


Committee on Energy and Commerce
U.S. House of Representatives
 Witness Disclosure Requirement – “Truth in Testimony”
 Required by House Rule XI, Clause 2(g)(5)

1. Your Name: David E. Newman-Toker, MD PhD		
2. Your Title: Professor of Neurology, Ophthalmology, & Otolaryngology		
3. The Entity(ies) You are Representing: Self (David Newman-Toker)		
4. Are you testifying on behalf of the Federal, or a State or local government entity?	Yes	No x
<p>5. Please list any Federal grants or contracts, or contracts or payments originating with a foreign government, that you or the entity(ies) you represent have received on or after January 1, 2020. Only grants, contracts, or payments related to the subject matter of the hearing must be listed.</p> <p>I do not hold any grants, contracts, or receive payments directly related to “artificial intelligence in health care,” but I serve as a principal investigator (PI) on multiple grants and contracts related to diagnostic safety, quality, and excellence. Since my testimony includes discussion of artificial intelligence for diagnosis, I have listed the qualifying Federal grants and contracts below that I have received on or after January 1, 2020. For these grants, my institution (Johns Hopkins University School of Medicine) is the grant recipient, and I receive support for a portion of my salary (not separate payment). Note also that I am representing myself, rather than my institution, in my testimony. I receive no other qualifying Federal or foreign payments.</p> <p><i>AHRQ R18 HS 029350 Newman-Toker/McDonald (PIs) 09/30/22-09/29/26 (~\$4.0M)</i> Armstrong Institute Center for Diagnostic Excellence-Pursuing Scalable System-Level Diagnostic Quality, Value and Equity by Applying Safety Science to Emergency Department Diagnosis This program seeks to integrate Safety I and Safety II principles to eliminate preventable misdiagnosis-related harms in the ED. Aims include a focus on identifying diagnostic errors and associated organizational learning.</p> <p><i>AHRQ R01 HS 27614 Newman-Toker (PI) 07/01/20-06/30/24 (~\$1.6M)</i> Towards a National Diagnostic Excellence Dashboard—Partnering with Stakeholders to Construct Evidence-Based Operational Measures of Misdiagnosis-Related Harms This study seeks to leverage stakeholder input and Medicare claims analysis to develop the first nationally endorsed measure of misdiagnosis-related harms for the symptom-disease pair of dizziness and stroke.</p> <p><i>AHRQ EPC VI Contract (TOPIC ID 503-4262) Newman-Toker (PI) 06/01/20-11/30/21 (~\$0.7M)</i> Diagnostic Errors in the Emergency Department This contract is to conduct a systematic review of the frequency and causes of diagnostic error in the ED.</p> <p><i>NIH (NIDCD) U01 DC013778 Newman-Toker (PI) 09/16/14-08/31/21 (~\$5.5M)</i> AVERT_Acute Video-oculography for Vertigo in Emergency Rooms for Rapid Triage This phase II diagnostic strategy, randomized clinical trial seeks to establish proof of concept for device-based diagnostic decision support to increase diagnostic accuracy for stroke & inner ear disease in acute dizziness.</p>		
6. Are you a fiduciary (including, but not limited to, a director, officer, advisor, or resident agent) of any organization or entity that has an interest in the subject matter of the hearing?	Yes	No x

7. Please attach your curriculum vitae to your completed disclosure form. (Attached)

Signature: _____  _____

Date: 11/27/2023 _____

CURRICULUM VITAE FOR ACADEMIC PROMOTION
The Johns Hopkins University School of Medicine (JHU SOM)



David E. Newman-Toker, M.D., Ph.D.

July 12, 2023

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Appointments (**staff appointments voluntarily relinquished during COVID-19 pandemic*)

07/1/02-04/16/20* Active Staff, Dept Neurology, The Johns Hopkins Hospital
07/1/02-04/16/20* Courtesy Staff, Dept Neurology, The Johns Hopkins Bayview Medical Center
07/1/10-present Core Faculty, Graduate Training Program in Clinical Investigation, JHU SOM
03/16/12-present Core Faculty, Armstrong Institute for Patient Safety & Quality, JHU SOM
10/1/16-present Professor of Neurology, JHU SOM (Assistant 7/1/02; Associate 2/1/10; Full 10/1/2016)
10/1/16-present Professor of Otolaryngology, Head & Neck Surgery, JHU SOM (initial 7/1/02)
10/1/16-present Professor of Emergency Medicine, JHU SOM (initial 7/1/06)
10/1/16-present Joint Appointment in Ophthalmology, JHU SOM (initial 7/1/02)
10/1/16-present Joint Appointment in Health Sciences Informatics, JHU SOM (initial 7/1/02)
10/1/16-present Professor of Epidemiology, Bloomberg School of Public Health (BSPH) (initial 4/1/03)
10/1/16-present Joint Appointment in Health Policy and Management, BSPH (initial 7/1/03)
06/22/17-present Joint Appointment in Acute and Chronic Care, JHU School of Nursing (initial 6/22/17)
08/22/17-04/16/20* Consulting Staff, Dept Neurology, Howard County General Hospital
03/11/22-present Appointed to the endowed David Robinson Professorship in Vestibular Neurology

Personal Data

Dept Neurology
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Education and Training

Undergraduate

05/91 B.S., Biophysics & Biochemistry, Yale University, New Haven, CT

Doctoral/Graduate

05/95 M.D., University of Pennsylvania School of Medicine, Philadelphia, PA
05/07 Ph.D., Clinical Investigation, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Post-doctoral

1995-06/1996 Intern, Internal Medicine, Harvard University/Massachusetts General Hospital, Boston, MA
1996-1999 Resident, Neurology, Harvard University/Massachusetts General Hospital, Boston, MA
1999-2000 Fellow, Neuro-ophthalmology, Harvard Univ./Massachusetts Eye & Ear Infirmary, Boston, MA
2000-2002 Fellow, Neuro-otology, Johns Hopkins University/Johns Hopkins Hospital, Baltimore, MD

Professional Experience

03/95-05/95 Clinical Clerk in Neurology, Institute of Neurology, Queen Square, London, UK
10/97-12/97 Clinical Clerk in Neuro-Otology, Royal Prince Alfred Hospital, Sydney, Australia
07/99-06/00 Clinical Associate in Neurology, Massachusetts General Hospital, Boston, MA
03/01-06/02 Senior Clinical Fellow in Neurology, Johns Hopkins Hospital, Baltimore, MD
07/02-01/10 Assistant Professor of Neurology, Johns Hopkins University, Baltimore, MD
08/07-10/07 Visiting Assistant Professor of Neurology, Univ. of Rochester SOM, Rochester, NY
02/10-09/16 Associate Professor of Neurology, Johns Hopkins University, Baltimore, MD
05/12 Visiting Professor of Neurologic Education, Mayo Clinic Dept Neurology, Rochester, MN
10/14-06/15 Co-Director, Vestibular Division, Johns Hopkins Medicine, Dept Neurology, Baltimore, MD
07/15-present Director, Neuro-Visual & Vestibular Division, JHM, Dept Neurology, Baltimore, MD
10/16-present Director, Center for Diagnostic Excellence, JHM, Armstrong Institute, Baltimore, MD
10/16-present Professor of Neurology, Johns Hopkins University, Baltimore, MD (effective 10/1/2016)

RESEARCH ACTIVITIES (yellow = dizziness/vertigo/stroke diagnosis; blue = diagnostic error/excellence)

Research Publications Original Science Publications (* = corresponding author)

1. **Newman-Toker DE**, Horton JC, Lessell S. Recurrent visual loss in Leber hereditary optic neuropathy. Arch Ophthalmol. 2003 Feb; 121(2):288-291. [ISI JIF 2003 = 3.2]
2. Stanton VA, Hsieh YH, Camargo CA Jr., Edlow JA, Lovett P, Goldstein JN, Abbuhl S, Lin M, Chanmugam A, Rothman RE, **Newman-Toker DE***. Overreliance on symptom quality in diagnosing dizziness: results of a multicenter survey of emergency physicians. Mayo Clin Proc 2007 Nov; 82(11):1319-1328. [ISI JIF 2007 = 4.4] (*Tandem featured cover articles with accompanying editorial*: Caplan LR. Dizziness: How do patients describe dizziness and how do emergency physicians use these descriptions for diagnosis? Mayo Clin Proc. 2007;82:1313-1315)
3. **Newman-Toker DE***, Cannon LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Imprecision in patient reports of dizziness symptom quality: a cross-sectional study conducted in an acute-care setting. Mayo Clin Proc. 2007 Nov; 82(11):1329-1340. [ISI JIF 2007 = 4.4] (*Tandem featured cover articles with accompanying editorial*: Caplan, Mayo Clin Proc 2007)
4. Cnyrim CD, **Newman-Toker DE**, Karch C, Brandt T, Strupp M. Bedside differentiation of vestibular neuritis from central “vestibular pseudoneuritis.” J Neurol Neurosurg Psychiatry. 2008 Mar; 79:458–460. [ISI JIF 2008 = 4.6]
5. **Newman-Toker DE**†, Kattah JC†, Alvernia JE, Wang DZ. Normal head impulse test differentiates acute cerebellar strokes from vestibular neuritis. Neurology. 2008 Jun;70:2378-2385. [ISI JIF 2008 = 7.0] (†*Co-first authorship*) (*Selected for inclusion in the 60th Anniversary “Stroke and Related Disorders” subspecialty bonus issue*)
6. **Newman-Toker DE***, Hsieh YH, Camargo CA Jr., Pelletier AJ, Butchy GT, Edlow JA. Spectrum of dizziness visits to US emergency departments: cross-sectional analysis from a nationally-representative sample. Mayo Clin Proc. 2008 Jul;83(7):765-775. [ISI JIF 2008 = 4.8]
7. Hsieh YH, Rothman RE, **Newman-Toker DE**, Kelen GD. National estimation of rates of HIV serology testing in US emergency departments 1993-2005: baseline prior to the 2006 Centers for Disease Control and Prevention recommendations. AIDS. 2008 Oct;22(16):2127-2134. [ISI JIF 2008 = 5.5]
8. **Newman-Toker DE***, Sharma P, Chowdhury M, Clemons TM, Zee DS, Della Santina CC. Penlight-cover test: a new bedside method to unmask nystagmus. J Neurol Neurosurg Psychiatry. 2009 Aug;80(8):900-903. [ISI JIF 2009 = 4.9]
9. **Newman-Toker DE***, Camargo CA Jr., Hsieh YH, Pelletier AJ, Edlow JA. Disconnect between charted vestibular diagnoses and emergency department management decisions: a cross-sectional analysis from a nationally-representative sample. Acad Emerg Med. 2009 Oct;16(10):970-977. [ISI JIF 2009 = 2.5]
10. Kattah JC, Talkad AV, Wang DZ, Hsieh YH, **Newman-Toker DE***. HINTS to diagnose stroke in the acute vestibular syndrome: three-step bedside oculomotor exam more sensitive than early MRI diffusion-weighted imaging. Stroke. 2009 Nov;40(11):3504-3510. [ISI JIF 2009 = 7.0] [“2nd prize winner of the *Stroke Innovation Award*]
11. **Newman-Toker DE**, Rizzo JF III. Subjectively quantified Maddox rod testing improves diagnostic yield over alternate cover testing alone in patients with diplopia. J Clin Neurosci. 2010 Jun;17(6):727-30. Epub 2010 Apr 10. [ISI JIF 2010 = 1.2]
12. Kerber KA, Morgenstern LB, Meurer WJ, McLaughlin T, Hall PA, Forman J, Fendrick AM, **Newman-Toker DE**. Nystagmus assessments documented by emergency physicians in acute dizziness presentations: a target for decision support? Acad Emerg Med. 2011 Jun;18(6):619-626. [ISI JIF 2011 = 1.9]
13. Kattah JC, Pula J, **Newman-Toker DE**. Ocular lateropulsion as a central oculomotor sign in acute vestibular syndrome is not posturally dependent. Ann N Y Acad Sci. 2011 Sep;1233:249-55. doi: 10.1111/j.1749-6632.2011.06160.x. [ISI JIF 2010 = 3.2]
14. **Newman-Toker DE***, Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH, Rothman RE, Hanley DF, Zee DS, Kattah JC. Quantitative video-oculography to help diagnose stroke in acute vertigo and dizziness: towards an “ECG” for the eyes. Stroke. 2013;44(4):1158-61. [ISI JIF 2012 = 6.2]
15. Saber Tehrani AS, Lee HW, Mathews SC, Shore A, Makary M, Pronovost PJ, **Newman-Toker DE***. 25-year summary of US malpractice claims for diagnostic errors 1986-2010: an analysis from the National Practitioner Data Bank. BMJ Qual Saf. 2013 Aug;22(8):672-80. doi: 10.1136/bmjqs-2012-001550. Epub 2013 Apr 22. [ISI JIF 2012 2.4]

