**NAME: NICHOLAS J. TUSTISON**

**Purpose:** The Annual Faculty Review is used as an opportunity to celebrate faculty successes, develop mechanisms for continued success, and provide guidance and feedback for professional advancement. Thank you for your thoughtful reporting efforts.

1. ***CURRICULUM VITAE***

Please submit an updated CV in School of Medicine P&T format when you submit this report. Please highlight any new activities completed during the April 1 – March 31 reporting period in your updated CV. This includes but is not limited to service on national committees and societies, lectures, papers, and grants.

Reference website: [P&T Resources | Faculty Affairs and Development (virginia.edu)](https://faculty.med.virginia.edu/facultyaffairs/advancement/pandt/pt-resources/)

1. ***ADMINISTRATIVE ACTIVITIES***
2. **Current Appointments/Roles (Including Department/Division/School of Medicine, UVA Health System, etc.)**

Professor, Department of Radiology and Medical Imaging, University of Virginia

1. **Do you expect the reported appointments/roles or allocation of effort to change significantly next year? Yes or No. If yes, please explain.**

No.

1. **Administrative Initiatives/Accomplishments**

\*Note: Include topic and timeframe, and brief descriptive narrative

None.

1. ***SCHOLARLY ACTIVITIES***
2. **Describe Research Efforts, Including Areas of Active Research, Future Research Operation Enhancements or Expansions and Intellectual Properties.**

*\*Note: Description should be no more than 1-2 paragraphs.*

My research focuses on developing and disseminating open-source computational strategies for advanced medical image analysis, particularly in neuroscience, pulmonary, and small animal applications. A significant contribution is my co-founding and development of the ANTsX ecosystem, a widely utilized library for image registration, segmentation, and deep learning, including ANTsPyNet and ANTsRNet. I also collaborate extensively on traumatic brain injury research, contributing statistical methods and neuroimaging analyses, and provide algorithmic innovation for hyperpolarized gas imaging quantification. My work is fundamentally collaborative, involving consulting and mentoring, and I actively support the broader research community

1. **Describe Research Collaboration/Team Science (Grants, papers, or other collaborations with faculty from other departments or UVA schools)**

