

Hadi Tadayyon, PhD

Physical Sciences, Sunnybrook Research Institute
Sunnybrook Health Sciences Centre
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Education

- Sept 2010-
August 2015* Doctor of Philosophy (PhD) in Medical Biophysics, University of Toronto,
Toronto, ON, Canada
Thesis: Quantitative ultrasound characterization and monitoring of breast
tumour response to chemotherapy
Advisor: Dr. Gregory Czarnota
- Sept 2008-
July 2010* Master of Applied Science (MAsc) in Electrical and Computer
Engineering, Queen's University, Kingston, ON, Canada
Thesis: Motion Tracking in MR-guided Prostate Biopsy
Advisor: Dr. Gabor Fichtinger
- Sept 2004-
June 2008* Bachelor of Engineering Science (BESc) in Electrical and Computer
Engineering, The University of Western Ontario, London, ON, Canada
Thesis: Exoskeleton Arm for Rehabilitation
Advisor: Dr. Mehrdad Kermani

Awards and Distinctions

- 2012-2014* NSERC Alexander Graham Bell Canada Graduate Scholarship CGS D
(\$70,000 over 2 years)
- 2013* Sunnybrook Research Institute Trainee Travel Award (\$1000)
- 2012* School of Graduate Studies Conference Grant (\$400)
- 2011-2012* Medical Biophysics Excellence Award - University of Toronto Graduate
Fellowship (\$16,000)
- 2008, 2009* Queen's Graduate Award (\$3,000 × 2)
- 2007* Hydro One Undergraduate Award (\$2,000)
- 2006, 2007* NSERC Undergraduate Summer Research Award (\$6,000 × 2)
- 2004-2005, 2005-* Dean's Honour List (× 3)

2006, 2007-2008

2004, 2005, 2006 Queen Elizabeth II Aiming for the Top Scholarship (\$3,500 × 3)

Professional Experience

- May 2015-present* Research Associate, Physical Sciences, Sunnybrook Research Institute, Sunnybrook Health Sciences Centre (Toronto, ON, Canada)
- Computer-aided cancer response detection using machine learning algorithms
 - 3D Ultrasound image reconstruction and tissue characterization
- 2010-2015* Research Assistant, Physical Sciences, Sunnybrook Research Institute, (Toronto, ON, Canada)
Research areas:
- Tissue classification using ultrasound signal analysis
 - Cancer therapy monitoring
 - Machine learning/pattern recognition
 - Clinical imaging
- 2012-present* Volunteer Web Developer, Noor House Association
- Initial template and graphic design
 - Content management
- 2008-2010* Web Developer, Centre for Teaching and Learning, Queen's University
- web content management, online course module development, database management, web page troubleshooting
- Fall Term 2009* Teaching Assistant, Department of Electrical and Computer Engineering, Queen's University
Course: Personal Computers in Engineering
- Winter term 2009* Teaching Assistant, Department of Electrical and Computer Engineering, Queen's University
Course: Electric Circuits and Machines
- June-Nov 2008* Web Developer, Digicomcore SA, Lausanne, Switzerland
- Summer 2007* Research Assistant, Dept. of Electrical and Computer Engineering, The University of Western Ontario (London, ON, Canada)
- NSERC Undergraduate Summer Research Award
 - Project: Conductivity analysis of packed beds in chemical reactors
- Summer 2006* Research Assistant, Dept. of Electrical and Computer Engineering, The

University of Western Ontario

- NSERC Undergraduate Summer Research Award
- Project: Haptic simulation (Medical Robotics)

Summers 2004,2005 Summer Student, Department of Chemistry, The University of Western Ontario Project: Lab experiment automation using LABVIEW

Scholarly Activities

2015-present Reviewer, IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control

2015-present Reviewer, Elsevier Journal of Ultrasonics

2014-present Reviewer, Bioengineering Online

2012-2013 Volunteer, Medical Biophysics Graduate Student Association, University of Toronto