16. Pula JH, **Newman-Toker DE**, Kattah JC. Multiple sclerosis as a cause of the acute vestibular syndrome. *J Neurol*. 2013 Jun;260(6):1649-54. doi: 10.1007/s00415-013-6850-1. Epub 2013 Feb 8. [ISI JIF 2012 = 3.6]
17. Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, **Newman-Toker DE***. Rising annual costs of dizziness presentations to US emergency departments. *Acad Emerg Med*. 2013 Jul;20(7):689-96. doi:10.1111/acem.12168. [ISI JIF 2012 = 1.8]
18. Herrick DB, Nakhasi A, Nelson B, Rice S, Abbott PA, Saber Tehrani AS, Rothman RE, Lehmann HP, **Newman-Toker DE***. Usability characteristics of self-administered computer-assisted interviewing in the emergency department—factors affecting ease of use, efficiency, and error. *Appl Clin Inform*. 2013 Jun 19;4(2):276-92. doi: 10.4338/ACI-2012-09-RA-0034. [ISI JIF 2011 NA]
19. **Newman-Toker DE***, Kerber KA, Hsieh YH, Pula JH, Omron R, Saber Tehrani AS, Mantokoudis G, Hanley DF, Zee DS, Kattah JC. HINTS outperforms ABCD2 to screen for stroke in acute continuous vertigo and dizziness. *Acad Emerg Med*. 2013 Oct;20(10):987-96. [ISI JIF 2012 = 1.8]
20. Kattah JC, Dhanani SD, Pula JH, Mantokoudis G, Saber Tehrani AS, **Newman-Toker DE**. Vestibular signs of thiamine deficiency during the early phase of suspected Wernicke's encephalopathy. *Neurol Clin Pract* 2013;3:460-468. [ISI JIF 2011 N/A]
21. Lee SH, **Newman-Toker DE**, Zee DS, Schubert MC. Compensatory saccade differences between outward versus inward head impulses in chronic unilateral vestibular hypofunction. *J Clin Neurosci*. 2014 Oct;21(10):1744-9. [ISI JIF 2012 1.3]
22. **Newman-Toker DE***, Moy E, Valente E, Coffey R, Hines A. Missed diagnosis of stroke in the emergency department: a cross-sectional analysis of a large population-based sample. *Diagnosis* 2014 Apr;1(2):155-166. DOI: [10.1515/dx-2013-0038](https://doi.org/10.1515/dx-2013-0038). [ISI JIF 2014 NA]
23. Saber Tehrani AS, Kattah JC, Mantokoudis G, Pula JH, Nair D, Blitz A, Ying SH, Hanley DF, Zee DS, **Newman-Toker DE***. Small strokes causing severe vertigo—frequency of false-negative MRIs and non-lacunar mechanisms. *Neurology*. 2014 Jul 8;83(2):169-73. [ISI JIF 2008 = 7.0]
24. Mantokoudis G, Saber Tehrani AS, Kattah JC, Eibenberger K, Guede I, Zee DS, **Newman-Toker DE***. Quantifying the vestibulo-ocular reflex with video-oculography: nature and frequency of artifacts. *Audiol Neurootol*. 2015;20(1):39-50. [ISI JIF 2012 = 2.3]
25. Moradiya Y, Murthy SB, **Newman-Toker DE**, Hanley DF, Ziai WC. Intraventricular thrombolysis in intracerebral hemorrhage requiring ventriculostomy: a decade-long real-world experience. *Stroke*. 2014 Sep;45(9):2629-35. [ISI JIF 2012 = 6.2]
26. Mantokoudis G, Saber Tehrani AS, Kattah JC, Eibenberger K, Guede I, Zee DS, **Newman-Toker DE***. VOR gain by head impulse video-oculography differentiates acute vestibular neuritis from stroke. *Otol Neurotol*. 2015 Mar;36(3):457-65. [ISI JIF 2012 = 2.0]
27. Moy E, Barrett M, Coffey R, Hines A, **Newman-Toker DE**. Missed diagnoses of acute myocardial infarction in the emergency department: variation by patient and facility characteristics. *Diagnosis* 2015 Feb;2(1):29-40. DOI: [10.1515/dx-2014-0053](https://doi.org/10.1515/dx-2014-0053). [ISI JIF 2015 NA]
28. Cifra CL, Jones KL, Ascenzi JA, Bhalala US, Bembea MM, **Newman-Toker DE**, Fackler JC, Miller MR. Diagnostic errors in a PICU: insights from the morbidity and mortality conference. *Pediatr Crit Care Med*. 2015 Jun;16(5):468-76. [ISI JIF 2012 = 2.4]
29. Mantokoudis G, Tehrani AS, Xie L, Eibenberger K, Roberts D, **Newman-Toker DE**, Zee DS. The video head impulse test during post-rotatory nystagmus: physiology and clinical implications. *Exp Brain Res*. 2016 Jan;234(1):277-86.
30. Mantokoudis G, Agrawal Y, **Newman-Toker DE**, Xie L, Saber Tehrani AS, Wong A, Schubert MC. Compensatory saccades benefit from prediction during head impulse testing in early recovery from vestibular deafferentation. *Eur Arch Otorhinolaryngol*. 2016 Jun;273(6):1379-85.
31. Thomas DB, **Newman-Toker DE***. Diagnosis is a team sport—partnering with allied health professionals to reduce diagnostic errors: a case study on the role of a vestibular therapist in diagnosing dizziness. *Diagnosis*. 2016 Jun;3(2):49-59. DOI: [10.1515/dx-2016-0009](https://doi.org/10.1515/dx-2016-0009). [ISI JIF N/A]
32. Mantokoudis G, Saber Tehrani AS, Wozniak A, Eibenberger K, Kattah JC, Guede I, Zee DS, **Newman-Toker DE***. Impact of artifacts on VOR gain measures by video-oculography in the acute vestibular syndrome. *J Vestib Res*. 2016 Nov 3;26(4):375-385. [ISI JIF 2012 = 1.0]
33. Dumitrascu OM, Torbati S, Tighiouart M, **Newman-Toker DE**, Song SS. Pitfalls and rewards for implementing ocular motor testing in acute vestibular syndrome. *Neurologist*. 2017 Mar;22(2):44-47. [ISI JIF 2012 = 1.5]

34. **Newman-Toker DE***, Austin JM, Derk J, Danforth M, Graber ML. Are health care provider organizations ready to tackle diagnostic error? A survey of Leapfrog-participating hospitals. *Diagnosis*. 2017; 4(2): 73–78. DOI: [10.1515/dx-2016-0048](https://doi.org/10.1515/dx-2016-0048) [ISI JIF N/A]
35. Chang TP, Wang Z, Winnick AA, Chuang HY, Urrutia VC, Carey JP, **Newman-Toker DE***. Sudden hearing loss with vertigo portends greater stroke risk than sudden hearing loss or vertigo alone. *J Stroke Cerebrovasc Dis*. 2017. Feb;27(2):472-478.
36. Liberman AS, **Newman-Toker DE***. Symptom-Disease Pair Analysis for Diagnostic Error (SPADE): A conceptual framework and methodological approach for unearthing misdiagnosis-related harms using big data. *BMJ Quality and Safety*. 2018 Jul;27(7):557-566.
37. Mane KK, Rubenstein KB, Nassery N, Sharp AL, Shamim EA, Sangha NS, Hassoon A, Fanai M, Wang Z, **Newman-Toker DE***. Diagnostic performance dashboards: tracking diagnostic errors using big data. *BMJ Qual Saf*. 2018;27(7):567-70.
38. Kattah JC, Saber Tehrani AS, du Lac S, **Newman-Toker DE**, Zee DS. Conversion of upbeat to downbeat nystagmus in Wernicke encephalopathy. *Neurology*. 2018 Oct 23;91(17):790-796.
39. Gleason KT, Peterson S, Kasda E, Ruzs D, Adler-Kirkley A, Wang Z, **Newman-Toker DE**. Capturing diagnostic errors in incident reporting systems: value of a specific ‘DX Tile’ for diagnosis-related concerns. *Diagnosis* 2018 Nov 27;5(4):249-251.
40. **Newman-Toker DE**, Schaffer AC, Yu-Moe CW, Nassery N, Saber Tehrani AS, Clemens GD, Wang Z, Zhu Y, Fanai M, Siegal D. Serious misdiagnosis-related harms in malpractice claims: the “Big Three” – vascular events, infections, & cancers. *Diagnosis (Berl)*. 2019 Aug 27;6(3):227-240. Corrigendum to: Serious misdiagnosis-related harms in malpractice claims: The "Big Three" - vascular events, infections, and cancers. *Diagnosis (Berl)*. 2020 May 16;8(1):127-128.
41. Liberman AL, Skillings J, Greenberg P, **Newman-Toker DE**, Siegal D. Breakdowns in the patient-provider encounter are a frequent source of diagnostic error among ischemic stroke cases included in a large medical malpractice claims database. *Diagnosis (Berl)*. 2020 Jan 28;7(1):37-43.
42. **Newman-Toker DE***, Wang Z, Zhu Y, Nassery N, Saber Tehrani AS, Schaffer AC, Yu-Moe CW, Clemens GD, Fanai M, Siegal D. Rate of diagnostic errors and serious misdiagnosis-related harms for major vascular events, infections, and cancers: toward a national incidence estimate using the "Big Three." *Diagnosis (Berl)*. 2020 May 14;8(1):67-84.
43. Sharp AL, Baecker A, Nassery N, Park S, Hassoon A, Lee MS, Peterson S, Pitts S, Wang Z, Zhu Y, **Newman-Toker DE**. Missed acute myocardial infarction in the emergency department — standardizing measurement of misdiagnosis-related harms using the SPADE method. *Diagnosis (Berl)*. 2020 Jul 24;8(2):177-186.
44. Gleason K, Dennison Himmelfarb CR, Wynna T, Villanueva M, Bondala P, Peterson S, Berg D, Jerde W, **Newman-Toker D**. Feasibility of patient-reported diagnostic errors following emergency department discharge: a pilot study. *Diagnosis (Berl)*. 2020 Oct 5;8(2):187-192.
45. Zamaro E, Saber Tehrani AS, Kattah JC, Eibenberger K, Guede CI, Armando L, Caversaccio MD, **Newman-Toker DE**, Mantokoudis G. VOR gain calculation methods in video head impulse recordings. *J Vestib Res*. 2020;30(4):225-234.
46. Kattah JC, Badihian S, Pula JH, Tarnutzer AA, **Newman-Toker DE**, Zee DS. Ocular lateral deviation with brief removal of visual fixation differentiates central from peripheral vestibular syndrome. *J Neurol*. 2020 Dec;267(12):3763-3772.
47. Parker TM, Farrell N, Otero-Millan J, Kheradmand A, McClenney A, **Newman-Toker DE**. Proof of Concept for an "eyePhone" App to Measure Video Head Impulses. *Digit Biomark*. 2020 Dec 30;5(1):1-8.
48. Nassery N, Horberg MA, Rubenstein KB, Certa JM, Watson E, Somasundaram B, Shamim E, Townsend JL, Galiatsatos P, Pitts SI, Hassoon A, **Newman-Toker DE**. Antecedent treat-and-release diagnoses prior to sepsis hospitalization among adult emergency department patients: a look-back analysis employing insurance claims data using Symptom-Disease Pair Analysis of Diagnostic Error (SPADE) methodology. *Diagnosis (Berl)*. 2021 Feb 25;8(4):469-478.
49. Kotwal S, Fanai M, Fu W, Wang Z, Bery AK, Omron R, Tevzadze N, Gold G, Garibaldi BT, Wright SM, **Newman-Toker DE**. Real-world virtual patient simulation to improve diagnostic performance through deliberate practice: a prospective quasi-experimental study. *Diagnosis (Berl)*. 2021 Mar 8;8(4):489-496.
50. Horberg MA, Nassery N, Rubenstein KB, Certa JM, Shamim EA, Rothman R, Wang Z, Hassoon A, Townsend JL, Galiatsatos P, Pitts SI, **Newman-Toker DE**. Rate of sepsis hospitalizations after misdiagnosis in adult emergency department patients: a look-forward analysis with administrative claims data using Symptom-Disease

Pair Analysis of Diagnostic Error (SPADE) methodology in an integrated health system. *Diagnosis (Berl)*. 2021 Apr 26. doi: 10.1515/dx-2020-0145.

51. Chang TP, Bery AK, Wang Z, Sebestyen K, Ko YH, Liberman AL, **Newman-Toker DE**. Stroke hospitalization after misdiagnosis of "benign dizziness" is lower in specialty care than general practice: a population-based cohort analysis of missed stroke using SPADE methods. *Diagnosis (Berl)*. 2021 Jun 21;9(1):96-106.
52. Ellenbogen MI, Prichett L, **Newman-Toker DE**, Brotman DJ. Characterizing the relationship between diagnostic intensity and quality of care. *Diagnosis (Berl)*. 2021 Jul 14;9(1):123-126.
53. Liberman AL, Hassoon A, Fanai M, Badihian S, Rupani H, Peterson SM, Sebestyen K, Wang Z, Zhu Y, Lipton RB, **Newman-Toker DE**. Cerebrovascular disease hospitalizations following emergency department headache visits: A nested case- control study. *Acad Emerg Med*. 2022 Jan;29(1):41-50.
54. Zhu Y, Wang Z, Liberman AL, Chang TP, **Newman-Toker D**. Statistical insights for crude-rate-based operational measures of misdiagnosis-related harms. *Stat Med*. 2021 Sep 10;40(20):4430-4441.
55. Sharp AL, Pallegadda R, Baecker A, Park S, Nassery N, Hassoon A, Peterson S, Pitts SI, Wang Z, Zhu Y, **Newman-Toker DE**. Are mental health and substance use disorders risk factors for missed acute myocardial infarction diagnoses among chest pain or dyspnea encounters in the emergency department? *Ann Emerg Med*. 2022 Feb;79(2):93-101.
56. Parker TM, Badihian S, Hassoon A, Saber Tehrani AS, Farrell N, **Newman-Toker DE**, Otero-Millan J. Eye and head movement recordings using smartphones for telemedicine applications: measurements of accuracy and precision. *Front Neurol*. 2022 Mar 18;13:789-581.
57. Wagle N, Morkos J, Liu J, Reith H, Greenstein J, Gong K, Gangan I, Pakhomov D, Hira S, Komogortsev OV, **Newman-Toker DE**, Winslow R, Zee DS, Otero-Millan J, Green KE. aEYE: A deep learning system for video nystagmus detection. *Front Neurol*. 2022 Aug 11;13:963968.
58. Liberman AL, Zhang C, Lipton RB, Kamel H, Parikh NS, Navi BB, Segal AZ, Razzak J, **Newman-Toker DE**, Merkler AE. Short-term stroke risk after emergency department treat-and-release headache visit. *Headache*. 2022 Oct;62(9):1198-1206.
59. Zhu Y, Wang Z, **Newman-Toker D**. Misdiagnosis-related harm quantification through mixture models and harm measures. *Biometrics*. 2022 Oct 11. doi: 10.1111/biom.13759. Online ahead of print.