**Papers**

1. **Nicholas J. Tustison**, Min Chen, Fae N. Kronman, Jeffrey T. Duda, Clare Gamlin, Mia G. Tustison, Michael Kunst, Rachel Dalley, Staci Sorenson, Quanxi Wang, Lydia Ng, Yongsoo Kim, and James C. Gee. The ANTsX Ecosystem for Mapping the Mouse Brain. Submitted.
2. Destiny E. Berisha, Batool Rizvi, Miranda G. Chappel-Farley, **Nicholas Tustison**, Lisa Taylor, Abhishek Dave, Negin S. Sattari, Ivy Y. Chen, Kitty K. Lui, John C. Janecek, David Keator, Ariel B. Neikrug, Ruth M. Benca, Michael A. Yassa, and Bryce A. Mander. Cerebrovascular pathology mediates associations between hypoxemia during rapid eye movement sleep and medial temporal lobe structure and function in older adults. Submitted.
3. Allyson T. Gage, James R. Stone, Elisabeth A. Wilde, Stephen R. McCauley, Robert C. Welsh, John P. Mugler, III, **Nick Tustison**, Brian Avants, Christopher T. Whitlow, Lee Lancashire, Seema D. Bhatt, and Magali Haas. Normative Neuroimaging Library: Designing a Comprehensive and Demographically Diverse Dataset of Healthy Controls to Support Traumatic Brain Injury Diagnostic and Therapeutic Development. *J Neurotrauma*. 41(23-24):2497-2512, Dec 2024.
4. Emily L Dennis, Jared Rowland, Carrie Esopenko, **Nicholas Tustison**, Mary Newsome, Brian Avants, Jessica Gill, Sidney Hinds II, Kimbra Kenney, Hannah Lindsey, Sarah Martindale-Supak, Mary Jo Pugh, Randall Scheibel, Pashtun-Poh Shahim, Robert Shih, James R Stone, Maya Troyanskaya, William C Walker, J Kent Werner, Gerald York, David Cifu, David Tate, and Elisabeth A Wilde. Brain volume changes following blast-related mild TBI in service members and veterans: a LIMBIC-CENC study. *JAMA Netw Open*. 7(11):e2443416, Nov 2024.
5. Fae A Kronman, Josephine K Liwang, Rebecca Betty, Daniel J Vanselow, Yuan-Ting Wu, **Nicholas J Tustison**, Ashwin Bhandiwad, Steffy B Manjila, Jennifer A Minteer, Donghui Shin, Choong Heon Lee, Rohan Patil, Jeffrey T Duda, Luis Puelles, James C Gee, Jiangyang Zhang, Lydia Ng, and Yongsoo Kim. Developmental Mouse Brain Common Coordinate Framework. *Nature Communications*. 15:9072, Oct 2024.
6. Chenxi Yuan, Jinhao Duan, **Nicholas J. Tustison**, Kaidi Xu, Rebecca A Hubbard, and Kristin A Linn. ReMiND: Recovery of Missing Neuroimaging using Diffusion Models with Application to Alzheimer's Disease.  *Imaging Neuroscience*. 2:1-14, 2024.
7. Fengling Hu, Alfredo Lucas, Andrew A. Chen, Kyle Coleman, Hannah Horng, Raymond W.S. Ng, **Nicholas J. Tustison**, Kathryn A. Davis, Haochang Shou, Mingyao Li, Russell T. Shinohara, and The Alzheimer’s Disease Neuroimaging Initiative. DeepComBat: A Statistically Motivated, Hyperparameter- Robust, Deep Learning Approach to Harmonization of Neuroimaging Data. *Human Brain Mapping*. 45(11):e26708, Aug 2024.
8. **Nicholas J. Tustison**, Michael A. Yassa, Batool Rizvi, Andrew J. Holbrook, Mithra T. Sathishkumar, Mia G. Tustison, James C. Gee, James R. Stone, and Brian B. Avants. ANTsX neuroimaging-derived structural phenotypes of UK Biobank. *Scientific Reports*. 14(1):8848, Apr 2024.
9. James R. Stone, Brian B. Avants, **Nicholas Tustison**, Jessica Gill, Elisabeth A. Wilde, George E. Wahlen, Kiel D. Neumann, Leslie A. Gladney, Madison O. Kilgore, F. Bowling, Christopher M. Wilson, John F. Detro, Heather G. Belanger, Katryna Deary, Hans Linsenbardt, and Stephen T. Ahlers. Neurological effects of repeated blast exposure in Special Operations personnel. *Journal of Neurotrauma*.  *Journal of Neurotrauma*. 41(7-8):942-956, Apr 2024.
10. Kun Qing, Talissa Altes, John Mugler III, **Nick Tustison**, Jaime Mata, Kai Ruppert, Peter Komlosi, Xue Feng, Ke Nie, Li Zhao, Zhixing Wang, F. William Hersman, Iulian Ruset, Bo Liu, Y. Michael Shim, and W. Gerald Teague. Pulmonary MRI with Hyperpolarized Xenon-129 Demonstrates Novel Alterations in Gas Transfer Across the Air-blood Barrier in Asthma. *Medical Physics. 51(4):2413-2423,* Apr 2024.

**Grants**

* Developing Hyperpolarized Gas MRI signatures to detect and manage acute cellular rejection.
* Other ongoing grants are listed in my CV, Section XV.

1. ***CLINICAL ACTIVITIES***
2. **DESCRIBE CLINICAL SERVICES FOR WHICH YOU ARE RESPONSIBLE**

NA.

1. **CLINICAL/OPERATIONAL ENHANCEMENTS:** Describe any clinical/operational enhancements or expansions of clinical services for which you are responsible, include plans for the next year (eg. Quality and safety projects, protocol changes, new clinical services).

NA.

1. **CLINICAL QUALITY INITIATIVES**
   1. **Describe your Quality Improvement (QI) project for current FY.**

NA.

* 1. **Describe other quality projects/initiatives**

NA.

1. ***TEACHING/EDUCATIONAL ACTIVITIES***

\*Note: Describe your responsibilities in a brief descriptive narrative.

None.

