Heiko Enderling, Ph.D. – Assistant Professor – Curriculum Vitae

Center of Cancer Systems Biology, CBR 115D
St. Elizabeth's Medical Center
Tufts University School of Medicine
736 Cambridge Street, Boston MA 02135

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Education

- Ph.D. in Mathematical Biology, Division of Mathematics, University of Dundee, 2006
  Dissertation: *'Mathematical modelling of breast tumour development, treatment and recurrence'*
  Advisors: Prof Mark AJ Chaplain, Dr Alexander RA Anderson, Dr Glenn W Rowe
- Diplom-Ingenieur for Computer Visualization, School of Computer Sciences, University of Magdeburg, Germany 2003
  Dissertation: *'Automated tracking of moving cells in vitro using a modified SuperCorrelation algorithm'*
  Advisors: Prof Dr Klaus D Toennies, Dr Walter Schubert

Positions Held

- 2010 – date: Associate Investigator, St. Elizabeth's Medical Center;
  Assistant Professor, Tufts University School of Medicine
  - development of minimal-parameter mathematical and computational models of cell-cell interaction during tumor progression and treatment;
  - the role of cancer stem cells in tumor growth and treatment
  Principal Investigator for Outreach and Education on ICBP center program
- 2009 – 2010: Senior Research Associate, St. Elizabeth's Medical Center;
  Instructor, Tufts University School of Medicine
  - development of minimal-parameter mathematical and computational models of cell-cell interaction during tumor progression and treatment
  - scientific visualization of high-dimensional data
- 2007 – 2008: Research Associate, St. Elizabeth's Medical Center;
  Postdoctoral fellow, Tufts University School of Medicine
  - development of novel agent-based models of cancer stem cells in tumor dynamics
- 2006: Postdoctoral researcher, University of Dundee,
  Divisions of Mathematics and Surgery and Molecular Oncology
  - development of spatio-temporal mathematical models of tumor growth dynamics and novel radiotherapy strategies for breast cancer
- 2005 – 2006: ICS (Information & Communication Services) HelpDesk Officer, Dundee, UK
- 2004 – 2006: Teaching assistant, University of Dundee, UK
- 1999 – 2003: Software Engineer, MelTec GmbH, Magdeburg, Germany

Awards and Fellowships

- 2008-2011: American Association for Cancer Research Centennial Postdoctoral Fellowship
- 2010: Best poster prize, Annual meeting of the Society for Mathematical Biology
- 2007: British Oncology Association Young Investigator Award
- 2006: Scottish International Education Trust Award
- 2005-2006: Cancer Research UK Pilot Project Research Award
- 2004: Best poster prize, Annual meeting of the Society for Mathematical Biology
- 2003-2006: Dundee University Nicholl-Lindsay PhD Scholarship

Professional Affiliations

- American Association for Cancer Research
- Society for Mathematical Biology *(Board of Directors)*
- European Society for Mathematical and Theoretical Biology

Committee Assignments

- 2010-date: Board of Directors, Society for Mathematical Biology
- 2010-date: Co-Chair, NIH ICBP Outreach and Education Committee
- 2011-date: NIH ICBP Website Advisory Committee

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Research Interests
- Mathematical modeling of tumor initiation, development and growth in irregular domains, radiotherapy strategies, and irradiation induced tumorigenesis
- Spatio-temporal evolution of cancer stem cells and self-metastatic tumor progression
- Modeling of the role of stem cells and tumor suppressor genes in tumorigenesis
- In-silico modeling of apoptosis, migration and proliferation in tumor dormancy
- Theoretical modeling of invadopodia formation and cellular feedback mechanisms
- Computational simulations and numerical schemes
- Visualization of 1D, 2D, and 3D solutions of mathematical models

Conference / Symposium Organization
- SMB Conference, Knoxville, USA, 2012
- Workshop on Systems Biology of Tumor Metronomics, Boston, USA, 2012
- ICBP Education, Training & Outreach Workshop, Houston, USA, 2012 (workshop co-chair)
- Workshop on Systems Biology of Tumor Dormancy, Boston, USA, 2011 (workshop co-chair)
- SMB Conference, Krakow, Poland, 2011
- SMB Conference, Vancouver, Canada, 2009
- European Conference for Mathematical and Theoretical Biology, Edinburgh, UK, 2008
- Joint SMB-JSMB Conference, San Jose, USA, 2007
- Joint SMB-SIAM Conference on the Life Sciences, Raleigh, USA, 2006

