

Specialty Area: Bringing Radiation Therapy to the Next Level: Technical Concepts & Clinical Applications (Tuesday 23 April 2013)

Speaker name: B. Gino Fallone, (bfallone@ualberta.ca)

Highlights:

1. Overview Advantages to Design
Avoid Irradiation of MRI
Avoid production of eddy Currents
Allows perpendicular and parallel configurations
2. Operations: Simulations and Hardware
RF and magnetic shieldings
 Perpendicular vs Parallel configurations
Radiation induced conductivity with RF coils
 Solutions to artifacts
3. Radiation Dosimetry
Perpendicular vs Parallel configurations
 Artifacts
 Surface dose
4. Tumour Tracking
Principles
Tumour Autocontouring
Auto Tracking and Prediction
Proof of Concept Demonstrated
5. Installation advantages

Title: MR-Guided RT: Rotating the Magnet

Target Audience: Physicists, engineers and clinicians in MRI and in Radiation Oncology

OUTCOME/Objectives: Demonstrate the feasibility and advantages of the Concept/Design

PURPOSE: Demonstrate the clinical need of the device and the potential of improved clinical outcome, and list and resolve scientific/engineering hurdles involved

METHODS: Simulations and prototype development

RESULTS: Demonstration of successful operations

DISCUSSION: Feasibility is established, installation advantages

CONCLUSION: Usage is expected to significantly improve clinical outcome of all solid tumours presently treated by radiation, and to be used for solid tumours (eg, abdominal areas, GI, etc) not presently treated by radiation.

References:

- A. Keyvanloo*, B. Burke, B. Warkentin, T. Tadic, S. Rathee, C. Kirkby, D.M. Santos, B.G. Fallone, *Skin Dose in Longitudinal and Transverse Linac-MRIs using Monte-Carlo and realistic 3D MRI field models*, Medical Physics, 39(10), pp.6509-6521(2012)
- B. J.Yun*, M. Mackenzie, S. Rathee, D. Robinson, B.G. Fallone, *An artificial neural network (ANN) based lung tumor motion predictor for intra-fractional MR tumor tracking*, Medical Physics, 39(7), pp. 4423-4433 (2012).
- C. C. Kirkby*, B. Murray, S. Rathee, B.G. Fallone, *Lung dosimetry in a linac-MR radiotherapy unit with a longitudinal magnetic field*, Medical Physics, 37(9) pp. 4722-4732 (2010).