Original Science Publications: Systematic Reviews

1. **Newman-Toker DE***, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. How often is dizziness from primary cardiovascular disease? A systematic review. *J Gen Intern Med* 2008 Dec;23(12):2087-2094. [ISI JIF 2008 = 2.7]
2. Tarnutzer AA, Berkowitz AL, Robinson KA, Hsieh YH, **Newman-Toker DE***. Does my dizzy patient have a stroke? A systematic review of bedside diagnosis in acute vestibular syndrome. *CMAJ*. 2011 Jun;183(9):E571-92. [ISI JIF 2011 = 8.2]
3. Gottesman RF, Sharma P, Robinson KA, Arnan M, Tsui M, Ladha K, **Newman-Toker DE***. Clinical characteristics of symptomatic vertebral artery dissection: a systematic review. *Neurologist*. 2012;18(5):245-54. [ISI JIF 2012 = 1.5]
4. Gottesman RF, Sharma P, Robinson KA, Arnan M, Tsui M, Saber-Tehrani A, **Newman-Toker DE***. Imaging characteristics of symptomatic vertebral artery dissection: a systematic review. *Neurologist*. 2012;18(5):255-60. [ISI JIF 2012 = 1.5]
5. Winters B, Custer J, Galvagno SM, Jr., Colantuoni E, Kapoor SG, Lee H, Goode V, Robinson K, Nakhasi A, Pronovost P, **Newman-Toker D**. Diagnostic errors in the intensive care unit: a systematic review of autopsy studies. *BMJ Qual Saf*. 2012;21(11):894-902. [ISI JIF 2012 2.4]
6. Custer JW, Winters BD, Goode V, Robinson KA, Yang T, Pronovost PJ, **Newman-Toker DE**. Diagnostic errors in the pediatric and neonatal intensive care unit: a systematic review. *Pediatr Crit Care Med*. 2015 Jan;16(1):29-36. [ISI JIF 2012 = 2.4]
7. Tarnutzer AA, Lee SH, Robinson KA, Kaplan PW, **Newman-Toker DE**. Clinical and electrographic findings in epileptic vertigo and dizziness: a systematic review. *Neurology*. 2015 Apr 14;84(15):1595-1604. [ISI JIF 2008 = 7.0]
8. Tarnutzer AA, Lee SH, Robinson KA, Wang Z, Edlow JA†, **Newman-Toker DE*†**. Emergency department misdiagnosis of cerebrovascular events in the era of modern neuroimaging: a meta-analysis. *Neurology*. 2017 Apr 11;88(15):1468-1477 [ISI JIF 2008 = 7.0] (†Co-senior authorship)
9. **Newman-Toker DE**, Peterson SM, Badihian S, Hassoon A, Nassery N, Parizadeh D, Wilson LM, Jia Y, Omron R, Tharmarajah S, Guerin L, Bastani PB, Fracica EA, Kotwal S, Robinson KA. Diagnostic Errors in the

Emergency Department: A Systematic Review. Comparative Effectiveness Review No. 258. (Prepared by the Johns Hopkins University Evidence-based Practice Center under Contract No. 75Q80120D00003.) AHRQ Publication No. 22(23)-EHC043. Rockville, MD: Agency for Healthcare Research and Quality; December 2022. DOI: <https://doi.org/10.23970/AHRQEPCCER258>.

Original Science publications: Research Letters (*'Research Letters' format is similar to Brief Report format*)

1. **Newman-Toker DE***. Charted records of dizzy patients suggest ED physicians emphasize symptom quality in diagnostic assessment. *Ann Emerg Med*. 2007 Aug; 50(2):204-5. [ISI JIF 2007 = 3.5]
2. **Newman-Toker DE***, Stanton VA, Hsieh YH, Rothman RE. Frontline providers harbor misconceptions about the bedside evaluation of dizzy patients. *Acta Otolaryngol*. 2008 May;128(5):601-604. [ISI JIF 2008 = 0.9]
3. Versino M, **Newman-Toker DE**. Blind spot heterotopia by automated static perimetry to assess static ocular torsion: centro-cecal axis rotation in normals. *J Neurol*. 2010 Feb;257(2):291-3. Epub 2009 Oct 10. [ISI JIF 2009 = 2.9]

Inventions, Patents, Copyrights:

- 11/20/2015 **Device-Enabled Automated Diagnosis of Dizziness and Vertigo** (JHU Creative Work Reference C13893). We propose to develop and validate an automated diagnostic algorithm for device-based diagnosis of stroke and inner ear disease in patients with dizziness and vertigo. The approach relies on a combination of computer-assisted medical interviewing (with branching logic and decision rules), portable hardware device-based physical examination, and software-based algorithms to interpret results and accurately diagnose patients. The algorithm is being refined and validated in an NIH-funded clinical trial (AVERT – U01 DC013778).
- 9/29/2017 **Smartphone-Based Quantitative Video Oculography to Aid the Diagnosis of Patients with Vertigo and Dizziness** (JHU Creative Work Reference C14982). The headset holds a smartphone and takes advantage of its camera and motion sensors to record eye and head movements. It includes a custom lighting system designed for eliminating fixation to better record nystagmus and related vestibular eye-movements under natural light conditions. The headset is complemented by a quantitative video-oculography iPhone 'app' that automatically records eye movement, head movement, and videos of the eye.
- 8/6/2019 **Platform to Detect Patient Health Condition Based on Images of Physiological Activity of a Patient** (JHU Creative Work Reference C15517, Provisional Application US #62/883,373; Application #17/597,213; PCT No.: PCT/US2020/070304). This provisional patent describes a specific form of device-based decision support to diagnose health conditions (particularly inner ear diseases and strokes) at the bedside on the basis of video images of eye movements and related sensor data from mobile devices.

Research Extramural Sponsorship

Current (in Reverse Chronological Order)

- 9/30/22-9/29/26 Armstrong Institute Center for Diagnostic Excellence-Pursuing Scalable System-Level Diagnostic Quality, Value and Equity by Applying Safety Science to Emergency Department Diagnosis
R18 HS 029350
Agency for Healthcare Research and Quality (AHRQ)
\$3,999,993
PIs: Newman-Toker D, McDonald K
Role: PI, 13%. This program supports our Center for Diagnostic Excellence at Johns Hopkins in its pursuit of improved ED diagnostic quality and safety by integrating Safety I and Safety II principles to eliminate preventable misdiagnosis-related harms.
- 10/26/21-12/31/22 National Diagnostic Performance Dashboard to Measure and Track Diagnostic Error Using Big Data

#5756 (Supplement)
Gordon & Betty Moore Foundation
\$221,419 (Supplement)
Role: PI, 4%. This study seeks to develop and disseminate novel measures for misdiagnosis-related harms for stroke, myocardial infarction, and sepsis. It will also build new informatics tools and statistical methods to facilitate exploratory data analysis to identify similar future measures for other disease states using the SPADE method.

- 9/15/21-3/14/23 Automated Vestibular Diagnosis Using Video-Oculography
Fox Squirrel Project
Natus, Incorporated
\$2,521,365
Role: PI, 30%. This study will develop an algorithm to automate expert VOG-based diagnosis of vestibular disorders & stroke.
- 11/21/20-12/31/22 Virtual Patient Education from Real Cases (ViPER) to Improve ED Diagnosis
DXQI Seed Grant
Society to Improve Diagnosis in Medicine (SIDM)
\$50,000
PI: Kotwal S
Role: Co-I, 0%. This study measures the impact of simulation-based education on ED diagnosis of dizziness.
- 7/1/20-6/30/24 Towards a National Diagnostic Excellence Dashboard—Partnering with Stakeholders to Construct Evidence-Based Operational Measures of Misdiagnosis-Related Harms
R01 HS27614
Agency for Healthcare Research and Quality (AHRQ)
\$1,598,351
Role: PI, 20-25%. This study seeks to leverage stakeholder input and Medicare claims analysis to develop the first NQF-endorsed measure of misdiagnosis-related harms for the symptom-disease pair of dizziness and stroke.
- 4/1/20-3/31/24 Center for Mobile Technologies to Achieve Equity in Cardiovascular Health (mTECH Center)
Strategically Focused Research Network 20SFRN35380046
American Heart Association (AHA)
\$2,500,000
PIs: Martin S, Newman-Toker D
Role: Senior Co-PI, 15-20%. The Center will complete multiple projects related to reduce health disparities for stroke and cardiovascular diseases through the use of mobile technologies.
- 7/1/19-6/30/24 The Misdiagnosis of Cerebrovascular Disease in Emergent Headache Evaluations
K23 NS107643
NIH / National Institute for Neurological Disorders and Stroke (NINDS)
\$2,500,000
PIs: Liberman A
Role: Mentor, 0%. This study extends prior work in misdiagnosis of dizziness to develop novel measures for misdiagnosis-related harms for stroke in patients presenting with headaches.
- 9/30/18-7/31/23 Connected Emergency Care Patient Safety Learning Lab (CEC-PSLL)
R18 HS026640
Agency for Healthcare Research and Quality (AHRQ)
\$2,435,861
PIs: Levin S, Hinson J
Role: Co-Investigator, 5%; The CEC-PSLL seeks to reduce health and financial harm for patients with lower respiratory tract infection caused by a fragmented emergency care system. We

intend to support and improve decision-making by emergency clinicians that relates to diagnosis, treatment, and disposition of patients with respiratory tract infections. This will be achieved through the development of clinical decision support tools that can be integrated into the electronic health record and easily shared among medical institutions.

7/1/16-6/30/23 JHU-Tufts TIC – NCATS Trial Innovation Center
U24 (TR001609)
National Center for Advancing Translational Sciences (NCATS)
\$21,000,000
PI: Hanley D
Role: Health services research co-investigator, 20%; Johns Hopkins University (JHU) and Tufts University (with Harvard Clinical Research Institute and Massachusetts Institute of Technology) have formed a working group to improve the science of randomized clinical trials. BIOS, a JHU trials research group, will convene this group of randomized, controlled trial experts to develop a Trial Innovation Center (TIC) as part of a bigger NCATS research resources initiative. The scientific purpose will be to demonstrate that innovations in trial design, execution, and evaluation will advance NCATS' goal of getting more treatments, to more patients, more quickly.

Pending

7/1/25-12/31/30 **V.E.R.T.I.G.O. Trial – V**estibular **E**mergency **R**oom **T**eleconsults vs. **I**maging for better diagnostic **O**utcomes
Patient Centered Outcomes Research Institute (PCORI)
\$30,940,669
Role: PI, 50%; This stepped wedge comparative effectiveness trial will compare remote, device-based tele-dizzy subspecialty consultations to best-available imaging their direct impact on emergency department diagnosis and patient outcomes, including stroke and quality of life.

Previous (in Chronological Order)

7/1/01-6/30/02 Biomedical Engineering Training Grant for Vestibular Research
NRSA 5 T32 DC00023
NIH
\$42,348
PI: Sachs M
Role: Trainee, 100%; NRSA training grant award resulted in 2 abstract and poster presentations about dizziness diagnosis at an international meeting and successful K23 award submission.

7/1/02-6/30/03 Building a New Model for Diagnosis of ED Dizzy Patients
FERNE Research Seed Grant
FERNE (Foundation for Education and Research in Neurologic Emergencies)
\$5,000
Role: PI, 5% (unfunded); Resulted in publication of 4 posters and 2 manuscripts describing pilot research studies about dizziness diagnosis (*see www.ferne.org – link to Newman-Toker publications on left – accessibility verified May 1, 2015*)

12/1/02-11/30/07 Building a New Model for Diagnosis of ED Dizzy Patients
(NCE to 6/30/09) 1K23RR17324-01
NIH (K23) (NCRR, Mentored Patient-Oriented Research Career Development Award)
\$844,927
Role: PI: 75% (5% unfunded during extended NCE period); K23 award funded a large cross sectional of dizzy patients conducted in the emergency department (>300 subjects, two-site, Baltimore), a multi-center, national survey of emergency physicians (>400), and several national and international collaborations on related projects. In turn, these studies resulted in 18 different abstract (poster or platform) presentations about dizziness at 14 national and 3 international meetings, 11 original research articles, 1 seminal case report, and 1 high-profile review about

diagnosis of cerebellar infarction. These led to 16 invited Grand Rounds research presentations nationwide about dizziness, and completion of a Ph.D. in Clinical Investigation.

- 9/1/08-8/31/09
(NCE to 8/31/10) Automated Medical Interviewing for Diagnostic Decision Support in the Emergency Department
HS017755-01
AHRQ (R03) (PAR-06-448; NOT-HS-08-002)
\$80,000
Role: PI, 10% (unfunded)
- 12/1/08-11/30/09 Automated Medical Interviewing for Diagnostic Decision Support
Advanced Translational Incubator Program
Johns Hopkins Institute for Clinical and Translational Research (CTSA)
\$50,000
Role: PI, 5% (unfunded)
- 2/1/09-1/31/10 Detection of Early Neurological Diseases in HIV-Positive Emergency Department Patients
Developmental grant mechanism
JHU NIMH Center for Novel Therapeutics of HIV-associated Cognitive Disorders
\$38,000
PI: Hsiang-Hsieh Y
Role: Co-Investigator, 5% (unfunded)
- 9/16/14-8/31/21 AVERT_Acute Video-oculography for Vertigo in Emergency Rooms for Rapid Triage
U01 (U01DC013778, in no-cost extension period)
National Institute on Deafness and Other Communication Disorders (NIDCD)
\$5,522,210
Role: PI, 50%; This grant supports a multi-center Phase II Clinical Trial of a novel diagnostic method for differentiating stroke and inner ear diseases among patients with acute dizziness and vertigo in the emergency department. It compares an eye-movement based diagnostic pathway with standard care for these patients, seeking to improve early diagnostic accuracy, correct application of treatments, and patient centered outcomes, while simultaneously reducing unnecessary resource utilization.
- 9/30/14-8/31/15 Validation of Point-of-Care TBI Detection System for Head Injured Patients
W81XWH-14-C-1405
Dept the Army / Brainscope Inc.
\$3,000,000
PI: Oberly D
Role: Co-investigator, 16%; This multi-center clinical trial seeks to validate the accuracy of a novel portable device to assess for traumatic brain injury using brain electrical activity.
- 3/1/16-2/28/17 Diagnostic Performance Dashboard to Reduce Diagnostic Error & Enhance Value Using Big Data
N/A
Kaiser Permanente Mid-Atlantic & Johns Hopkins Medicine
\$65,000
Role: PI, 0%; This health services research project seeks to develop methods and tools to operationally measure and monitor diagnostic errors using administrative data.
- 9/15/13-7/31/18 MISTIE III Intracerebral Hemorrhage Trial (Minimally Invasive Surgery plus t-PA for Intracerebral Hemorrhage Evacuation)
U01 (NS080824-01A1)
National Institute of Neurological Disorders and Stroke (NINDS)

\$23,335,454

PI: Hanley DF

Role: Health services research co-investigator, 20%; This grant supports a follow-on randomized controlled trial of Minimally Invasive Surgery plus t-PA for Intracerebral Hemorrhage Evacuation (MISTIE III). The results of this study will include novel efficacy and safety data that will change the way intracerebral hemorrhage (ICH) is treated in clinical practice. This will include previously unavailable data about rt-PA safety, efficacy, and pharmacokinetics, as well as minimally-invasive surgery (MIS) data regarding the validity and safety of patient selection, quantification of surgical effectiveness, patient stability, and disease/treatment-related complications. In addition, the proposed study results will provide the first estimates of the relation between initial disease severity and long-term outcome for ICH. Dr. Newman-Toker is leading efforts to conduct cost-effectiveness and comparative effectiveness analyses of the proposed therapies using high-quality, randomized controlled trial data.