Technical Skills and Assets

Statistical analysis software: R, SAS, MATLAB, SPSS, Graphpad, Excel

Big data analytics: HDFS (Hadoop)

Database management: SQL

Programming languages: Java, C++, SQL, MATLAB

Source code revision control: SVN

Web Development: HTML, CSS, Flash, JavaScript, PHP, and MySQL

Engineering design software: Simulink, COMSOL, LABVIEW, Solid Works

Office applications: Microsoft Office – Word, Excel, PowerPoint, Publisher

Peer-reviewed Journal Publications

W.T. Tran, L. Sannachi, N. Papanicolau, **H. Tadayyon** et al., “Quantitative Ultrasound Imaging of Therapy Response in Bladder Cancer In Vivo”, *Oncoscience* 3(3-4), 122-123 (2016)

H. Tadayyon, L. Sannachi, M. Gangeh, *et al.*, “Quantitative Ultrasound Assessment of Breast Tumor Response to Chemotherapy Using a Multi-Parameter Approach”, *Oncotarget* (2016; in press)

W.T. Tran, C. Childs, L. Chin, E. Slodkowska, L. Sannachi, **H. Tadayyon** *et al.*, “Multiparametric Monitoring of Chemotherapy Treatment Response in Locally Advanced Breast Cancer using Quantitative Ultrasound and Diffuse Optical Spectroscopy”, *Oncotarget* 7(15), 19762-19780 (2016)

H. Tadayyon, L. Sannachi, A. Sadeghi-Naini, A. Al-Mahrouki, W.T. Tran, M.C. Kolios, and G.J. Czarnota, “Quantification of ultrasonic scattering properties of in vivo tumor cell death in mouse models of breast cancer”, *Translational Oncology* 8(6), 463-73 (2015)

M. Gangeh, **H. Tadayyon**, L. Sannachi, A. Sadeghi-Naini, W. T. Tran, and G.J. Czarnota, “Computer Aided Theragnosis Using Quantitative Ultrasound Spectroscopy and Maximum Mean Discrepancy in Locally Advanced Breast Cancer”, *IEEE Transactions on Medical Imaging* (2015; in press)

L. Sannachi, **H. Tadayyon**, A. Sadeghi-Naini, W.T. Tran, S. Gandhi, F.C. Wright, M.L. Oelze, and G.J. Czarnota, "Non-invasive evaluation of breast cancer response to chemotherapy using quantitative ultrasonic backscatter parameters", *Medical Image Analysis* 20(1), 224-36 (2014)

H. Tadayyon, A. Sadeghi-Naini, and G.J. Czarnota, “Non-Invasive Characterization of Locally Advanced Breast Cancer using Textural Analysis of Ultrasound Spectral Parametric Images”, *Translational Oncology* 7(6), 759-67 (2014)

M. Gangeh, A. Sadeghi-Naini, M. Diu, **H. Tadayyon**, M.S. Kamel, and G.J. Czarnota, "Categorizing Extent of Tumour Cell Death Response to Cancer Therapy Using Quantitative Ultrasound Spectroscopy and Maximum Mean Discrepancy", *IEEE Transactions on Medical Imaging* 33(6), 1390-400, (2014)

H. Tadayyon, A. Sadeghi-Naini, L. Wirtzfeld, F.C. Wright, and G.J. Czarnota, "Quantitative ultrasound characterization of locally advanced breast cancer by estimation of its scatterer properties", *Medical Physics* 41(1), 012903 (2014)

L. Sannachi, **H. Tadayyon**, A. Sadeghi-Naini, M.C. Kolios, and G.J. Czarnota, “Personalization of breast cancer chemotherapy using non-invasive imaging methods to detect tumor cell death response”, *Breast Cancer Management* 3(1), 31-35 (2014)

A. Sadeghi-Naini, N. Papanicolau, O. Falou, **H. Tadayyon**, J. Lee, J. Zubovitz, A. Sadeghian, R. Karshafian, A. Al-Mahrouki, A. Giles, M.C. Kolios, and G.J. Czarnota., “Low-frequency quantitative ultrasound imaging of cell death in vivo”, *Medical Physics* 40(8), 082901 (2013).

