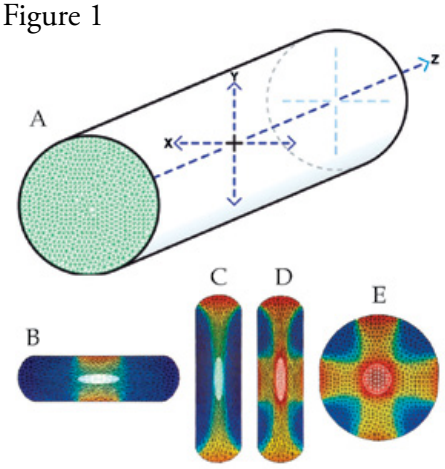
Mark J. Rivard, PhD[1], Hamid R. Ghadyani, PhD[2], Adam D. Bastien, BSE[3], Nicholas N. Lutz, MSE[3], Jaroslaw T. Hepel, MD[4]

[1]Department of Radiation Oncology, Tufts University School of Medicine, Boston, MA, [2]Department of Engineering, Farmingdale State College SUNY, Farmingdale, NY, [3]Department of Engineering, University Massachusetts Lowell, Lowell, MA, [4]Department of Radiation Oncology, Rhode Island Hospital, Brown University, Providence, RI, USA

AccuBoost dosimetry is the feature article in the recent issue of the Journal of Contemporary Brachytherapy with the output of the AccuBoost dose model is displayed on the cover of the magazine. Mark Rivard, Ph.D. and his co-authors in this article, report on the development of a biomechanical model to register the composite dose to breast tissue when immobilized by parallel plates and irradiated from two different directions. The model uses a finite element analysis model to track the breast tissue and register the dose that it receives when immobilized on two different axes – as commonly practiced in the AccuBoost procedure. The findings of this study are summarized below:

Method – The model assumes that breast is a 15 cm right cylinder, under compression on two different axes. Breast tissue with typical Young's modulus (30 kPa) and Poisson's ratio (0.3) is under planar stress sequentially on each axis. A Finite Element Analysis (FEA) is applied to model the breast as it steps through varying levels of compression in small increments. Three Dimensional Monte Carlo (MC) simulation data is applied to the breast when immobilized along one axis and then tracks the dose distributions as the breast is relaxed and subsequently immobilized on a different axis, as graphically shown in Figure 1.

Figure 1



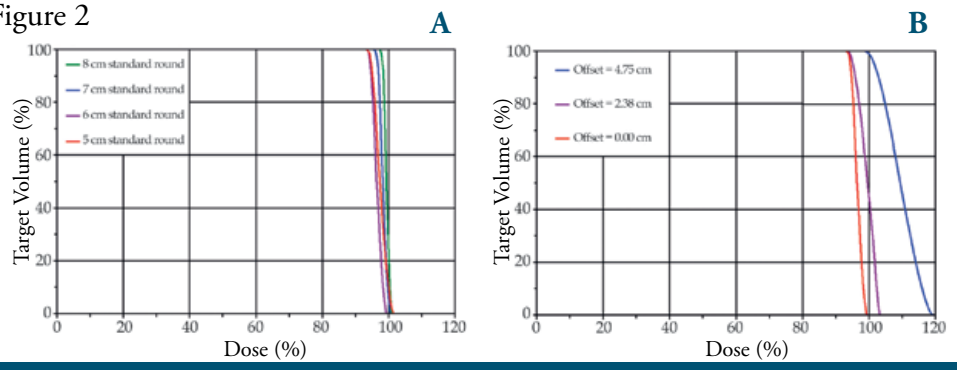
3-D Finite element analysis structure showing successive deformations along the cranio-caudal (y-axis) and medio-lateral (x-axis) directions. Parallel opposed AccuBoost beams are applied successively to the immobilized breast on each axis. Composite dose is shown in (E).

Dose distributions for both skin and breast volume as well as dose-volume histograms are generated for various conditions. The dose distributions were examined as a function of breast thickness, applicator size, target size and offset distance (of the target) from the center.

Results – Over the breast thickness ranges examined, as anticipated, the target size increases by several millimeters as the breast compression is

"ACCUBOOST DOSIMETRY" *(cont.)*

Figure 2



A) Dose volume histogram (DVH) showing the influence of varying applicator diameters on coverage for centrally positioned spherical 3.5 cm target, B) DVH for varying target offset distances from the central plane for a 6 cm breast with a 6 cm applicator.

increased. This observation is valid for targets with or without an offset from the center of the breast.

In all cases, with an applicator larger or equal to the compressed target size, > 90% of the target is covered by > 90% of the prescription dose. The dose volume histograms for a typical case of a 3.5 cm centrally located target (when uncompressed) are shown in Figure 2A for different applicator diameters on a breast immobilized to 6 cm. The effect of target offset (measured from the central plane) for identical cases, is shown in Figures 2B for comparison.

Conclusions – The 3-D FEA model developed in this study, in part, overcomes the challenges of tracking the dose delivered from two orthogonal axes when breast tissue experiences significant deformation. The model exhibits trends and skin dose that matches prior MC dose simulation benchmarking within 2% over a wide range of breast compression levels and target sizes and agrees with the clinical observations. The findings highlight the need for careful target localization, accurate identification of compression thickness and target offset distance. Finally, the article concludes that by virtue of breast immobilization that mechanically displaces non-target tissue out of the radiation field and high resolution image guidance for targeting the dose, Non-invasive Breast Brachytherapy (NIBB) maintains a high degree of precision without the need for invasive catheters.

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