1. ***ADVISING & MENTORING ACTIVITIES***
2. **FORMAL ADVISING & MENTORING ACTIVITIES:**

|  |  |
| --- | --- |
| # of Pre-doctoral students mentored | 0 |
| # of Doctoral/Post-doctoral students mentored | 0 |
| # of Post-doctoral Fellows on training grants mentored | 0 |
| # of Post-doctoral Fellows in funded fellowships mentored | 0 |
| # of Unfunded Post-doctoral Fellows mentored | 0 |
| # of Medical Scientist Training Program students mentored | 0 |
| # of Medical Student Summer Research Program students mentored | 0 |

1. ***REPUTATION***

Given the challenges of obtaining referee letters from independent, external (IE) referees (for promotion, endowed chair nominations, prestigious awards, etc.), it is advantageous to develop a list of potential referees and update it through the course of a faculty member’s career. Criteria for IE referees can be found in the P&T FAQs section under “Referees”

(see: <https://faculty.med.virginia.edu/facultyaffairs/advancement/pandt/ptfaq/>)

Please list three to five people who can serve as independent, external referees.

* + - Paul Thompson, Professor, University of Southern California, pthomp@usc.edu
    - Daniel Rueckert, Professor, Imperial College London, d.rueckert@imperial.ac.uk
    - Marius Staring, Professor, Leiden University, m.staring@lumc.nl
    - Martin Styner, Professor, University of North Carolina, styner@cs.unc.edu
    - Mallar Chakravarty, Professor, McGill University, mallar@cobralab.ca
    - Marc Niethammer, Professor, University of North Carolina at Chappel Hill, mn@cs.unc.edu

1. ***DEMONSTRATION OF ASPIRE VALUES***

Include a brief self-evaluation in your annual review regarding adherence to the UVA Health ASPIRE values by describing at least one example of activities that demonstrate an ASPIRE value. For details see SOM Code of Conduct from the link on this page: <https://med.virginia.edu/policies/university-of-virginia-school-of-medicine-code-of-conduct/>

My development of the ANTsX ecosystem for medical image analysis directly exemplifies the ASPIRE values of Stewardship and Equity. By responsibly managing and sharing these resources openly, I ensure wider accessibility and promote continuous improvement within the research community, demonstrating Stewardship. Furthermore, a commitment to Equity is demonstrated by its open-source development where knowledge is shared and diverse perspectives are valued.

1. ***PROFESSIONAL & BUSINESS DEVELOPMENT***
2. **PROFESSIONAL DEVELOPMENT ACTIVITIES**

Eg. Leadership in Academic Matters [LAM] or other leadership training, Promotion & Tenure Sessions, department development or institutional lectures

None.

1. **DESCRIBE NEW BUSINESS DEVELOPMENT**

None.

1. **NATIONAL SERVICE & Leadership**

**Insight Software Consortium Council** 2018-

I currently serve on the board of the Insight Software Consortium. This body determines policy and direction of the Insight Toolkit.

**Developer, Insight Toolkit, National Library of Medicine** 2008-

I am one of the top contributors to the Insight Toolkit of the National Library of Medicine under the National Institute of Health where I have made software contributions for image registration, segmentation, visualization, and other processing components.

1. **COMMUNITY SERVICE**

Eg. Miscellaneous activities that have enhanced your professional development or the growth, improvement and/or visibility of the department, such as volunteer work at the Free Clinic, Day of Caring, community service, diversity initiatives, Albemarle Medical Society, Radiology interest groups, etc.

I volunteer with the local high school cross-country team.

1. **ACHIEVEMENTS AND GOALS**
   1. **Briefly describe what you consider your major achievements this year:**

I wrote a couple of grant proposals with James Stone and Brian Avants. Finished revamping a couple of major networks for ANTsXNet. Found and implemented a network for PVS segmentation.

* 1. **Goals: List at least three professional/academic goals for the coming year:**

**Goal 1:** Publish Nature communications submission.

**Goal 2:** Finish DeepSiMLR algorithm including evaluation.

**Goal 3:** Develop HCP-based publication.

* 1. **Describe your 3-5 year goals, and describe what steps you will take this year towards achieving these goals:**

Continue to work with collaborators and develop new collaborations with whom I will continue to work towards papers, grants, etc.

* 1. **How can the department help you succeed in achieving the goals you described in items 2 & 3 above?**

Nothing other than the continued support for allowing remote work.

* 1. **Additional comments:**

None.

1. ***COMMENTS FROM THE CHAIR***
2. ***ACKNOWLEDGMENT***

Your signature indicates your acknowledgement of having discussed your annual review and teaching evaluations with the Department Chair.

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Signature: Faculty Member Date of Review

***(Leave blank until your meeting)***

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Signature: Department Chair Date of Review