Bruce Faddegon

Bruce Faddegon, Ph.D., FCCPM, FAAPM

Professor
Division of Physics
Department of Radiation Oncology

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Professional Focus

Dr. Faddegon?s research goal is to improve accuracy and precision in radiotherapy through cost-effective solutions to improve the therapeutic ratio. This will allow for more aggressive treatment in sites where side effects, local control, and even metastases are a problem. The National Institute of Health (NIH) has fully funded Dr. Faddegon's project to help establish

Monte Carlo, a highly accurate method of radiation transport, as a critical tool in radiotherapy, including treatment planning. Related projects include adding electrons to intensity-modulated radiotherapy with x-rays, using Monte Carlo methods for dose calculation, and establishing fast means of dose calculation for depth penetration and output calculation using the accurate beam models developed for the NIH project. Dr. Faddegon is also working to establish image-guided radiotherapy with portal imaging for more precise targeting of tumors and avoidance of critical structures.

Dr. Faddegon?s clinical responsibility is physics support of linear accelerators (linacs). This includes management, installation, commissioning, maintenance and quality assurance (QA), along with supervision of engineers and physicists. At UCSF, Dr. Faddegon commissioned Total Body Irradiation on several linacs, developing the means to treat the whole body over a short distance (3 meters). He also developed new targets to resolve a water leakage problem, implemented high precision graticules for patient localization, commissioned a missing tissue compensator system, and determined the means to detect and correct defective circuitry he discovered in treatments using virtual wedges. He is currently working on implementing a new, more accurate and efficient system for electron output calculation. He routinely consults for Intraoperative Radiotherapy, special procedures, electron treatment, and dose calculation in complex treatments including those where dose delivery is influenced by air cavities, bone, and prosthesis.

Education

1977	University of Victoria, BC, Canada	BS	Physics
1983	University of Victoria, BC, Canada	MS	Physics (radiobiology)
1986-90	Carleton University, Ottawa, Canada	Ph.D.	Physics

Professional Experience

2010-present	UCSF	Professor in Residence	Radiation Oncology
2000-2010	UCSF	Associate Professor in Residence	Radiation Oncology
2002-present	Joint UCSF/UC-Berkeley Bioengineering Department	Faculty Member	
1998-2000	Toronto-Sunnybrook Cancer Center	Senior Medical Physicist	Radiation Oncology
1994-1998	Toronto-Sunnybrook Cancer Center Medical	Physicist	Radiation Oncology
1992-1993	BC Cancer Agency, Vancouver	Medical Physicist	Radiation Oncology
1990-1992	National Research Council of Canada	Research Associate	Standards

1984-1986	Ottawa Regional Cancer Center, Ontario	Junior Medical Physicist	Radiation Oncology
1982-1984	University of Victoria, Victoria, BC	Lecturer, Lab Instructor	Physics
1977-1980	Amoco Canada, Calgary, Alberta	Geophysicist	Exploration

Awards & Honors

1973	BC government undergraduate scholarship, first year, University of Victoria
1980	National Science and Engineering Research Council scholarship, MSc
1982	National Science and Engineering Research Council scholarship, PhD (declined)
1986	Ontario Cancer Foundation fellowship, PhD, Carleton University
1988	Ontario Graduate Scholarships, PhD, Carleton University
1989	AAPM Young Investigator's Award, Second Prize
1991	Farrington Daniels Award
1992	Runner-up to Sylvia Fedoruk Prize
1997	Runner-up to Sylvia Fedoruk Prize

Recent Significant Publications :

Faddegon BA, Shin J, Castenada CM, Ramos-Méndez J, Daftari IK., **Experimental depth dose curves of a 67.5 MeV proton beam for benchmarking and validation of Monte Carlo simulation.** Med Phys. 2015 Jul;42(7):4199-210. doi: 10.1118/1.4922501.

Shiao SL, Ruffell B, DeNardo DG, Faddegon BA, Park CC, Coussens LM., **TH2-Polarized CD4(+) T Cells and Macrophages Limit Efficacy of Radiotherapy.** Cancer Immunol Res. 2015 May;3(5):518-25. doi: 10.1158/2326-6066.CIR-14-0232. Epub 2015 Feb 25.

Shin J, Perl J, Schümann J, Paganetti H, Faddegon BA., **A modular method to handle multiple time-dependent quantities in Monte Carlo simulations.** Phys Med Biol. 2012 Jun 7;57(11):3295-308.

Schreiber EC, Sawkey DL, Faddegon BA., **Sensitivity analysis of an asymmetric Monte Carlo beam model of a Siemens Primus accelerator.** J Appl Clin Med Phys. 2012 Mar 8;13(2):3402.

O'Shea TP, Ge Y, Foley MJ, Faddegon BA., **Characterization of an extendable multi-leaf collimator for clinical electron beams.** Phys Med Biol. 2011 Dec 7;56(23):7621-38.

Ge Y, Faddegon BA., **Study of intensity-modulated photon-electron radiation therapy using digital phantoms.** Phys Med Biol. 2011 Oct 21;56(20):6693-708.

O'Shea TP, Foley MJ, Faddegon BA., **Accounting for the fringe magnetic field from the bending magnet in a Monte Carlo accelerator treatment head simulation.** Med Phys. 2011 Jun;38(6):3260-9.

Nakamura JL, Phong C, Pinarbasi E, Kogan SC, Vandenberg S, Horvai AE, Faddegon BA, Fiedler D, Shokat K, Houseman BT, Chao R, Pieper RO, Shannon K., **Dose-dependent effects of focal fractionated irradiation on secondary malignant neoplasms in Nf1 mutant mice.** Cancer Res. 2011 Jan 1;71(1):106-15.

Halabi T, Faddegon B., **Practical quantitative measurement of graticule misalignment relative to collimator axis of rotation.** J Appl Clin Med Phys. 2010 Aug 15;11(4):3318.

O'Shea TP, Sawkey DL, Foley MJ, Faddegon BA., **Monte Carlo commissioning of clinical electron beams using large field measurements.** Phys Med Biol. 2010 Jul 21;55(14):4083-105.

Faddegon BA, Aubin M, Bani-Hashemi A, Gangadharan B, Gottschalk AR, Morin O, Sawkey D, Wu V, Yom SS., **Comparison of patient megavoltage cone beam CT images acquired with an unflattened beam from a carbon target and a flattened treatment beam.** Med Phys. 2010 Apr;37(4):1737-41.

Fragoso M, Kawrakow I, Faddegon BA, Solberg TD, Chetty IJ., **Fast, accurate photon beam accelerator modeling using BEAMnrc: a systematic investigation of efficiency enhancing methods and cross-section data.**Med Phys. 2009 Dec;36(12):5451-66.

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