Invited Lectures / Seminars
- MD Anderson Odyssey Symposium, Houston, TX, USA, 2012
- Worcester Polytechinic Institute, Worcester, MA, USA, 2012
- Grand Rounds, Boston University School of Medicine, Boston, MA, USA, 2012
- Mathematical Oncology Workshop, Erice, Italy, 2011
- Computational Biology Seminar, Memorial Sloan Kettering Cancer Institute, New York, USA, 2011
- Workshop on Systems Biology of Tumor Dormancy, Boston, MA, USA, 2011
- International Congress on Industrial and Applied Mathematics, Vancouver, Canada, 2011
- Annual Meeting of the Society for Mathematical Biology, Krakow, Poland, 2011
- Cancer Systems Biology Annual Symposium, Stanford University, Palo Alto, CA, USA, 2011
- Biocomplexity Institute Seminar, Indiana University, Bloomington, IN, USA, 2011
- Integrative Mathematical Oncology Seminar, Moffitt Cancer Center, Tampa, FL, USA, 2011
- Mathematics Colloquium, Dartmouth College, Hanover, NH, USA, 2011
- NIMBioS Investigative Workshop on Solid Tumor Modeling, Knoxville, TN, USA, 2011
- Bootcamp in Cancer Modeling, MBI, Ohio State University, Columbus, USA, 2010
- Mathematical Modeling of Cancer Growth and Treatment School, Dundee, UK, 2010
- Systems Radiation Biology Workshop, New York, USA, 2010
- Developmental Biology Seminar, Tufts University School of Medicine, Boston, MA, USA, 2010
- Merrimack Pharmaceuticals, Boston, MA, USA, 2010
- Cancer Systems Biology Seminar, Dana Faber Cancer Institute, Boston, MA, USA, 2009
- Annual Meeting of the Society for Mathematical Biology, Vancouver, Canada, 2009
- SIAM Conference on Computational Science and Engineering, Miami, USA, 2009
- Cells, Circuits and Computation, Boston, MA, USA, 2009
- Systems Radiation Biology Workshop, Rovaniemi, Finland, 2009
- European Conference on Mathematical & Theoretical Biology, Scotland, 2008
- PIMS Mathematical Biology Seminar, University of Alberta, Canada, 2008
- Boston Chaos Club, Boston, MA, USA, 2007
- Mathematics Analysis & Biomathematics Seminar, Vanderbilt University, USA, 2007
- Marie Currie Research Training Network, University of Dundee, Scotland, 2007
- International Congress on Industrial and Applied Mathematics, Zurich, Switzerland, 2007
- Vanderbilt University Integrative Cancer Biology Center, Nashville, TN, USA, 2005 & 2006

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Books
- Enderling H, Almog N, Hlatky L (Eds). Systems Biology of Tumor Dormancy. Springer, 2012