- 4/1/16-3/31/18 Research Supplement to Promote Diversity in Health-Related Research (U01DC013778-01A1) 3U01DC013778-02S1 (Diversity Candidate Maningbe Bérété Keïta; parent trial AVERT U01) National Institute on Deafness and Other Communication Disorders (NIDCD)
\$77,000
Role: PI, 0%; This cost-effectiveness modeling analysis seeks to establish the projected national costs and health benefits of using video-oculography for diagnosing stroke in dizziness.
- 5/1/16-4/30/18 Cost Effectiveness of an MRI-First Strategy for Diagnosing Acute Dizziness and Vertigo
(NCE to 12/31/18) Society to Improve Diagnosis in Medicine (SIDM)
\$80,000
Role: PI, 0%; This cost-effectiveness modeling analysis seeks to establish the projected national costs and health benefits of using an ‘MRI-first’ strategy for diagnosing stroke in dizziness.
- 1/15/18-4/15/18 Identifying Top Targets for Diagnostic Error Reduction: A Multi-Method Study of “The Big 3”
Society to Improve Diagnosis in Medicine (SIDM)
\$40,000
Role: PI, 10%. This study seeks to develop estimates of the total burden of misdiagnosis-related harms from three major disease categories – vascular events, infections, and cancer and the individual diseases within them.
- 5/1/18-4/30/21 National Diagnostic Performance Dashboard to Measure and Track Diagnostic Error Using Big
Data
#5756
Gordon & Betty Moore Foundation
\$2,397,410
Role: PI, 25%. This study seeks to develop and disseminate novel measures for misdiagnosis-related harms for stroke, myocardial infarction, and sepsis. It will also build new informatics tools and statistical methods to facilitate exploratory data analysis to identify similar future measures for other disease states using the SPADE method.
- 7/1/18-12/31/19 Patients Assigned to Research Teams with Nurses and ER providers to Enhance Diagnosis
(PARTNERED)
Eugene Washington Award
Patient Centered Outcomes Research Institute (PCORI)
\$249,974
PI: Peterson S
Role: Senior Co-Investigator, 5%; This grant seeks to build capacity among patients and nurses for engaging in patient-centered research to improve diagnosis in the emergency department.
- 1/1/19-1/15/22 Video-oculography-based Emergency Room Tele-consults to Improve diaGnostic Outcomes –
The V.E.R.T.I.G.O. Study

Coverys Community Healthcare Foundation

\$330,890 (\$299,880 extramural)

Role: PI, 5%; This quasi-experimental quality improvement implementation study is intended to scale our novel eye-movement based diagnostic approaches, extending tele-dizzy consultations to two community hospitals and assessing their direct impact on patient outcomes.

- 2/1/19-10/31/19 Identifying Top Targets for Diagnostic Error Reduction: A Multi-Method Study of “The Big 3” (Cost Extension / Second Grant)
Society to Improve Diagnosis in Medicine (SIDM)
\$40,000
Role: PI, 10%. This study seeks to extend work on estimates of the total burden of misdiagnosis-related harms from three major disease categories – vascular events, infections, and cancer and the individual diseases within them.
- 5/1/20-4/30/21 In-Home Diagnostic Triage via Smartphone Video Virtual Check-In for Potential Stroke Symptoms
COVID-19 Rapid Response
American Heart Association (AHA)
\$200,000
Role: PI, 5%. This project adapts an existing sub-specialty consultation service for diagnosing strokes among patients with acute dizziness and vertigo from the emergency department to patients’ homes via mobile phone technology.
- 6/1/20-5/30/21 Maturation of a Partially Developed Performance Measure of Stroke Misdiagnosis in Hospital EDs
Quality Measure Innovation Grant 30009-1044
AARP
\$125,000
PI: Austin M
Role: Co-I, 5%. The goal of this project is to build upon prior work in developing a hospital-level performance measure of stroke misdiagnosis for hospital emergency departments.
- 6/1/20-11/30/21 Diagnostic Errors in the Emergency Department
EPC VI Contract (Topic ID 503-4262)
Agency for Healthcare Research and Quality (AHRQ)
\$700,000
Role: PI, 20-25%. This contract is to conduct a systematic review of the frequency and causes of diagnostic error in the ED.
- 10/20/20-6/30/22 A Patient-Reported Measure of Diagnostic Excellence
Gordon & Betty Moore Foundation
\$500,000
PI: Gleason K
Role: Co-I, 0%. This study seeks to develop a patient-reported measure of excellence in ED diagnosis. Role: Co-Investigator.

Research Program Building/Leadership:

National and International Committees (*also listed with professional societies, committees*)

- 10/07-present International Bárány Society (2007-present, working group member) (Committee for the Classification of Vestibular Disorders of the Bárány Society [10/07-present, working group member; 6/09-present Co-Chair]) [*this group develops research criteria for vestibular disorders, similar to those developed by the International Headache Society for headache disorders*]
- 11/08 NIH roundtable on Opportunities to Advance Research on Neurological and Psychiatric Emergencies, sponsored by NINDS (panelist, discussant, co-author of summary manuscript)

5/10-12/12

Invited expert participant, Development of ICF Core Sets for Vertigo; Kloster Seeon, Germany. [international expert consensus conference to develop standards (ICF Core Sets) for classifying and describing functioning and disability in patients with vertigo]

EDUCATIONAL ACTIVITIES

Educational Publications

Peer-Reviewed Publications (e.g. consensus statements, expert opinions) (* = *corresponding author*)

1. Edlow JA, **Newman-Toker DE**, Savitz SI. Diagnosis and initial management of cerebellar infarction. *Lancet Neurol.* 2008 Oct;7:951-64. [ISI JIF 2008 = 14.3]
2. **Newman-Toker DE***, Pronovost PJ. Diagnostic errors: the next frontier for patient safety. *JAMA.* 2009 Mar; 301(10):1060-62. [ISI JIF 2009 = 28.9] [*commentary drawing attention to diagnostic error and highlighting systems-oriented solutions*] (*leading to press release and national public radio interview*)
3. Bisdorff A, von Brevern M, Lempert T, **Newman-Toker DE**. Classification of vestibular symptoms: towards an international classification of vestibular disorders. *J Vestib Res.* 2009;19(1-2):1-13. [ISI JIF 2009 = 0.6]
4. D'Onofrio G, Jauch E, Jagoda A, Allen MH, Anglin D, Barsan WG, Berger RP, Bobrow BJ, Boudreaux ED, Bushnell C, Chan YF, Currier G, Eggly S, Ichord R, Larkin GL, Laskowitz D, Neumar RW, **Newman-Toker DE**, Quinn J, Shear K, Todd KH, Zatzick D; Roundtable External Participants and Roundtable Steering Committee and Federal Participants. NIH roundtable on opportunities to advance research on neurologic and psychiatric emergencies. *Ann Emerg Med.* 2010 Nov;56(5):551-64. [ISI JIF 2010 = 4.1]
5. Weaver SJ, **Newman-Toker DE**, Rosen MA. Cognitive skill decay and diagnostic error: best practices for continuing education in healthcare. *J Contin Educ Health Prof.* 2012 Sep;32(4):269-78. [ISI JIF 2012 = 1.3]
6. Lempert T, Olesen J, Furman J, Waterston J, Seemungal B, Carey J, Bisdorff A, Versino M, Evers S, **Newman-Toker D**. Vestibular migraine: Diagnostic criteria. *J Vestib Res.* 2012;22(4):167-72. [ISI JIF 2012 = 1.0]
7. Lempert T, Olesen J, Furman J, Waterston J, Seemungal B, Carey J, Bisdorff A, Versino M, Evers S, **Newman-Toker D**. Vestibular migraine: Diagnostic criteria. *Der Nervenarzt* 2013 Apr;84(4):511-6. doi: 10.1007/s00115-013-3768-x. German. [ISI JIF 2012 = 0.8]
8. **Newman-Toker DE***, McDonald KM, Meltzer DO. How much diagnostic safety can we afford... and how should we decide? A health economics perspective. *BMJ Qual Saf.* 2013 22 Suppl 2 (2013), ii11-ii20. [ISI JIF 2012 = 2.4].
9. **Newman-Toker DE***. A unified conceptual model for diagnostic errors: underdiagnosis, overdiagnosis, and misdiagnosis. *Diagnosis* 2014 1(1): 43–48. DOI: [10.1515/dx-2013-0027](https://doi.org/10.1515/dx-2013-0027). [ISI JIF N/A].
10. Lempert T, Olesen J, Furman J, Waterston J, Seemungal B, Carey J, Bisdorff A, Versino M, Evers S, **Newman-Toker D**. Vestibular migraine: diagnostic criteria. *Rev Neurol (Paris).* 2014 170 (2014), 401-406. <http://dx.doi.org/10.1016/j.neurol.2013.05.010>. French. [ISI JIF N/A].
11. Lopez-Escamez JA, Carey J, Chung WH, Goebel JA, Magnusson M, Mandalà M, **Newman-Toker DE**, Strupp M, Suzuki M, Trabalzini F, Bisdorff A. Diagnostic criteria for Menière's disease. *J Vestib Res.* 2015 Jan 1;25(1):1-7. [ISI JIF 2012 = 1.0]
12. von Brevern M, Bertholon P, Brandt T, Fife T, Imai T, Nuti D, **Newman-Toker D**. Benign paroxysmal positional vertigo: diagnostic criteria. *J Vestib Res.* 2015;25(3-4):105-17. [ISI JIF 2012 = 1.0]
13. Lopez-Escamez JA, Carey J, Chung WH, Goebel JA, Magnusson M, Mandalà M, **Newman-Toker DE**, Strupp M, Suzuki M, Trabalzini F, Bisdorff A. Diagnostic criteria for Menière's disease. Consensus document of the Bárány Society, the Japan Society for Equilibrium Research, the European Academy of Otolaryngology and Neurotology (EAONO), the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) and the Korean Balance Society. *Acta Otorrinolaringol Esp.* 2015 Aug 12.
14. Rao G, Epner PL, Bauer V, Solomonides A, **Newman-Toker DE**. Identifying and analyzing diagnostic paths: a new approach for studying diagnostic practices. *Diagnosis.* 2017 Jun 27;4(2):67-72.
15. Gleason KT, Davidson PM, Tanner EK, Day J, Sawyer M, Baker D, Baptiste D, Paine L, Rushton C, Dennison Himmelfarb CR, **Newman-Toker DE**. The critical role of nurses in diagnostic error prevention: a conceptual framework and a call to action. *Diagnosis.* 2017 Nov 27;4(4):201-210.
16. Berger ZD, Brito JP, Ospina NS, Kannan S, Hinson JS, Hess EP, Haskell H, Montori VM, **Newman-Toker DE**. Patient-centered diagnosis: sharing diagnostic decisions with patients in clinical practice. *BMJ.* 2017 Nov 1;359:j4218.
17. Pronovost PJ, Miller J, **Newman-Toker DE**, Ishii L, Wu, AW. We should measure what matters in bundled payment programs. *Ann Intern Med.* 2018 May 15;168(10):735-736.

18. Omron R, Kotwal S, Garibaldi B, **Newman-Toker DE**. The diagnostic performance feedback “calibration gap”—why clinical experience alone isn’t enough to prevent serious diagnostic errors. *Acad Emerg Med Educat Train*. 2018 Sep 17;2(4):339-342.
19. Eggers SDZ, Bisdorff A, von Brevern M, Zee DS, Kim JS, Perez-Fernandez N, Welgampola MS, Della Santina CC, **Newman-Toker DE**. Classification of Vestibular Signs and Examination Techniques: Nystagmus and Nystagmus-like Movements. *J Vestib Res*. 2019;29(2-3):57-87.
20. Stunkel L, **Newman-Toker DE**, Biousse V. Diagnostic error of neuro-ophthalmic conditions—state of the science. *J Neuroophthalmol*. 2021 Mar 1;41(1):98-113.
21. Green KE, Pogson JM, Otero-Millan J, Gold DR, Tevzadze N, Saber Tehrani AS, Zee DS, **Newman-Toker DE**, Kheradmand A. Opinion and Special Articles: Remote Evaluation of Acute Vertigo: Strategies and Technological Considerations. *Neurology*. 2021 Jan 5;96(1):34-38. Erratum in: *Neurology*. 2021 Aug 31;97(9):459.
22. Yousef EA, Sutcliffe KM, McDonald KM, **Newman-Toker DE**. Crossing Academic Boundaries for Diagnostic Safety: 10 Complex Challenges and Potential Solutions From Clinical Perspectives and High-Reliability Organizing Principles. *Hum Factors*. 2022 Feb;64(1):6-20.
23. Lempert T, Olesen J, Furman J, Waterston J, Seemungal B, Carey J, Bisdorff A, Versino M, Evers S, Kheradmand A, **Newman-Toker D**. Vestibular migraine: Diagnostic criteria. *J Vestib Res*. 2022;32(1):1-6.
24. Kim JS, **Newman-Toker DE**, Kerber KA, Jahn K, Bertholon P, Waterston J, Lee H, Bisdorff A, Strupp M. Vascular vertigo and dizziness: Diagnostic criteria. *J Vestib Res*. 2022;32(3):205-222.
25. Strupp M, Bisdorff A, Furman J, Hornibrook J, Jahn K, Maire R, **Newman-Toker D**, Magnusson M. Acute unilateral vestibulopathy/ vestibular neuritis: Diagnostic criteria. *J Vestib Res*. 2022 Jun 11 (in press).