A. Sadeghi-Naini, O. Falou, **H. Tadayyon**, A. Al-Mahrouki, W. Tran, N. Papanicolau, M.C. Kolios, and G.J. Czarnota, "Conventional-Frequency Ultrasonic Biomarkers of Breast Cancer Treatment Response *in Vivo*", *Translational Oncology* 6(3), 234-243 (2013)

H. Tadayyon, A. Lasso, A. Kaushal, P. Guion, and G. Fichtinger, "Target Motion Tracking in MRI-guided Transrectal Robotic Prostate Biopsy", *IEEE Transactions on Biomedical Engineering* 58(11), 3135 - 3142 (2011)

Peer-reviewed Conference Proceedings

A. Sadeghi-Naini*, M. Stanisz, **H. Tadayyon**, J. Taank, and G. Czarnota "Low-Frequency Ultrasound Radiosensitization and Therapy Response Monitoring of Tumors: an In Vivo Study", In *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, (May 2016; accepted)

MJ. Gangeh, H.R. Tizhoosh, **H. Tadayyon**, and G.J. Czarnota, "Tumour ROI Estimation in Ultrasound Images via Radon Barcodes in Patients with Locally Advanced Breast Cancer", In *International Symposium on Biomedical Imaging*, (April 2016; accepted)

MJ. Gangeh, A. Raheem, **H. Tadayyon**, S. Liu, F. Hadizad, and GJ. Czarnota, "Breast tumour visualization using 3D quantitative ultrasound spectroscopy", In *SPIE Medical Imaging*, (Feb 2016; accepted)

MJ. Gangeh, B. Fung, **H. Tadayyon**, WT. Tran, and GJ. Czarnota, "Response monitoring using quantitative ultrasound methods and supervised dictionary learning in locally advanced breast cancer", In *SPIE Medical Imaging*, (March 2016; accepted)

M. Gangeh, **H. Tadayyon**, L. Sanachi, A. Sadeghi-Naini, and GJ Czarnota, "Quantitative Ultrasound Spectroscopy and a Kernel-Based Metric in Clinical Cancer Response Monitoring", In *2015 IEEE 12th International Symposium on Biomedical Imaging (ISBI)*, pp. 255–259, (2015).

H. Tadayyon, L. Sannachi, and G. J. Czarnota, "Quantitative ultrasound monitoring of breast tumor response to chemotherapy by analysis of frequency-dependent attenuation and backscattered power", In *Proc. SPIE* 9040, pp. 904009 (Feb 2014)

H. Tadayyon, S. Vikal, S. Gill, A. Lasso, and G. Fichtinger, "MRI-Guided Prostate Motion Tracking by Means of Multi-Slice-to-Volume Registration", In *Proc. SPIE* 7625, pp. 76252V (Feb 2010)

Conference Presentations

H. Tadayyon, A. Sadeghi-Naini, L. Sannachi, M. Gangeh, M. Trudeau and G. Czarnota, "Quantitative ultrasound as a predictor of tumor response prior to treatment initiation", Ultrasonic Imaging and Tissue Characterization Symposium, Arlington, VA, (June 2015) (Oral)

H. Tadayyon, A. Sadeghi-Naini, and G.J. Czarnota, "Non-Invasive Characterization of Breast Cancer Using Textural Analysis of Ultrasound Spectral Parametric Images", 2014 IEEE International Ultrasonics Symposium, Chicago, IL, (Sept 2014) (Oral)

H. Tadayyon, L. Sannachi, A. Sadeghi-Naini, and G.J. Czarnota, "Multi-class Quantitative Ultrasound Categorization of Breast Tumour Response to Chemotherapy", 2014 IEEE International Ultrasonics Symposium, Chicago, IL, (Sept 2014) (Poster)

