

Nick Tustison

Curriculum Vitae

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Education

- 2004 **D.Sc. Biomedical Engineering**, Washington University in St. Louis, St. Louis, MO.
Thesis: *Biventricular Myocardial Strains With Anatomical NURBS Models From Tagged MRI*
- 2000 **M.S. Biomedical Engineering**, University of Virginia, Charlottesville, VA.
Thesis: *Quantification Methods for Assessing Asthma in Hyperpolarized ^3He Lung MRI Studies*
- 1998 **B.S. Applied Physics: Computer Science**, Brigham Young University, Provo, UT.

Professional Appointments

- 2017– **Associate Professor**, Department of Radiology and Medical Imaging, University of Virginia, Charlottesville, VA.
- 2016– **Visiting Assistant Researcher**, Department of Neurobiology and Behavior, University of California, Irvine, Irvine, CA.
- 2010–2017 **Assistant Professor**, Department of Radiology and Medical Imaging, University of Virginia, Charlottesville, VA.
- 2005–2010 **Senior Research Investigator**, Department of Radiology, University of Pennsylvania, Philadelphia, PA.
- 2004–2005 **Research Fellow**, Department of Radiology, University of Pennsylvania, Philadelphia, PA.

Academic Service

Program committees

- 2012–present **SPIE Medical Imaging**.

Editorships

- 2012–present **Frontiers Review Editorial Board**.
- May 2013– **Frontiers in Neuroinformatics: Guest Editor**, *Neuroinformatics with the Insight ToolKit*.

Reviewer Duties

Academic Radiology
American Journal of Neuroradiology
Annals of Biomedical Engineering
Artificial Intelligence in Medicine
Biomedical Signal Processing and Control
Computer Vision and Image Understanding
Computers in Biology and Medicine
Computerized Medical Imaging and Graphics
Focused Ultrasound Foundation ad hoc grant reviewer
Human Brain Mapping
Image and Vision Computing
International Journal of Pattern Recognition and Artificial Intelligence
IEEE Transactions on Cybernetics
IEEE Transactions on Medical Imaging
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Biomedical Engineering
Insight Journal
International Conf. on Medical Image Computing and Computer Assisted Intervention
International Journal of Biomedical Imaging
International Journal of Computer Vision
International Workshop on Medical Imaging and Augmented Reality
IEEE International Symposium on Biomedical Imaging: From Nano to Macro
Journal of Computed Tomography
Journal of Electronic Imaging
Journal of Magnetic Resonance Imaging
Journal of Neurotrauma
Journal of the Optical Society of America A
Magnetic Resonance in Medicine
Medical Physics
Medical Image Analysis
Neurobiology of Aging
NeuroImage
NeuroImage: Clinical
Neuroradiology
Neuroscience and Biobehavioral Reviews
PLOS ONE
Respirology
SIAM Journal on Imaging Sciences

Invited Talks/Participation

- Feb 2012 **SPIE conference**, *Open source tools for medical image analysis.*
- Sept 2012 **MICCAI**, *provided canonical registrations for Grand Challenge and Workshop on Multi-Atlas Labeling.*
- Sept 2013 **MICCAI**, *provided canonical registrations for SATA challenge workshop.*
- May 2015 **CREATE-MIA**, *ANTs Workshop.*
- Oct 2015 **MICCAI**, *SimpleITK tutorial.*

Computer Skills

Languages C++, perl, bash, L^AT_EX, R
Tools and Advanced Normalization Tools (ANTs), Insight Toolkit (ITK), Visualization Toolkit (VTK),
Libraries Paraview, git, Matlab, PBS/SGE qsub

Awards

- 2010 **1st place**, *EMPIRE10 lung registration competition*, MICCAI Conference 2010.
2013 **1st place**, *BRATS2013 multimodal brain tumor segmentation competition*, MICCAI Conference 2013.
2014 **Best paper award**, *STACOM2014 cardiac motion estimation challenge*, MICCAI Conference 2014.