Invited Reviews/Other Invited Articles

1. **Newman-Toker DE**, Rizzo JF. Neuro-ophthalmic diseases masquerading as ‘benign’ strabismus. *Int Ophthalmol Clin*. 2001 Fall; 41(4):115-27. [ISI JIF 2001 = 0.5]
2. **Newman-Toker DE***. Time management top 10 list. *J Investig Med*. 2004 May; 52(4):262-4. [ISI JIF 2004 = 2.0]
3. **Newman-Toker DE***, Pham JC, Winters BD, Pronovost PJ. Diagnostic errors in critical care settings – managing information overload. *ICU Management* 2009 Summer; 9(2):6-11. [ISI JIF N/A]
4. Lynn JD, Ali I, Isaacson RS, **Newman-Toker DE**. ACE Journal Watch from ACE (Alliance For Clinical Education): Review of medical education articles in neurology 2007–2008. *Teach Learn Med*. 2009; 21(4):351-354. [ISI JIF 2009 = 0.7]
5. **Newman-Toker DE***. Pitfalls in diagnostic reasoning in neurology. *Journal Watch Neurology*, September, 2010; (<http://neurology.jwatch.org/cgi/content/full/2010/907/2>). [ISI JIF NA]
6. **Newman-Toker DE**. Symptoms and signs of neuro-otologic disorders. *Continuum (Minneap Minn)*. 2012;18:1016-1040. [ISI JIF NA]
7. **Newman-Toker DE***. From Possible to Probable to Sure to Wrong—Premature Closure and Anchoring in a Complicated Case. *AHRQ Web M&M. Morbidity & Mortality Rounds on the Web*, April, 2013; (<http://www.webmm.ahrq.gov/case.aspx?caseID=297>). [ISI JIF NA]
8. Lee CS, Nagy PG, Weaver SJ, **Newman-Toker DE**. Cognitive and system factors contributing to diagnostic errors in radiology. *AJR Am J Roentgenol*. 2013 Sep;201(3):611-7. [ISI JIF 2012 = 2.9]
9. **Newman-Toker DE***, Kerber KA, Meurer WJ, Omron R, Edlow JA. Why Acute Dizziness and Vertigo? Articulating the Emergency Neuro-Otology Imperative. *Neurol Clin*. 2015 Aug;33(3):xiii-xv.
10. Bisdorff A, Staab JP, **Newman-Toker DE**. Overview of the International Classification of Vestibular Disorders. *Neurol Clin*. 2015 Aug;33(3):541-50, vii.
11. Kerber KA, **Newman-Toker DE**. Misdiagnosing dizzy patients: common pitfalls in clinical practice. *Neurol Clin*. 2015 Aug;33(3):565-75, viii.
12. Edlow JA, **Newman-Toker DE**. Medical and non-stroke neurologic causes of acute, continuous vestibular symptoms. *Neurol Clin*. 2015 33(3):699-716,xi.
13. **Newman-Toker DE***, Edlow JA. TiTrATE: a novel, evidence-based approach to diagnosing acute dizziness and vertigo. *Neurol Clin*. 2015 Aug;33(3):577-99, viii.
14. **Newman-Toker DE***, Curthoys IS, Halmagyi GM. Diagnosing stroke in acute vertigo: the HINTS family of eye movement tests and the future of the "eye ECG". *Semin Neurol*. 2015 Oct;35(5):506-21.
15. Benishek LE, Weaver SJ, **Newman-Toker DE**. (2015). The cognitive psychology of diagnostic errors. *Scientific American Neurology*. 10.2310/7900.6288.

16. Edlow JE, **Newman-Toker DE**. Best Clinical Practice: Using the physical examination to diagnose patients with acute dizziness and vertigo. *J Emerg Med*. 2016 Apr;50(4):617-28.
17. **Newman-Toker DE**, Della Santina CC, Blitz AM. Vertigo and hearing loss. *Handb Clin Neurol*. 2016;136:905-21.
18. Saber Tehrani AS, Kattah JC, Kerber KA, Gold DR, Zee DS, Urrutia VC, **Newman-Toker DE**. Diagnosing stroke in acute dizziness and vertigo: pitfalls and pearls. *Stroke*, 2018 Mar;49(3):788-795.
19. Edlow JA, Gurley KL, **Newman-Toker DE**. A new diagnostic approach to the adult patient with acute dizziness. *J Emerg Med*. 2018 Apr;54(4):469-483.

Editorials

1. **Newman-Toker DE***, Makary MA. Measuring diagnostic errors in primary care – the first step on a path forward. *JAMA Intern Med*. 2013 Mar 25;173(6):425-6. [ISI JIF 2012 = 10.6]
2. **Newman-Toker DE***, Edlow JA. High-stakes diagnostic decision rules for serious disorders: the Ottawa subarachnoid hemorrhage rule. *JAMA*. 2013 Sep 25;310(12). [ISI JIF 2012 = 30.0]
3. **Newman-Toker DE***, Perry JJ. Acute diagnostic neurology: challenges and opportunities. *Acad Emerg Med*. 2015 Mar;22(3):357-61. [ISI JIF 2012 = 1.8]
4. Gold D, **Newman-Toker DE**, Sharfstein JM. Neurology and the affordable care act. *JAMA Neurol*. 2015 Jun;72(6):623-4. [ISI JIF 2012 = 7.0]
5. **Newman-Toker DE***. Diagnosing stroke in acute dizziness-do the “eyes” still have it? *Neurol*. 2015 Nov 24;85(21):1877.
6. **Newman-Toker DE***. Missed stroke in acute vertigo and dizziness: It is time for action, not debate. *Ann Neurol*. 2016 Jan;79(1):27-31.
7. **Newman-Toker DE***. Where is the ‘low-hanging fruit’ in diagnostic quality and safety? *Qual Saf Health Care*. 2018 Oct/Dec;27(4):234-236.
8. Wu A, Buckle P, Haut ER, Bellandi T, Koizumi S, Mair A, Øvretveit J, Power C, Sax H, Thomas EJ, **Newman-Toker D**, Vincent C. Supporting the emotional well-being of health care workers during the COVID-19 pandemic. *J Pat Safe Risk Manage*. 2020;25(3):93-96.
9. Kattah JC, **Newman-Toker DE**. Video-oculography to guide neuroimaging for dizziness and vertigo. *JAMA Otolaryngol Head Neck Surg*. 2022 May 1;148(5):474-475
10. Edlow JA, Agrawal Y, **Newman-Toker DE**. Correct diagnosis for the proper treatment of acute vertigo-putting the diagnostic horse before the therapeutic cart. *JAMA Neurol*. 2022 Sep 1;79(9):841-843.
11. Perry JJ, **Newman-Toker DE**, Ohle R. The HINTS exam is a skill emergency physicians need to learn, apply and master. *CJEM*. 2022 Nov 10. Online ahead of print (PMID: 36279097, erratum 36355247).

Case Reports (journal publications) (*note: pre-marriage last name “Toker”*)

1. Kelly PJ, **Toker DE**, Boyer P, McDonald CT, Niles J. Granulomatous compressive thoracic myelopathy as the initial manifestation of Wegener’s granulomatosis. *Neurology*. 1998; 51(6): 1769-1770. [ISI JIF 1998 = 5.0]
2. Kaiser UB, Hedley-Whyte ET, Wolsko L, Schaefer PW, Greicius MD, **Toker DE**. Case records of the Massachusetts General Hospital. Weekly clinicopathological exercises. Case 15-2001. A 72-year-old man with persistent fever and hypotension. *N Engl J Med*. 2001;344:1536-1542. [ISI JIF 2001 = 29.1] [*also note PubMed lists no authors; ISI Thompson gives complete author list*]
3. Bienfang DC, Karluk D, Buchbinder BR, **Toker DE**, Durand ML, Hedley-Whyte ET, Scully RE. Case 9-2002 - An 80-Year-Old Woman with Sudden Unilateral Blindness. *N Engl J Med*. 2002;346:924-929. [ISI JIF 2002 = 31.7] [*note PubMed lists only first two authors; ISI Thompson gives complete author list*]
4. Seidel G, Pardo CA, **Newman-Toker D**, Olivi A, Eberhart CG. Neurobrucellosis presenting as leukoencephalopathy: the role of cytotoxic T lymphocytes. *Arch Pathol Lab Med*. 2003 Sep; 127(9):e374-377. [ISI JIF 2003 = 1.3]
5. **Newman-Toker DE***, Camargo CA Jr. ‘Cardiogenic Vertigo’—True vertigo as the presenting manifestation of primary cardiac disease. *Nat Clin Pract Neurol*. 2006 Mar; 2(3):167-172. [ISI JIF 2006 = 0.6] [*seminal case report*]
6. Castle J, Sakonju A, Dalmau J, **Newman-Toker DE***. Anti-Ma2-associated encephalitis with normal FDG-PET: a case of pseudo-Whipple’s disease. *Nat Clin Pract Neurol*. 2006 Oct; 2(10):566-572. [ISI JIF 2006 = 0.6] [*case report with review of pertinent literature*]

7. Cheong R, Wilson RK, Cortese ICM, **Newman-Toker DE***. Mothball Withdrawal Encephalopathy – Case Report and Review of Paradichlorobenzene Neurotoxicity. *Subst Abuse*. 2007 Mar; 27(4):63-67. [ISI JIF N/A] [*case report with review of pertinent literature*]
8. Levy M, **Newman-Toker DE***. Reversible chest tube Horner syndrome. *J Neuroophthalmol*. 2008 Sep; 28(3):212-3. [ISI JIF 2008 = 1.3] [*case report with photo essay*]
9. Mantokoudis G, Saber Tehrani AS, **Newman-Toker DE***. An unusual stroke-like clinical presentation of Creutzfeldt-Jakob disease: acute vestibular syndrome. *Neurologist* 2015 Apr;19(4):96-8 [ISI JIF 2012 = 1.5]
10. Kattah JC, Saber Tehrani AS, Roeber S, Gujrati M, Bach SE, **Newman-Toker DE**, Blitz AM, Horn AKE. Transient vestibulopathy in Wallenberg’s syndrome: pathologic analysis. *Front Neurol* 2017 May;8(191) [ISI JIF 2015 3.2]

Case Reports (published meeting proceedings/presentations)

1. Wilson R, Pardo-Villamizar C, **Newman-Toker DE***. When a fine diagnosis isn’t good enough. Walsh Society Meeting, February, 2005. [*published in meeting proceedings and on NOVEL website <http://library.med.utah.edu/NOVEL/>*]
2. Sakonju A, **Newman-Toker DE***. You shake my nerves and you rattle my brain. Walsh Society Meeting, February, 2007. [*published in meeting proceedings and on NOVEL website <http://library.med.utah.edu/NOVEL/>*]
3. Kattah JC, Pula JH, Patel P, Gujrati M, **Newman-Toker DE**. Deaf and dizzy: have we been Susacked? Platform presentation at the Walsh meeting at the 39th Annual Meeting of the North American Neuro-Ophthalmology Society. Snowbird, Utah February 9-14, 2013. [*published in meeting proceedings and on NOVEL website <http://library.med.utah.edu/NOVEL/>*]

Letters and Correspondence

1. **Newman-Toker DE***, Reich SG. “Wrong-way” nystagmus in the AICA syndrome. *Laryngoscope*. 2008 Feb; 118(2):378-379. [ISI JIF 2008 = 1.9]
2. **Newman-Toker DE***, Camargo CA Jr., Edlow JA. Diagnosing dizziness in the emergency and primary care settings – Reply. *Mayo Clin Proc* 2008 Nov; 83(11):1297-1299. [ISI JIF 2008 = 4.8]
3. **Newman-Toker DE***, Pronovost PJ. Diagnostic errors and patient safety – Reply. *JAMA* 2009 Jul; 302(3):259-260. [ISI JIF 2008 = 28.9]
4. **Newman-Toker DE***, Makary MA. Administrative overload as a cause of diagnostic error – Reply. *JAMA Intern Med* 173 (2013), 1927. [ISI JIF 2008 = 28.9]
5. **Newman-Toker DE***, Kattah JC. HINTS for identifying stroke in ED patients with dizziness – Reply. *Acad Emerg Med*. 2013. [ISI JIF 2012 = 1.8]
6. Cifra CL, Jones KL, Bhalala US, Bembea MM, **Newman-Toker DE**, Fackler JC, Miller MR. Diagnostic errors in a PICU: insights from the morbidity and mortality conference – Reply. *Pediatr Crit Care Med*. 2015 Nov;16(9):896-7. [ISI JIF 2012 = 2.4]
7. Thomas D, **Newman-Toker DE***. Avoiding 'HINTS positive/negative' to minimize diagnostic confusion in acute vertigo and dizziness. *J Acute Care Phys Ther* 2016;7(4):129-31. doi: 10.1097/jat.0000000000000042.
8. Gleason KT, Davidson PM, Dennison-Himmelfarb CR, Sawyer M, **Newman-Toker DE**. Don’t forget the rest of the team – nurses and allied health professionals are needed to tackle diagnostic errors. *Ann Int Med* 2016 Oct 18;165(8):HO2-HO4 (web-only comment <http://annals.org.ezp.welch.jhmi.edu/aim/article/2569422/annals-hospitalists-inpatient-notes-reducing-diagnostic-error-new-horizon-opportunities>).
9. Liberman AL, Prabhakaram S, **Newman-Toker DE**. Response to “Psychiatric Hospitalization Increases Short-Term Risk of Stroke”. *Stroke*, 2017 Sep;48(9):e260.
10. Chang TP, **Newman-Toker DE**. The Link between BPPV and Sudden Hearing Loss in Administrative Data – Biological Basis or Diagnostic Deception? *Otology-Neurotology*, 2019 Jul;40(6):843-844.
11. Gold DR, **Newman-Toker DE**. Reader response: Questionnaire-based diagnosis of benign paroxysmal positional vertigo. *Neurology*. 2020 Nov 10;95(19):887-888.
12. Tarnutzer AT, Gold D, Blitz A, Kattah JC, **Newman-Toker DE**. Teaching Video NeuroImages: Vestibulo-ocular reflex defect in cerebellar stroke. *Neurology*, 2019 Aug 20;93(8):367-368.
13. Green KE, Pogson JM, Otero-Millan J, Gold DR, Tevzadze N, Saber Tehrani AS, Zee DS, **Newman-Toker DE**, Kheradmand A. Author Response: Opinion and Special Articles: Remote Evaluation of Acute Vertigo Strategies and Technological Considerations. *Neurology*. 2021 Sep 28;97(13):652.