H. Tadayyon, L. Sannachi, A. Sadeghi-Naini, O. Falou, M. Oelze, and G.J. Czarnota, "Quantitative ultrasound monitoring of breast cancer cell death in-vivo using tissue-scattering models – a preclinical study", Ultrasonic Imaging and Tissue Characterization Symposium, Arlington, VA, (June 2013) (Oral)

H. Tadayyon, L. Sannachi, A. Sadeghi-Naini, O. Falou, M. Oelze, and G.J. Czarnota, "Quantitative ultrasound monitoring of breast cancer cell death in-vivo using the Gaussian form factor – a pre-clinical study", Imaging Network Ontario: 11th Imaging Symposium, Toronto, ON, Canada, (Feb 2013) (Oral)

L. Sannachi, **H. Tadayyon**, A. Sadeghi-Naini *et al.*, "Evaluation of tumor cell death response in locally-advanced breast cancer patients to chemotherapy treatment by scattering property estimates using ultrasound backscatter", ICA (Acoustical Society of America), (2012) (Oral)

H. Tadayyon, N. Papanicolau, S. Iradji, E. Sofroni, and G.J. Czarnota, "Noninvasive breast tumor grading using ultrasound frequency-dependent backscatter analysis", Ultrasonic Imaging and Tissue Characterization Symposium, Arlington, VA, (2012) (Oral).

N. Samavati, R. Vlad, **H. Tadayyon**, J. Moseley, S. Iradji, G.J. Czarnota, and K. Brock, "3D ultrasound reconstruction from freehand scans using an optical tracking system", AAPM 54th annual meeting, Charlotte, NC, (2012) (Oral).

R. Vlad, N. Samavati, J. Moseley, **H. Tadayyon**, S. Iradji, G. Stanis, G.J. Czarnota, and K. Brock, "Registration of magnetic resonance, reconstructed 3D ultrasound imaging and whole-mount breast pathology for therapy assessment of breast cancer", AAPM 54th annual meeting, Charlotte, NC, (2012) (Oral).

H. Tadayyon, L. Wirtzfeld, and G.J. Czarnota, "Quantitative Ultrasound Characterization of Breast Cancer", Canadian Institutes of Health and Research Symposium on Novel Cancer Therapies and Innovations in Treatment Monitoring, Toronto, Canada, Nov (2011) (Poster)

A. Lasso, **H. Tadayyon**, A. Kaushal, P. Guion, G. Fichtinger, "Multi-slice-to-volume registration for reducing targeting error during MRI-guided transrectal biopsy", 4th NCIGT and NIH Image Guided Therapy Workshop, Arlington VA, (2011) (Oral)

H. Tadayyon, A. Lasso, S. Gill, A. Kaushal, P. Guion, and G. Fichtinger, "Target Motion Compensation in MRI-guided Prostate Biopsy with Static Images", *IEEE Engineering in Medicine and Biology*, pp 5416 – 5419, (2010) (Oral presentation + proceedings manuscript)

Theses

H. Tadayyon, "Quantitative Ultrasound Characterization and Monitoring of Locally Advanced Breast Cancer", PhD, University of Toronto, (2015)

H. Tadayyon, "MRI-Guided Prostate Motion Tracking using Multislice-to-Volume Registration", MASc, Queen's University, (2010)

H. Tadayyon, A. Schuessler, and J. Gangjee "Exoskeleton Arm for Rehabilitation", BSc, University of Western Ontario, (2008).

Patents

H. Tadayyon, G.J. Czarnota, A Sadeghi-Naini, L. Sannachi, M Gangeh, and W. Tran, "Systems and Methods for Prediction of Tumor Response to Chemotherapy Using Pre-Treatment Quantitative Ultrasound Parameters", 2015, US patent pending.

A.Sadeghi-Naini, **H. Tadayyon**, G.J. Czarnota, and O. Falou, "System and Method for Classifying and Characterizing Tissues Using First-Order and Second-Order Statistics of Quantitative Ultrasound Parametric Maps", 2014, US patent pending.