Publications

Articles

Amy C Ladd, David G Brohawn, Ravindar R Thomas, Paula M Keeney, Stuart S Berr, Shaharyar M Khan, Francisco R Portell, Meiram Zh Shakenov, Patrick F Antkowiak, Bijoy Kundu, Nicholas Tustison, and James P Bennett. Rna-seq analyses reveal that cervical spinal cords and anterior motor neurons from amyotrophic lateral sclerosis subjects show reduced expression of mitochondrial dna-encoded respiratory genes, and rhtfam may correct this respiratory deficiency. *Brain Res*, 1667:74–83, Jul 2017.

Talissa A Altes, Mac Johnson, Meredith Fidler, Martyn Botfield, Nicholas J Tustison, Carlos Leiva-Salinas, Eduard E de Lange, Deborah Froh, and John P Mugler, 3rd. Use of hyperpolarized helium-3 mri to assess response to ivacaftor treatment in patients with cystic fibrosis. *J Cyst Fibros*, 16(2):267–274, Mar 2017.

Lucia Flors, John P Mugler, 3rd, Eduard E de Lange, Grady W Miller, Jaime F Mata, Nick Tustison, Iulian C Ruset, F William Hersman, and Talissa A Altes. Hyperpolarized gas magnetic resonance lung imaging in children and young adults. *J Thorac Imaging*, 31(5):285–95, Sep 2016.

Nicholas J Tustison, Kun Qing, Chengbo Wang, Talissa A Altes, and John P Mugler, 3rd. Atlas-based estimation of lung and lobar anatomy in proton mri. *Magn Reson Med*, 76(1):315–20, Jul 2016.

Genevera I Allen, Nicola Amoroso, Catalina Anghel, Venkat Balagurusamy, Christopher J Bare, Derek Beaton, Roberto Bellotti, David A Bennett, Kevin L Boehme, Paul C Boutros, Laura Caberlotto, Cristian Caloian, Frederick Campbell, Elias Chaibub Neto, Yu-Chuan Chang, Beibei Chen, Chien-Yu Chen, Ting-Ying Chien, Tim Clark, Sudeshna Das, Christos Davatzikos, Jieyao Deng, Donna Dillenberger, Richard J B Dobson, Qilin Dong, Jimit Doshi, Denise Duma, Rosangela Errico, Guray Erus, Evan Everett, David W Fardo, Stephen H Friend, Holger Fröhlich, Jessica Gan, Peter St George-Hyslop, Satrajit S Ghosh, Enrico Glaab, Robert C Green, Yuanfang Guan, Ming-Yi Hong, Chao Huang, Jinseub Hwang, Joseph Ibrahim, Paolo Inglese, Anandhi Iyappan, Qijia Jiang, Yuriko Katsumata, John S K Kauwe, Arno Klein, Dehan Kong, Roland Krause, Emilie Lalonde, Mario Lauria, Eunjee Lee, Xihui Lin, Zhandong Liu, Julie Livingstone, Benjamin A Logsdon, Simon Lovestone, Tsung-Wei Ma, Ashutosh Malhotra, Lara M Mangravite, Taylor J Maxwell, Emily Merrill, John Nagorski, Aishwarya Namasivayam, Manjari Narayan, Mufassra Naz,

Stephen J Newhouse, Thea C Norman, Ramil N Nurtdinov, Yen-Jen Oyang, Yudi Pawitan, Shengwen Peng, Mette A Peters, Stephen R Piccolo, Paurush Praveen, Corrado Priami, Veronica Y Sabelnykova, Philipp Senger, Xia Shen, Andrew Simmons, Aristeidis Sotiras, Gustavo Stolovitzky, Sabina Tangaro, Andrea Tateo, Yi-An Tung, Nicholas J Tustison, Erdem Varol, George Vradenburg, Michael W Weiner, Guanghua Xiao, Lei Xie, Yang Xie, Jia Xu, Hojin Yang, Xiaowei Zhan, Yunyun Zhou, Fan Zhu, Hongtu Zhu, Shanfeng Zhu, and Alzheimer's Disease Neuroimaging Initiative. Crowdsourced estimation of cognitive decline and resilience in alzheimer's disease. *Alzheimers Dement*, 12(6):645–53, Jun 2016.

Khader M Hasan, Benson Mwangi, Bo Cao, Zafer Keser, Nicholas J Tustison, Peter Kochunov, Richard E Frye, Mirjana Savatic, and Jair Soares. Entorhinal cortex thickness across the human lifespan. *J Neuroimaging*, 26(3):278–82, May 2016.