Book Chapters and Monographs

1. Zee DS, **Newman-Toker DE**. Supranuclear and Internuclear Ocular Motor Disorders. In Walsh and Hoyt's Clinical Neuro-Ophthalmology, 6th Ed. Miller NR, Newman NJ, Biousse V, Kerrison JB (eds). Baltimore, Lippincott-Williams Wilkins, 2004. ASIN: B0088PTORY.
2. Solomon D, **Newman-Toker DE**, Durmer JS. Dizziness and Vertigo in Older Adults. In Clinical Neurology of the Older Adult, 2nd Ed. Sirven JI, Malamut BL (eds). Philadelphia, Lippincott Williams Wilkins, 2008. ISBN-10: 0781769477. ISBN-13: 978-0781769471.
3. Bisdorff AR, Staab JP, **Newman-Toker DE**. Vestibular symptoms, balance and their disorders: how will we classify them? In Vertigo and Imbalance, 1st Ed (Oxford Textbooks in Clinical Neurology). Bronstein A (ed). Oxford, Oxford University Press, 2013. ISBN-10: 0199608997. ISBN-13: 978-0199608997.
4. Tarnutzer AA, **Newman-Toker DE**. Fits, faints and funny turns in the differential diagnosis of the dizzy patient. In Vertigo and Imbalance, 1st Edition (Oxford Textbooks in Clinical Neurology). Bronstein A (ed). Oxford, Oxford University Press, 2013. ISBN-10: 0199608997. ISBN-13: 978-0199608997.
5. Edlow JA, **Newman-Toker DE**. Dizziness in the Elderly. In Geriatric Emergency Medicine. Kahn et al (eds). Cambridge, Cambridge University Press, 2014 (ISBN: 9781107677647).
6. **Newman-Toker DE**. Vertigo and Dizziness. In Encyclopedia of the Neurological Sciences. Aminoff M, Daroff B (eds). Oxford, Elsevier, 2014 (ISBN: 9780123851574).
7. **Newman-Toker DE**, Kerber KA, Meurer WJ, Omron R, Edlow JA (eds). Emergency Neuro-Otology: Diagnosis and Management of Acute Dizziness and Vertigo. *Neurol Clin.* 2015 Aug;33(3). [Monograph]

Books, Textbooks

1. **Newman-Toker DE**. *Diagnosing Dizziness in the Emergency Department—Why "What do you mean by 'dizzy'?" Should Not Be the First Question You Ask* [Doctoral Dissertation, Clinical Investigation, Bloomberg School of Public Health]. Baltimore, MD: The Johns Hopkins University; 2007. In: ProQuest Digital Dissertations [database on Internet, <http://www.proquest.com/>]; publication number: AAT 3267879. Accessibility verified May 1, 2015 at: http://gateway.proquest.com/openurl?url_ver=Z39.88-2004&res_dat=xri:pqdiss&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&rft_dat=xri:pqdiss:3267879.

Other Media (films, videos, CD-ROMs, slide sets, etc.)

1. **Newman-Toker DE**. Skew Deviation and the Ocular Tilt Reaction (slides, published on the internet-based, open access Neuro-ophthalmology Virtual Education Library [NOVEL <http://library.med.utah.edu/NOVEL/>], University of Utah, 12/05). (*accessibility verified May 1, 2015*)
2. **Newman-Toker DE**. The David Newman-Toker Neuro-Ophthalmology Collection (videos and syllabi, published on the internet-based, open access Neuro-ophthalmology Virtual Education Library [NOVEL], University of Utah, <http://novel.utah.edu/Newman-Toker/>, 5/10) (*accessibility verified May 1, 2015*)

Classroom instruction

Instruction at Medical Student Level (within JHMI)

JHU SOM 1st-Year Neuroscience Course (Lecturer, Small Group Leader)

2/03-3/03	Guest lecturer & laboratory instructor (Brainstem Lab, Vestibular Lab)
2/04-3/04	Discussion-group leader (clinical case correlations, 3 sessions, 1 hr each)
2/05-3/05	Discussion-group leader (clinical case correlations, 5 sessions, 1 hr each)
2/06-3/06	Discussion-group leader (clinical case correlations, 1 session, 1 hr)
2/09-3/09	Discussion-group leader (clinical case correlations, 2 sessions, 2 hrs)

JHU SOM 1st-Year Nervous System & Special Senses Section (Lecturer, Small Group Leader)

4/10-6/10	Lab instructor (14 sessions – 4 Anatomy, 5 SSM; 5 MSD, 28 hrs total), team-based learning [TBL] instructor (3 sessions, each twice – 2 SSM, 1 MSD; 11 hrs total); lecturer (16 hrs total) “Course Introduction & Overview of Functional Neuroanatomy” (1) “Brainstem & Cranial Nerve Overview” (1) “Afferent Visual Overview” (1) “Cranial Motor & Sensory Overview” (1) “Oculomotor Control Systems” (1) “Oculomotor Cases” (2) [TBL] “Acute Vestibular Syndrome” (1)
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“Vestibular Cases” (1.5) [TBL]
 “Special Sensory & Motor Review” (2)
 “SSM Post-Exam Review Session” (2)
 “Localization in Neurology: Functional Pathoanatomy” (2)
 “Localization Cases” (2) [TBL]
 “Secondary Headaches” (1)
 “Ion Channelopathies: Migraine Aura & Episodic Disorders” (1.5) [case conference]
 “Final Structured Review” (1.5)

JHU SOM 1st/2nd Year Clinical Skills Course (Lecturer)

2/02 Neurology Clinical Skills Instructor, Small Group (3 sessions)
 10/02 Lecturer (1 lecture), “Introduction to the Neurologic History & Physical Examination”
 10/03 Lecturer (1 lecture), “Introduction to the Neurologic History & Physical Examination”
 10/04 Lecturer (1 lecture), “Introduction to the Neurologic History & Physical Examination”
 10/05 Lecturer (1 lecture), “Introduction to the Neurologic History & Physical Examination”
 Guest Small Group Clinical Skills Instructor (The Neurologic Exam)

JHU SOM 2nd-Year Pathophysiology Course, Neuro Block (Lecturer, Small Group Leader)

2/02 Laboratory instructor (10 sessions, 19.5 hrs)
 1/03-2/03 Lab instructor (10 sessions, 19 hrs), lecturer (3.5 lect hrs)
 “Localization in Neurology: Functional Pathoanatomy”
 “Migraine and Other Headache Syndromes”
 “Neuropathology-Pathophysiology Structured Review”
 1/04-2/04 Lab instructor (9 sessions, 15 hrs), lecturer (4.5 lect hrs)
 “Functional Neuroanatomy of the Brainstem & Cranial Nerves”
 “Localization in Neurology: Functional Pathoanatomy”
 “Migraine and Other Headache Syndromes”
 “Neuropathology-Pathophysiology Structured Review”
 1/05-2/05 Lab instructor (10 sessions, 21 hrs), lecturer (6.5 lect hrs)
 “Functional Neuroanatomy of the Brainstem & Cranial Nerves”
 “Localization in Neurology: Functional Pathoanatomy”
 “Migraine, Tension, and Other Headaches”
 “Vestibular Pathophysiology: Understanding Nystagmus”
 “Neuropathology-Pathophysiology Structured Review”
 1/06-2/06 Lab instructor (8 sessions, 16.5 hrs), lecturer (10.5 lect hrs)
 “Course Introduction & Overview of Functional Neuroanatomy”
 “Functional Neuroanatomy of the Brainstem & Cranial Nerves”
 “Localization in Neurology: Functional Pathoanatomy”
 “Dizziness, Vertigo, and the Pathophysiology of Nystagmus”
 “Patho-Anatomy of Neuro-ophthalmic Signs in Cerebrovascular Disease”
 “Headaches Syndromes and the Pathophysiology of Migraine Pain”
 “Episodic Neurologic Symptoms - Channelopathies & Beyond”
 “Neuropathology-Pathophysiology Structured Review”
 2/07-3/07 Lab instructor (9 sessions, 18.5 hrs), lecturer (10.5 lect hrs)
 “Course Introduction & Overview of Functional Neuroanatomy”
 “Functional Neuroanatomy of the Brainstem & Cranial Nerves”
 “Localization in Neurology: Functional Pathoanatomy”
 “Patho-Anatomy of Neuro-ophthalmic Signs in Cerebrovascular Disease”
 “Headaches Syndromes and the Pathophysiology of Migraine Pain”
 “Dizziness, Vertigo, and the Pathophysiology of Nystagmus”
 “Episodic Neurologic Symptoms - Channelopathies & Beyond”
 “Neuropathology-Pathophysiology Structured Review”
 2/08-3/08 Lab instructor (9 sessions, 18.5 hrs), lecturer (9.75 lect hrs)
 “Course Introduction & Overview of Functional Neuroanatomy”
 “Localization in Neurology: Functional Pathoanatomy”
 “Headaches Syndromes and the Pathophysiology of Migraine Pain”

“Vertigo and the Pathophysiology of Bedside Vestibular Eye Signs”
 “TNDs, TIAs, & Neuro-electrical Auras: Pathogenesis of Episodic Neurologic Symptoms”
 “Neuropathology-Pathophysiology Structured Review”
 2/09-3/09 Lab instructor (8 sessions, 16.5 hrs), lecturer (10 lect hrs)
 “Course Introduction & Overview of Functional Neuroanatomy”
 “Localization in Neurology: Functional Pathoanatomy”
 “Cerebrovascular Disease: Pupil & Eye Movement Findings”
 “Dangerous Causes of Headaches”
 “Vertigo and the Pathophysiology of Bedside Vestibular Eye Signs”
 “TNDs, TIAs, & Neuro-electrical Auras: Pathogenesis of Episodic Neurologic Symptoms”
 “Neuropathology-Pathophysiology Structured Review”
 12/09 Lab instructor (9 sessions, 18.5 hrs), lecturer (10 lect hrs)
 “Course Introduction & Overview of Functional Neuroanatomy”
 “Localization in Neurology: Functional Pathoanatomy”
 “Cerebrovascular Disease: Pupil & Eye Movement Findings”
 “Dangerous Causes of Headaches”
 “Vertigo and the Pathophysiology of Bedside Vestibular Eye Signs”
 “TNDs, TIAs, & Neuro-electrical Auras: Pathogenesis of Episodic Neurologic Symptoms”
 “Neuropathology-Pathophysiology Structured Review”

JHU SOM 2nd-Year Pathophysiology Course, Pain Block (Guest Small Group Leader)
 3/07 Small-group case session on headache (1hr)

JHU SOM 2nd-Year Transition to the Wards Course (Director, Lecturer, Small Group Leader)
 1/10-3/10 Team-based learning [TBL] instructor (1.5 hrs), panelist (1.5 hrs), lecturer (2.5 hrs)
 “Course Orientation” (0.5)
 “Evidence Based Medicine 1 – Diagnosis” (1.5) [TBL]
 “The Hospital Experience – Physician’s Perspective” (1.5) [panelist]
 “Diagnosis & Diagnostic Reasoning – Framework of Problem Oriented Approaches” (1.5)
 “Evidence Based Medicine Review” (0.5)

JHU SOM 3rd-Year Neurology Clerkship (10 cycles/year) (Lecturer, Small Group Leader)
 10/01 Guest instructor, bedside patient presentations (2 sessions)
 4/03-8/03 Small group leader, patient case presentations (4 sessions monthly)
 1/04-8/04 Small group leader, ‘Searching the Medical Literature’ (1 session monthly)
 9/03-7/10 Clerkship introduction (5 cycles/yr until 9/09 then 10 cycles/yr; previously 0.5hrs now 1hr)
 9/03-7/10 Small group leader, patient case presentations (~3 sessions monthly)
 9/03-7/10 Lecturer (4 lecture hours monthly)
 “Neurologic Emergencies”
 “History-Taking in Neurology”
 “Dizziness” (substituted TBL 2/09-12/09)
 “Headaches” (substituted TBL 9/09-12/09)
 2/09-12/09 Team-based learning leader (3 lecture hours monthly 2-7/09; 6 hours monthly 9-12/09)
 “Dizziness” TBL (2/09-12/09)
 “Headaches” TBL (9/09-12/09)
 3/09 Substitute lecturer: “Coma Exam”

JHU SOM 3rd-Year Ophthalmology Clerkship (5 cycles/year) (Lecturer)
 9/05-6/07 Lecturer “Optic Disc Edema & Optic Neuropathies” (5 cycles/year)
 9/07-3/10 Lecturer “Optic Disc Edema & Optic Neuropathies” (~2-3 cycles/year)