Publications
- Enderling H. Cancer stem cells and tumor dormancy. *Adv Exp Med Biol*, 2012
- Sasi SP, Yan X, **Enderling H**, et al. Breaking the 'harmony' of TNF-α signaling for cancer treatment. *Oncogene*, PMID: 22158049, 2011
- Morton CI, Hlatky L, Hahnfeldt P, **Enderling H**. Non-Stem Cancer Cell Kinetics Modulate Solid Tumor Progression. *Theor Biol Med Model* 8(1):48, 2011
- Enderling H, Hahnfeldt P. Cancer stem cells in solid tumors: is 'evading apoptosis' a hallmark of cancer? *Progr Biophys Mol Biol* in press, 2011.
- Tang J, Enderling H, Becker-Weimann S, Pham C, Polyzos A, Che CY, Costes SV. Phenotypic transition maps of 3D breast acini obtained by imaging-guided agent-based modeling. *Integr Biol* DOI: 10.1039/c0ib00092b, 2011
- Enderling H, Hlatky L, Hahnfeldt P. The promoting role of a tumor-secreted chemorepellent in self-metastatic tumor progression. *Math Med Biol* in press, 2011
- Enderling H, Chaplain MAJ, Hahnfeldt P. Quantitative modeling of tumor dynamics and radiotherapy. *Acta Biotheor* 58(4): 341-353, 2010
- Enderling H, Hlatky L, Hahnfeldt P. Tumor morphological evolution: directed migration and gain and loss of the self-metastatic phenotype. *Biol Direct* 5:23, 2010
- Enderling H, Anderson ARA, Chaplain MAJ, Beheshti A, Hlatky L, Hahnfeldt P. Paradoxical Dependencies of Tumor Dormancy and Progression on Basic Cell Kinetics. *Cancer Res* 69(22): 8814-8821, 2009
- Enderling H, Hlatky L, Hahnfeldt P. Reply: Inflammatory breast carcinoma as a model of accelerated self-metastatic expansion by intra-vascular growth. *Br J Cancer* 101(6): 1030, 2009
- Enderling H, Hlatky L, Hahnfeldt P. Migration rules: tumours are conglomerates of self-metastases. *Br J Cancer* 100(12): 1917-1925, 2009
- Enderling H, Park D, Hlatky L, Hahnfeldt P. The importance of spatial distribution of stemness and proliferation state in determining tumor radioresponse. *Math Model Nat Phenom* 4(3): 117-133, 2009
- Enderling H, Alexander NR, Clark E et al. Dependence of invadopodia function on collagen fiber spacing and crosslinking: computational modeling and experimental evidence. *Biophys J* 95(5): 2203-2218, 2008
- Enderling H, Anderson ARA, Chaplain MAJ. A model of breast carcinogenesis and recurrence after radiotherapy. *Proc Appl Math Mech* 7(1): 1121701-2, 2007
- Enderling H, Chaplain MAJ, Anderson ARA et al. A Mathematical Model of breast cancer development, local treatment and recurrence. *J Theor Biol* 246(2): 245-259, 2007
- Enderling H, Anderson ARA, Chaplain MAJ et al. Visualisation of the Numerical Solution of Partial Differential Equation Systems in Three Space Dimensions and its Importance for Mathematical Models in Biology. *Math Biosci Eng* 3(4): 571-582, 2006
- Enderling H, Anderson ARA, Chaplain MAJ et al. Mathematical Modelling of Radiotherapy Strategies for Early Breast Cancer. *J Theor Biol* 241(1): 158-171, 2006

Book Chapters
- Enderling H. Cancer stem cell kinetics. *Encyclopaedia of Systems Biology*, 2013
- Enderling H. Cancer stem cells and tumor dormancy. *Systems Biology of Tumor Dormancy.* Springer, 2012
- M.J. Piotrowska, H. Enderling, U. an der Heiden et al. Mathematcial modelling of stem cells related to cancer. In: Dittmar T and Zanker KS. *Stem cells and cancer*. Nova Science Publishers: 2008
- H. Enderling, J.S. Vaidya. Mathematical Modelling of Breast Carcinogenesis, Treatment with Surgery and Radiotherapy, and Local Recurrence. In: *Selected Topics on Cancer Modelling – Genesis, Evolution, immune competition, and therapy*. Birkhäuser, Boston: 337, 2008

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Editor
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Ad-hoc Peer Reviewer
- Cancer Research
- Physical Oncology
- Cancers
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- Stem Cell Reviews and Reports
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- Frontiers in Bioscience
- Mathematical Biosciences
- Mathematics in Computers and Simulation
- Applied Mathematics and Computation
- Journal of Theoretical Biology
- Bulletin of Mathematical Biology
- Mathematical Medicine and Biology
- Journal of Mathematical Biology
- Mathematical Biosciences and Engineering
- Transactions on Bioengineering
- Mathematical Modeling of Natural Phenomena

Grant Proposal Reviewer
- UK Medical Research Council, Molecular and Cellular Medicine Board
- French National Research Agency

Public Evening Lecture Series Organization
- Low dose radiation and cancer: fact and fiction. Dr. Mary Helen Barcellos-Hoff, 2012
- Can we eat to starve cancer? Dr. William Li, 2011
- Current aspects of prostate cancer, Dr. Ingolf Tuerk, 2011
- How to starve cancer? Dr. Giannoula Klement, 2010
- Can calculus cure cancer? Dr. Mark Chaplain, 2010