Dorian Pustina, H Branch Coslett, Peter E Turkeltaub, Nicholas Tustison, Myrna F Schwartz, and Brian Avants. Automated segmentation of chronic stroke lesions using linda: Lesion identification with neighborhood data analysis. *Hum Brain Mapp*, Jan 2016.

Anthony J Filiano, Yang Xu, Nicholas J Tustison, Rachel L Marsh, Wendy Baker, Igor Smirnov, Christopher C Overall, Sachin P Gadani, Stephen D Turner, Zhiping Weng, Sayeda Najamussahar Peerzade, Hao Chen, Kevin S Lee, Michael M Scott, Mark P Beenhakker, Vladimir Litvak, and Jonathan Kipnis. Unexpected role of interferon- λ in regulating neuronal connectivity and social behaviour. *Nature*, 535(7612):425–9, 07 2016.

James R Stone, Elisabeth A Wilde, Brian A Taylor, David F Tate, Harvey Levin, Erin D Bigler, Randall S Scheibel, Mary R Newsome, Andrew R Mayer, Tracy Abildskov, Garrett M Black, Michael J Lennon, Gerald E York, Rajan Agarwal, Jorge DeVillasante, John L Ritter, Peter B Walker, Stephen T Ahlers, and Nicholas J Tustison. Supervised learning technique for the automated identification of white matter hyperintensities in traumatic brain injury. *Brain Inj*, 30(12):1458–1468, 2016.

Elisabeth A Wilde, Erin D Bigler, Trevor Huff, Haonan Wang, Garrett M Black, Zachary P Christensen, Naomi Goodrich-Hunsaker, Jo Ann Petrie, Tracy Abildskov, Brian A Taylor, James R Stone, Nicholas J Tustison, Mary R Newsome, Harvey S Levin, Zili D Chu, Gerald E York, and David F Tate. Quantitative structural neuroimaging of mild traumatic brain injury in the chronic effects of neurotrauma consortium (cenc): Comparison of volumetric data within and across scanners. *Brain Inj*, 30(12):1442–1451, 2016.

Talissa A Altes, John P Mugler, 3rd, Kai Ruppert, Nicholas J Tustison, Joanne Gersbach, Sylvia Szentpetery, Craig H Meyer, Eduard E de Lange, and W Gerald Teague. Clinical correlates of lung ventilation defects in asthmatic children. *J Allergy Clin Immunol*, Oct 2015.

Khader M Hasan, Benson Mwangi, Bo Cao, Zafer Keser, Nicholas J Tustison, Peter Kochunov, Richard E Frye, Mirjana Savatic, and Jair Soares. Entorhinal cortex thickness across the human lifespan. *J Neuroimaging*, Oct 2015.

Bjoern H Menze, Andras Jakab, Stefan Bauer, Jayashree Kalpathy-Cramer, Keyvan Fara-hani, Justin Kirby, Yuliya Burren, Nicole Porz, Johannes Slotboom, Roland Wiest, Levente Lanczi, Elizabeth Gerstner, Marc-Andre Weber, Tal Arbel, Brian B Avants, Nicholas Ayache, Patricia Buendia, D Louis Collins, Nicolas Cordier, Jason J Corso, Antonio Criminisi, Tilak Das, Herve Delingette, Cagatay Demiralp, Christopher R Durst, Michel Dojat, Senan Doyle, Joana Festa, Florence Forbes, Ezequiel Geremia, Ben Glocker, Polina Golland, Xiaotao Guo,

Andac Hamamci, Khan M Iftekharuddin, Raj Jena, Nigel M John, Ender Konukoglu, Danial Lashkari, Jose Antonio Mariz, Raphael Meier, Sergio Pereira, Doina Precup, Stephen J Price, Tammy Riklin Raviv, Syed M S Reza, Michael Ryan, Duygu Sarikaya, Lawrence Schwartz, Hoo-Chang Shin, Jamie Shotton, Carlos A Silva, Nuno Sousa, Nagesh K Subbanna, Gabor Szekely, Thomas J Taylor, Owen M Thomas, Nicholas J Tustison, Gozde Unal, Flor Vasseur, Max Wintermark, Dong Hye Ye, Liang Zhao, Binsheng Zhao, Darko Zikic, Marcel Prastawa, Mauricio Reyes, and Koen Van Leemput. The multimodal brain tumor image segmentation benchmark (brats). *IEEE Trans Med Imaging*, 34(10):1993–2024, Oct 2015.