Instruction at Medical Student Level (outside JHMI)
 University of Pennsylvania SOM Clinical Skills Course (Small Group Leader)
 1994, Spring Clinical Skills Instructor, Small Group (6 sessions)

Harvard University SOM 3rd-Year Neurology Clerkship, Massachusetts General Hospital (Lecturer)

1997, Summer Course organizer and lecturer (12 lectures)

Harvard University SOM 2nd-Year Nervous System & Behavior Course (Lecturer, Lab Leader)
9-11/97 Laboratory instructor (8 sessions), lecturer (3 lectures)

“Basic Anatomy of the Afferent Visual System”

“Basic Anatomy of the Brainstem: The Oculomotor System”

“Basic Anatomy of the Brainstem: The Lower Cranial Nerves”

10/99 Guest lecturer (1 lecture)

“Basic Anatomy of the Afferent Visual System”

Rochester University SOM 2nd-Year Mind-Brain-Behavior Course (Lab Leader, Problem-Based Learning Tutor)
8/07-10/07 Laboratory instructor (14 sessions, 28 hrs), Problem-Based Learning Tutor (9 cases, 46 hrs)

Rochester University SOM 2nd-Year Ambulatory Clerkship (Neuro Clinical Skills Leader)
8/07-10/07 Neuro Skills Training Leader (8 hrs)

Instruction at Resident/Fellow Level (within JHMI)

Johns Hopkins Hospital Emergency Medicine Resident Lecture Series (Lecturer)
12/00 “Evaluation of Dizziness in the Emergency Ward”

1/01 “Transient Neurologic Dysfunction: When to Worry”

3/04 “A New Approach to Evaluation of the Dizzy Patient”

7/09 “Diagnosing the Acutely Dizzy Patient – A New Approach”

8/11 “Cerebrovascular Vertigo–When to Worry about an Acutely Dizzy Patient”

8/11 “Vertigo Day” – small group facilitator for Diagnostic Approach to Acute Dizziness x 4 cycles

Johns Hopkins Hospital Neurology Resident Lecture Series (Lecturer)

10/01 “Nystagmus and Related Oscillatory Eye Movement Disorders”

4/02 “The Neuroanatomy of Primary Supranuclear Oculomotor Control Mechanisms”

5/02 “The Neuroanatomy of Adaptive Supranuclear Oculomotor Control Mechanisms”

8/02 “Brainstem Neuroanatomy Made Ridiculously Simple”

8/02 “Bedside Evaluation of Ocular Motility Disorders”

8/02 “Oculomotor Anatomy I – Horizontal Eye Movements (Basic)”

8/02 “Oculomotor Anatomy II – Horizontal Eye Movements (Advanced)”

8/03 “Transient Neurologic Deficits”

8/03 “Diplopia”

5/04 “Diplopia”

8/04 “Brainstem Anatomy”

8/04 “Oculomotor Anatomy I – Horizontal Eye Movements”

8/04 “Oculomotor Anatomy II – Vertical Eye Movements”

8/04 “Oculomotor Anatomy III – Torsional Eye Movements”

8/04 “Dangerous Headaches – What’s NOT Migraine?”

10/05 “Neurology of Eye Movements I: The Oculomotor Plant”

10/05 “Neurology of Eye Movements II: Saccades & Vergence”

10/05 “Neurology of Eye Movements III: Smooth Pursuit & VOR”

11/05 “Neurology of Eye Movements V: Ocular Tilt & Skew Deviation”

1/08 “Neurology of Eye Movements I: Saccades, Smooth Pursuit & VOR”

1/08 “Neurology of Eye Movements II: Ocular Tilt & Skew Deviation”

7/08 “Acute Vision Loss”

1/09 “Optic Neuropathies and Visual Field Interpretation”

5/09 “Diagnosing the Acutely Dizzy Patient – A New Approach”

6/09 “Skew Deviation and the Ocular Tilt Reaction”

7/09 “Acute Vision Loss”

7/10 “Acute Vision Loss”

2/11 “Diplopia 1”

3/11 “Diplopia 2”

4/11 “Acute Vision Loss”

5/12 “Diplopia”

JHU SOM Other (Lecturer/Discussant/Small Group Leader)

7/10: Introduction to Clinical Research 2010. Small group leader (8 sessions to hone student research abstracts plus final presentations mentoring, 10 hours) (JHUSOM, Welch Center for Prevention, Epidemiology, and Clinical Research; Course Directors Daniel Ford, Steven Goodman)

Instruction at Resident Level (outside JHMI)

Massachusetts General Hospital Neurology Resident Lecture Series (Lecturer)

10/98 “Evaluation of Acute Dizziness in the Emergency Ward”

8/01 “Double Vision – A Practical Approach to Bedside Diagnosis”

Massachusetts Eye & Ear Infirmary Ophthalmology Resident Lecture Series (Lecturer)

8/99 “Hysteria & Functional Visual Loss”

6/00 “Migraine: Current Concepts & Clinical Approach”

Great Lakes Neuro-Ophthalmology Conference, Michigan State Univ. (Guest Lecturer)

4/08 “Clinically-Relevant Neuroanatomy of Horizontal Gaze Pathways”

4/08 “Vertigo and the Pathophysiology of Bedside Vestibular Eye Signs”

University of Maryland Neurology Resident Lecture Series (Guest Lecturer)

8/08 “Triage and Initial Management of the Acutely Dizzy Patient”

Visiting Professor, Dept Emergency Medicine, Emory University (Guest Lecturer)

10/14 Small group skills training: “Head Impulse & Dix-Hallpike Tests”

Clinical instruction

Clinical Teaching

7/01-8/03 Neurology Clerkship, Outpatient Clinic Attending, JHUSOM, 0.5 days per week

8/02-7/10 Neurology Clerkship, Inpatient Ward/Consult Attending, average ~4 weeks per year

9/14-10/18 Eye Movement Rounds for Neurology Residents, JHUSOM, average ~1 hour every other week

7/15-present Case Rounds for Neuro-otology, JHUSOM, average ~1 hour per month

Clinical Case Conferences

8/01 Conference Moderator, “A patient with transient visual loss” (Massachusetts General Hospital, Dept Internal Medicine, Resident Report)

10/02 Case Conference, “Dizziness with mixed central & peripheral features” (JHU SOM, Depts Neurology & Otolaryngology, Neuro-otology Conference)

3/03 CPC Discussant, “A woman with AIDS, decreased alertness, and focal neurologic deficits” (JHH, Dept Internal Medicine, Clinico-pathologic Case Conference)

5/03 Case Conference, “A woman with trouble standing out of proportion to trouble walking” (JHH, Depts Neurology & Otolaryngology, Neuro-otology Conference)

11/07/03 Case Conference, “A woman with worsening imbalance, multiple falls, & bifacial weakness” (JHH, Depts Neurology & Otolaryngology, Neuro-otology Conference)

11/07/03 Case Conference, “A man with progressive imbalance, trouble reading, & cognitive decline” (JHH, Depts Neurology & Otolaryngology, Neuro-otology Conference)

3/9/05 Chairman’s Rounds, “A woman with recurrent falls and progressive cognitive decline” (JHBMC, Dept Neurology, Chairman’s Rounds)

5/3/06 Herlong Rounds, “A 90 year-old woman with episodic vertigo and syncope” (JHU SOM, M.D.-Ph.D. Case Session, Herlong Rounds)

8/4/09 Chairman’s Rounds, “A patient with unusual white matter pathology.” (JHH, Dept Neurology, Chairman’s Rounds)

5/15/12 Clinical Case Session: Diagnostic Unknowns (Visiting Professor of Neurologic Education; Mayo Clinic Dept Neurology, Rochester, MN)

10/25/12 Clinical Case Session: Diagnostic Unknowns (Visiting Professor Dept Emergency Medicine, University of Ottawa, Ottawa, ON, CA)

CME Instruction

CME Lectures

- 12/01 Current Concepts in Ophthalmology 2001, Lecturer, “Neuro-ophthalmic Diseases Masquerading as Benign Strabismus,” Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore, MD
- 12/02 Neurology for the Primary Care Provider 2002, Lecturer, “A New Approach to Evaluation of the Dizzy Patient,” “CNS Neurodiagnostics,” Johns Hopkins University, Baltimore, MD
- 12/03 Neurology for the Primary Care Provider 2003, Lecturer, “A New Approach to Evaluation of the Dizzy Patient,” “CNS Neurodiagnostics,” Johns Hopkins University, Baltimore, MD
- 12/04 Current Concepts in Ophthalmology 2004, Lecturer, “Maddox Rod Testing in Patients with Diplopia – Does it Help?,” Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore
- 12/04 Neurology for the Primary Care Provider 2004, Lecturer, “A New Approach to Evaluation of the Dizzy Patient,” “CNS Neurodiagnostics,” Johns Hopkins University, Baltimore, MD
- 5/05 Topics in Clinical Medicine 2005, Lecturer, “Meet the Professor” Roundtable Discussion – Neurology/Dizziness, Johns Hopkins University, Baltimore, MD
- 12/05 Current Concepts in Ophthalmology 2005, Lecturer, “Office Differentiation of Skew Deviation from 4th Nerve Palsy,” Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore
- 12/05 Neurology for the Primary Care Provider 2005, Lecturer, “Triage and Initial Management of the Acutely Dizzy Patient,” Johns Hopkins University, Baltimore, MD
- 12/05 Neurology for the Neurologist 2005, Lecturer, “Triage and Initial Management of the Acutely Dizzy Patient,” Johns Hopkins University, Baltimore, MD
- 5/06 Topics in Clinical Medicine 2006, Lecturer, “Meet the Professor” Roundtable Discussion – Neurology/Dizziness, Johns Hopkins University, Baltimore, MD
- 5/06 Hot Topics 2006 – Emergency Neurology, Lecturer, “Emergency Evaluation of the Acutely Dizzy Patient,” Medical University of Ohio, Toledo, OH
- 12/06 Current Concepts in Ophthalmology 2006, Lecturer, “‘The World is Shaking’ – Differential Diagnosis of Oscillopsia,” Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore, MD
- 12/06 Neurology for the Primary Care Provider 2006, Lecturer, “Triage and Initial Management of the Acutely Dizzy Patient,” Johns Hopkins University, Baltimore, MD
- 12/06 Neurology for the Neurologist 2006, Lecturer, “Triage and Initial Management of the Acutely Dizzy Patient,” Johns Hopkins University, Baltimore, MD
- 1/07 University of Maryland Health Center Annual CME Course 2007, Lecturer, “Triage and Initial Management of the Acutely Dizzy Patient,” University of Maryland, Baltimore, MD
- 5/07 GBMC’s Current Concepts in Adult Stroke 2007, “When is Acute Dizziness a Cerebrovascular Problem?,” Greater Baltimore Medical Center, Baltimore, MD
- 11/07 Pri-Med Annual Current Clinical Issues in Primary Care CME Course 2007, Lecturer, “The Acutely Dizzy Patient: When is it a Cerebrovascular Problem?,” Harvard University, Cambridge, MA and Johns Hopkins University, Baltimore, MD
- 3/08 NANOS 2008 Stroke Symposium, Lecturer, “When is Dizziness Acute Dizziness a Cerebrovascular Problem? The Eyes Have It,” North American Neuro-Ophthalmology Society Annual Meeting 2008, Orlando, FL
- 9/08 MAPA Trends in Patient Management 2008, Lecturer, “Workup of the Acute Dizzy Patient: When is it a Cerebrovascular Problem?,” Maryland Academy of Physician Assistants, Annual Meeting 2008, Ocean City, MD
- 12/09 Current Concepts in Ophthalmology 2009, Lecturer, “Visuo-Vestibular Symptoms: Is it the Eye or the Ear?,” Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore, MD
- 4/10 AAN Neuro-otology Course (8AC.007), Lecturer, “Transient spontaneous dizziness,” American Academy of Neurology, Annual Meeting 2010, Toronto, ON
- 4/10 AAN Neuro-otology Course (8AC.007), Lecturer, “Acute vestibular syndrome,” American Academy of Neurology, Annual Meeting 2010, Toronto, ON
- 4/10 AAN Neuro-otology Course (8AC.007), Lecturer, “Case unknowns,” American Academy of Neurology, Annual Meeting 2010, Toronto, ON
- 5/10 Topics in Clinical Medicine 2010, Lecturer, “The Acutely Dizzy Patient – When is it a cerebrovascular problem?,” Johns Hopkins University, Baltimore, MD