Kun Qing, Talissa A Altes, Nicholas J Tustison, Xue Feng, Xiao Chen, Jaime F Mata, G Wilson Miller, Eduard E de Lange, William A Tobias, Gordon D Cates, Jr, James R Brookeman, and John P Mugler, 3rd. Rapid acquisition of helium-3 and proton three-dimensional image sets of the human lung in a single breath-hold using compressed sensing. *Magn Reson Med*, 74(4):1110–5, Oct 2015.

Nicholas J Tustison, Kun Qing, Chengbo Wang, Talissa A Altes, and John P Mugler, 3rd. Atlas-based estimation of lung and lobar anatomy in proton MRI. *Magn Reson Med*, Jul 2015.

Christopher R Durst, Navin Michael, Nicholas J Tustison, James T Patrie, Prashant Raghavan, Max Wintermark, and S Sendhil Velan. Noninvasive evaluation of the regional variations of gaba using magnetic resonance spectroscopy at 3 tesla. *Magn Reson Imaging*, 33(5):611–7, Jun 2015.

Nicholas J Tustison, K L Shrinidhi, Max Wintermark, Christopher R Durst, Benjamin M Kandel, James C Gee, Murray C Grossman, and Brian B Avants. Optimal symmetric multimodal templates and concatenated random forests for supervised brain tumor segmentation (simplified) with ANTsR. *Neuroinformatics*, 13(2):209–25, Apr 2015.

Yi Xin, Gang Song, Maurizio Cereda, Stephen Kadlec, Hooman Hamedani, Yunqing Jiang, Jennia Rajaei, Justin Clapp, Harrilla Profka, Natalie Meeder, Jue Wu, Nicholas J Tustison, James C Gee, and Rahim R Rizi. Semiautomatic segmentation of longitudinal computed tomography images in a rat model of lung injury by surfactant depletion. *J Appl Physiol (1985)*, 118(3):377–85, Feb 2015.

Brian B Avants, Jeffrey T Duda, Emily Kilroy, Kate Krasileva, Kay Jann, Benjamin T Kandel, Nicholas J Tustison, Lirong Yan, Mayank Jog, Robert Smith, Yi Wang, Mirella Dapretto, and Danny J J Wang. The pediatric template of brain perfusion. *Sci Data*, 2:150003, 2015.

Brian B Avants, Hans J Johnson, and Nicholas J Tustison. Neuroinformatics and the Insight ToolKit. *Front Neuroinform*, 9:5, 2015.

Jonathon H Yoder, John M Peloquin, Gang Song, Nick J Tustison, Sung M Moon, Alexander C Wright, Edward J Vresilovic, James C Gee, and Dawn M Elliott. Internal three-dimensional strains in human intervertebral discs under axial compression quantified noninvasively by magnetic resonance imaging and image registration. *J Biomech Eng*, 136(11), Nov 2014.

Nicholas Said, W Jeff Elias, Prashant Raghavan, Alan Cupino, Nicholas Tustison, Robert Frysinger, James Patrie, Wenjun Xin, and Max Wintermark. Correlation of diffusion tensor tractography and intraoperative macrostimulation during deep brain stimulation for Parkinson disease. *J Neurosurg*, 121(4):929–35, Oct 2014.

Nicholas J Tustison, Philip A Cook, Arno Klein, Gang Song, Sandhitsu R Das, Jeffrey T Duda, Benjamin M Kandel, Niels van Strien, James R Stone, James C Gee, and Brian B Avants. Large-scale evaluation of ANTs and FreeSurfer cortical thickness measurements. *Neuroimage*, 99:166–79, Oct 2014.

W Gerald Teague, Nicholas J Tustison, and Talissa A Altes. Ventilation heterogeneity in asthma. *J Asthma*, 51(7):677–84, Sep 2014.

Max Wintermark, Diane S Huss, Binit B Shah, Nicholas Tustison, T Jason Druzgal, Neal Kassell, and W Jeff Elias. Thalamic connectivity in patients with essential tremor treated with MR imaging-guided focused ultrasound: in vivo fiber tracking by using diffusion-tensor MR imaging. *Radiology*, 272(1):202–9, Jul 2014.

Max Wintermark, Nicholas J Tustison, William J Elias, James T Patrie, Wenjun Xin, Nicholas Demartini, Matt Eames, Suna Sumer, Benison Lau, Alan Cupino, John Snell, Arik Hananel, Neal Kassell, and Jean-Francois Aubry. T1-weighted MRI as a substitute to CT for refocusing planning in MR-guided focused ultrasound. *Phys Med Biol*, 59(13):3599–614, Jul 2014.

Nicholas J Tustison, Brian B Avants, Philip A Cook, Junghoon Kim, John Whyte, James C Gee, and James R Stone. Logical circularity in voxel-based analysis: normalization strategy may induce statistical bias. *Hum Brain Mapp*, 35(3):745–59, Mar 2014.

Christopher R Durst, Prashant Raghavan, Mark E Shaffrey, David Schiff, M Beatriz Lopes, Jason P Sheehan, Nicholas J Tustison, James T Patrie, Wenjun Xin, W Jeff Elias, Kenneth C Liu, Greg A Helm, A Cupino, and Max Wintermark. Multimodal MR imaging model to predict tumor infiltration in patients with gliomas. *Neuroradiology*, 56(2):107–15, Feb 2014.

Brian B Avants, Nicholas J Tustison, Michael Stauffer, Gang Song, Baohua Wu, and James C Gee. The Insight ToolKit image registration framework. *Front Neuroinform*, 8:44, 2014.

Nicholas J Tustison and Brian B Avants. Explicit B-spline regularization in diffeomorphic image registration. *Front Neuroinform*, 7:39, 2013.

Nicholas J Tustison, Hans J Johnson, Torsten Rohlfing, Arno Klein, Satrajit S Ghosh, Luis Ibanez, and Brian B Avants. Instrumentation bias in the use and evaluation of scientific software: recommendations for reproducible practices in the computational sciences. *Front Neurosci*, 7:162, 2013.

Gang Song, Eduardo Mortani Barbosa, Jr, Nicholas Tustison, Warren B Geftter, Maryl Kreider, James C Gee, and Drew A Torigian. A comparative study of HRCT image metrics and PFT values for characterization of ILD and COPD. *Acad Radiol*, 19(7):857–64, Jul 2012.

Brian B Avants, Nicholas J Tustison, Jue Wu, Philip A Cook, and James C Gee. An open source multivariate framework for n -tissue segmentation with evaluation on public data. *Neuroinformatics*, 9(4):381–400, Dec 2011.

Keelin Murphy, Bram van Ginneken, Joseph M Reinhardt, Sven Kabus, Kai Ding, Xiang Deng, Kunlin Cao, Kaifang Du, Gary E Christensen, Vincent Garcia, Tom Vercauteren, Nicholas Ayache, Olivier Commowick, Grégoire Malandain, Ben Glocker, Nikos Paragios, Nassir Navab, Vladlena Gorbunova, Jon Sporring, Marleen de Bruijne, Xiao Han, Matthias P Heinrich, Julia A Schnabel, Mark Jenkinson, Cristian Lorenz, Marc Modat, Jamie R McClelland, Sébastien Ourselin, Sascha E A Muenzing, Max A Viergever, Dante De Nigris,

D Louis Collins, Tal Arbel, Marta Peroni, Rui Li, Gregory C Sharp, Alexander Schmidt-Richberg, Jan Ehrhardt, René Werner, Dirk Smeets, Dirk Loeckx, Gang Song, Nicholas Tustison, Brian Avants, James C Gee, Marius Staring, Stefan Klein, Berend C Stoel, Martin Urschler, Manuel Werlberger, Jef Vandemeulebroucke, Simon Rit, David Sarrut, and Josien P W Pluim. Evaluation of registration methods on thoracic CT: the EMPIRE10 challenge. *IEEE Trans Med Imaging*, 30(11):1901–20, Nov 2011.

Eduardo Mortani Barbosa, Jr, Gang Song, Nicholas Tustison, Maryl Kreider, James C Gee, Warren B Gefter, and Drew A Torigian. Computational analysis of thoracic multidetector row HRCT for segmentation and quantification of small airway air trapping and emphysema in obstructive pulmonary disease. *Acad Radiol*, 18(10):1258–69, Oct 2011.

Nicholas J Tustison, Brian B Avants, Lucia Flors, Talissa A Altes, Eduard E de Lange, John P Mugler, 3rd, and James C Gee. Ventilation-based segmentation of the lungs using hyperpolarized (³He) MRI. *J Magn Reson Imaging*, 34(4):831–41, Oct 2011.

Cuneyt Yilmaz, Nicholas J Tustison, D Merrill Dane, Priya Ravikumar, Masaya Takahashi, James C Gee, and Connie C W Hsia. Progressive adaptation in regional parenchyma mechanics following extensive lung resection assessed by functional computed tomography. *J Appl Physiol (1985)*, 111(4):1150–8, Oct 2011.

Nicholas J Tustison, Brian B Avants, Marcelo Siqueira, and James C Gee. Topological well-composedness and glamorous glue: a digital gluing algorithm for topologically constrained front propagation. *IEEE Trans Image Process*, 20(6):1756–61, Jun 2011.

Nicholas J Tustison, Tessa S Cook, Gang Song, and James C Gee. Pulmonary kinematics from image data: a review. *Acad Radiol*, 18(4):402–17, Apr 2011.

Brian B Avants, Nicholas J Tustison, Gang Song, Philip A Cook, Arno Klein, and James C Gee. A reproducible evaluation of ANTs similarity metric performance in brain image registration. *Neuroimage*, 54(3):2033–44, Feb 2011.

Nicholas J Tustison, Suyash P Awate, Gang Song, Tessa S Cook, and James C Gee. Point set registration using Havrda-Charvat-Tsallis entropy measures. *IEEE Trans Med Imaging*, 30(2):451–60, Feb 2011.

Nicholas J Tustison, Talissa A Altes, Gang Song, Eduard E de Lange, John P Mugler, 3rd, and James C Gee. Feature analysis of hyperpolarized helium-3 pulmonary MRI: a study of asthmatics versus nonasthmatics. *Magn Reson Med*, 63(6):1448–55, Jun 2010.

Nicholas J Tustison, Brian B Avants, Philip A Cook, Yuanjie Zheng, Alexander Egan, Paul A Yushkevich, and James C Gee. N4ITK: improved N3 bias correction. *IEEE Trans Med Imaging*, 29(6):1310–20, Jun 2010.

Nicholas J Tustison, Suyash P Awate, Jing Cai, Talissa A Altes, G Wilson Miller, Eduard E de Lange, John P Mugler, 3rd, and James C Gee. Pulmonary kinematics from tagged hyperpolarized helium-3 MRI. *J Magn Reson Imaging*, 31(5):1236–41, May 2010.

Nicholas J Tustison, Brian B Avants, and James C Gee. Directly manipulated free-form deformation image registration. *IEEE Trans Image Process*, 18(3):624–35, Mar 2009.

Marcelo Siqueira, Longin J. Latecki, Nicholas J. Tustison, J. Gallier, and James C. Gee. Topological repairing of 3D digital images. *Journal of Mathematical Imaging and Vision*, 30(3):249–274, March 2008.

Nicholas J Tustison and Amir A Amini. Biventricular myocardial strains via nonrigid registration of anatomical NURBS model [corrected]. *IEEE Trans Med Imaging*, 25(1):94–112, Jan 2006.

Nicholas J Tustison, Victor G Dávila-Román, and Amir A Amini. Myocardial kinematics from tagged MRI based on a 4-D B-spline model. *IEEE Trans Biomed Eng*, 50(8):1038–40, Aug 2003.

K D Hagspiel, T A Altes, J P Mugler, 3rd, M J Spellman, Jr, J F Mata, N J Tustison, and J R Brookeman. MR virtual colonography using hyperpolarized $(3)\text{He}$ as an endoluminal contrast agent: demonstration of feasibility. *Magn Reson Med*, 44(5):813–6, Nov 2000.