- 4/11 AAN Neuro-otology Course (2AC.002), Lecturer, "Transient spontaneous dizziness," American Academy of Neurology, Annual Meeting 2011, Honolulu, HI
- 4/11 AAN Neuro-otology Course (2AC.002), Lecturer, "Acute vestibular syndrome," American Academy of Neurology, Annual Meeting 2011, Honolulu, HI
- 4/11 AAN Neuro-otology Course (2AC.002), Lecturer, "Case unknowns," American Academy of Neurology, Annual Meeting 2011, Honolulu, HI
- 12/11 Current Concepts in Ophthalmology 2011, Lecturer, "Nystagmus and Other Ocular Oscillations '101'" Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore, MD
- 2/12 ISC Pre-conference Symposium, "Stroke in the Real World: Emergency Stroke Care", Lecturer and Panelist, "You Spin Me Around: Acute Dizziness Identification and Management," International Stroke Conference Annual Meeting 2012, New Orleans, LA
- 2/12 NANOS Neuro-vestibular Skills Training Course 2012, Lecturer, "Intro to Vestibular Skills Training – Why Bother?" North American Neuro-Ophthalmology Society, Annual Meeting 2012, San Antonio, TX
- 2/12 NANOS Neuro-vestibular Skills Training Course 2012, Lecturer, "Case Unknowns," North American Neuro-Ophthalmology Society, Annual Meeting 2012, San Antonio, TX
- 10/12 AAN Continuum Audio, Lecturer, "Neuro-otology: symptoms and signs of neuro-otologic disorders," American Academy of Neurology 2012, Audio Recording in Baltimore, MD
- 5/14 AAN Annual Meeting Update Course (C144), Lecturer, "Dissecting Dizziness: Recent Advances in Diagnosing Stroke in Acute Dizziness & Vertigo," American Academy of Neurology Annual Meeting 2014, Philadelphia, PA
- 5/14 SAEM Annual Meeting Didactic Session, Lecturer, "Diagnosing Dizziness – a Fresh Approach," Society of Academic Emergency Medicine Annual Meeting 2014, Dallas, TX
- 9/14 DEM Annual Meeting Interactive Case Conference, Lecturer, "Eye Pain and The Chronic Red Eye," Diagnostic Error in Medicine 7th Annual Conference, Atlanta, GA
- 4/15 AAN Subspecialty in Focus (C16), Lecturer, "Diagnostic Value: Balancing Misdiagnosis and Test Overuse in the New Landscape of Healthcare Delivery & Finance," American Academy of Neurology Annual Meeting 2015, Washington, DC
- 4/15 AAN Integrated Neuroscience (I1), Lecturer, "In Pursuit of the 'Eye ECG': Eye Movement-Based Stroke Diagnosis in Acute Vertigo and Dizziness," American Academy of Neurology Annual Meeting 2015, Washington, DC
- 4/15 AAN Annual Meeting Update Course (C143), Lecturer, "Dissecting Dizziness: Recent Advances in Diagnosing Stroke in Acute Dizziness & Vertigo," American Academy of Neurology Annual Meeting 2015, Washington, DC
- 12/15 Current Concepts in Ophthalmology 2015, Lecturer, ""Saccadomania": When to Worry about Intrusive Eye Movements" Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore, MD
- 4/16 AAN Annual Meeting Update Course (C185), Lecturer, "Approach to the History, Examination and Imaging Evaluation of the Dizzy Patient," American Academy of Neurology Annual Meeting 2016, Vancouver, BC, CA
- 4/16 AAN Annual Meeting Update Course (C195), Lecturer, "Central versus Peripheral Vertigo," American Academy of Neurology Annual Meeting 2016, Vancouver, BC, CA
- 3/17 "Diagnostic Errors in Acute Dizziness: The Public Health Burden of Missed Stroke," Vestibular Testing Masterclass, Johns Hopkins University School of Medicine, March 31-April 1, 2017, Baltimore, MD
- 3/17 Vestibular Testing Masterclass, Lecturer, "Ti.Tr.A.T.E. – A New Approach to Diagnosing the Dizzy Patient," Dept Neurology, Johns Hopkins University, March 31-April 1, 2017, Baltimore, MD
- 3/17 Vestibular Testing Masterclass, Lecturer, "Vestibular Case Unknowns & Name that Funny Eye Movement," Dept Neurology, Johns Hopkins University, March 31-April 1, 2017, Baltimore, MD
- 9/17 Current Concepts in Ophthalmology 2017, Lecturer, ""The World is Shaking": Differential Diagnosis of Oscillopsia," Wilmer Eye Institute, Dept Ophthalmology, Johns Hopkins University, Baltimore, MD

Faculty Development/Education Workshops/Seminars

- 3/06 NANOS Faculty Development Seminar Series, Lecturer, “Advanced PowerPoint – Enhancing Learning with Animations and More”, North American Neuro-Ophthalmology Society Annual Meeting 2006, Tucson, AZ
- 2/07 NANOS Faculty Development Seminar Series, Lecturer, “Advanced PowerPoint – Enhancing Learning with Animations and More,” North American Neuro-Ophthalmology Society Annual Meeting 2007, Snowbird, UT
- 12/06 JHMI Faculty Development Seminar Series, Lecturer, “Effective and Efficient Outpatient Clinical Teaching – a Primer and Panel Discussion,” Johns Hopkins University, Baltimore, MD
- 3/08 JHMI Faculty Development Seminar Series, Lecturer, “Advanced PowerPoint Skills – Animations to Enhance Education,” Johns Hopkins University, Baltimore, MD
- 6/08 JHMI Genes to Society Curriculum Retreat, Lecturer, “Team-Based Learning Workshop,” Johns Hopkins University, Baltimore, MD
- 10/08 JHMI Faculty Development Seminar Series, Lecturer, “Advanced PowerPoint Skills – Animations to Enhance Education,” Johns Hopkins University, Baltimore, MD
- 6/12 McMaster Evidence-Based Clinical Practice Workshop (6/4/12-6/8/12), Small Group Facilitator in workshop training faculty how to teach evidence-based medicine to physicians, Hamilton, ON
- 11/19 LAMMICO recorded patient safety lecture, “Diagnostic Errors: The New Frontier for Patient Safety,” New Orleans, LA
- 11/19 LAMMICO recorded patient safety lecture, “Diagnosis is a Team Sport,” New Orleans, LA

Clinical Workshops/Seminars

- 3/08 NANOS Stroke Symposium, Co-Moderator and Speaker, North American Neuro-Ophthalmology Society Annual Meeting 2008, Orlando, FL
- 4/08 Great Lakes Neuro-Ophthalmology Conference. Visiting Professor (case sessions) and Guest Lecturer, Michigan State University, Lansing, MI
- 4/09 AAN Neuro-ophthalmology and Neurovestibular Examination Laboratory (3BS.002), Course Faculty for hands-on clinical skills transfer workshop focused on training techniques for bedside assessment of patients with dizziness, American Academy of Neurology, Annual Meeting 2009, Seattle, WA
- 4/10 AAN Neurology Skills Pavilion: Neuro-ophthalmology and Neurovestibular Exam Lab (7NP.001), Course Faculty for hands-on clinical skills transfer workshop focused on training techniques for bedside assessment of patients with dizziness, American Academy of Neurology, Annual Meeting 2010, Toronto, ON
- 4/10 AAN Neuro-otology (8AC.007), Course Director, Speaker, and Panel Moderator for CME course at American Academy of Neurology, Annual Meeting 2010, Toronto, ON
- 7/10 2nd International Neuro-Otology Course, Meeting of the ABC Neurological Center, Featured Guest Speaker and hands-on Skills Workshop Leader, July 7-9, 2010, Mexico City, Mexico
- 4/11 AAN Neurology Skills Pavilion: Neuro-ophthalmology and Neurovestibular Exam Lab (2NP.001), Course Faculty for hands-on clinical skills transfer workshop focused on training techniques for bedside assessment of patients with dizziness, American Academy of Neurology, Annual Meeting 2011, Honolulu, HI
- 4/11 AAN Neuro-otology (2AC.002), Course Director, Speaker, and Panel Moderator for CME course at AAN Annual Meeting 2011, Honolulu, HI
- 2/12 NANOS Neuro-vestibular Skills Training Course, Course Director, Speaker, Small Group Leader, and Panelist for hands-on clinical skills transfer workshop focused on training techniques for bedside assessment of patients with dizziness, North American Neuro-Ophthalmology Society Annual Meeting 2012, San Antonio, TX
- 4/12 AAN Neurology Skills Pavilion: Neuro-ophthalmology and Neurovestibular Exam Lab (5NP.001), Course Faculty for hands-on clinical skills transfer workshop focused on training techniques for bedside assessment of patients with dizziness, American Academy of Neurology Annual Meeting 2012, New Orleans, LA
- 5/14 SAEM Short Course: Diagnosing Dizziness – a Fresh Approach, course Co-Director and Speaker, Society of Academic Emergency Medicine Annual Meeting 2014, Dallas, TX
- 2/15 NANOS Vestibular Skills Training Course, Course Director, Speaker, Small Group Leader, and Panelist for hands-on clinical skills transfer workshop focused on training techniques for bedside

- assessment of patients with dizziness, North American Neuro-Ophthalmology Society Annual Meeting 2015, San Diego, CA
- 3/15 Hands-on vestibular skills training session, Dept Emergency Medicine, Community Hospital of the Monterey Peninsula, Monterey, CA
- 8/15 Masterclass on Acute Vertigo & Emergency Neurotology, Clínica de Vértigo ABC, Featured Guest Speaker and hands-on Skills Workshop Leader, August 29, 2015, Mexico City, Mexico
- 4/16 International Course on Diagnosis and Treatment of Vestibular Disorders, Featured Guest Speaker and hands-on Skills Workshop Leader, April 30, 2016, Madrid, Spain
- 3/17 Vestibular Testing Masterclass, Johns Hopkins University School of Medicine, Course Director, Featured Guest Speaker, Hands-On Skills Workshop Leader, March 31-April 1, 2017, Baltimore, MD
- 3/19 NANOS Neuro-vestibular Skills Training Course, Course Co-Director, Speaker, Small Group Leader, for hands-on clinical skills transfer workshop focused on training techniques for bedside assessment of patients with dizziness, North American Neuro-Ophthalmology Society Annual Meeting 2019, Las Vegas, NV

Mentoring

General Mentoring Activities

- 4/02-7/03 Annual Neurology New Faculty Orientation Committee Member
- 9/02-7/10 Career Advisor to students interested in careers in Neurology
- 1/03-3/05 Annual Medical Student Residency Fair Discussant for Neurology (1/03, 1/04, 3/05)
- 8/03 Speaker & Panelist, Neurology New Faculty Orientation
- 3/04-3/09 Annual Neurology 'Liver Rounds' Participant for Neurology (3/04, 2/05, 3/07, 3/09)
- 12/04 Web Designer, Student Interest Group in Neurology [SIGN]
- 1/05 SIGN Presenter – Preparing for a Possible Career in Neurology
- 2/07 SIGN Discussant – Neurology Research Opportunities
- 11/07 SIGN Discussant – Neurology Residency Application Process
- 4/08 Faculty, Re-Visit Luncheon for School of Medicine Applicants
- 9/09 SIGN Presenter – “On Being a Neurologist”
- 7/15-present Mentor to junior faculty in the Division of Neuro-Visual and Vestibular Disorders
- 1/18-present Mentor to clinical neuro-otology fellows (~2 per year)

Advisees/Mentees: Faculty (17)

- 01/15-present Najlla Nassery, M.D. (*served as her career advisor, K08 application co-Mentor*). Advise on career development, research program building for diagnostic errors, grants and individual research projects.
- 07/15-present Daniel Gold, D.O. (*served as his career advisor and Division Director*). Advise on career development and clinical program building (Tele-Dizzy Program).
- 07/15-present Amir Kheradmand, M.D. (*served as his career advisor and Division Director*). Advise on career development and research program building (Spatial Perception Laboratory).
- 12/15-present Ava Liberman, M.D. (*served as her career advisor and K23 award mentor [7/19]*). Advise on career development and research program building (stroke misdiagnosis in headache).
- 10/16-present Kelly Gleason, R.N., Ph.D. (*served as her career advisor and KL2 Award Mentor*). Advise on career development and research program building (patient engagement to improve diagnosis).
- 10/16-present Susan Peterson, M.D. (*served as her career advisor, senior Co-I / mentor on grants*). Advise on career development in diagnostic safety and quality, including research and publications.
- 10/16-present Susrutha Kotwal, M.B.B.S., M.D. (*served as his career advisor, senior Co-I / mentor on grants*). Advise on career development in diagnostic safety and quality, including research and publications.
- 10/16-present Rodney Omron, M.D. (*served as his career advisor, senior Co-I / mentor on projects*). Advise on career development in diagnostic safety and quality, including education and publications.
- 02/17-present Zheyu Wang, Ph.D. (*served as her career advisor, Division Director [DXC]*). Advise on career development and research program building (diagnostic statistical methods).
- 07/17-present Ahmed Hassoon, M.D. (*served as his career advisor, K submission mentor*). Advise on career development and research program building (machine learning and big data to improve diagnosis).
- 01/18-present Elham Yousef, M.D. (*served as her career advisor*). Advise on career development in diagnostic safety and quality, including publications.
- 05/18-present Matt Austin, Ph.D. (*served as his career advisor, senior Co-I / mentor on projects*). Advise on career development, research project management, publications (diagnostic quality measures).

- 09/19-present Ali Saber Tehrani, M.D. (*served as his career advisor, KL2 application Mentor*). Advise on career development and research program building (posterior circulation stroke misdiagnosis).
- 04/20-present Seth Martin, M.D. (*served as senior Co-Director, Mentor on AHA SFRN Center*). Advise on leadership development and research program building (mobile cardiovascular health).
- 07/20-12/21 Kemar Green, M.D. (*served as his career advisor and Division Director*). Advised on career development and research program building (machine learning for eye movement diagnosis).
- 10/20-present Michael Ellenbogen, M.D. (*served as his career advisor, K submission advisor [awarded 9/22]*). Advise on career development and research program building (diagnostic test overuse).
- 7/21-present Yuxin (Daisy) Zhu, Ph.D. (*served as her career advisor, Division Director [DXC]*). Advise on career development and research program building (diagnostic statistical methods).

Advisees: Post-doctoral Research Fellows (12)

- 7/06-6/08 Gregory Butchy, D.O., M.M.I. (*served as his career advisor and primary research mentor during MMI fellowship*): Completed his Master of Medical Informatics (MMI) Thesis under my direct supervision on cost-effectiveness of diagnostic evaluation of dizzy patients in the ED, JHU SOM Division of Health Sciences Informatics. Went on to Pathology residency (7/08), University of Medicine and Dentistry, New Jersey.
- Thesis (1) Butchy GT. Decision and cost-effectiveness analyses to determine the performance requirements for a potential diagnostic decision support system. A thesis submitted to Johns Hopkins University in conformity with the requirements for the degree of Master of Science in Health Sciences Informatics. Baltimore, MD. 3/08.
- Abstracts (1) **Newman-Toker DE**, Butchy GT, Lehmann HP, Aldrich EM, Chanmugam A, Frick KD. Diagnostic decision support to reduce stroke misdiagnosis among acutely dizzy patients: a cost effectiveness analysis. Poster presentation at 61st Annual Meeting of American Academy of Neurology. Seattle, WA, 4/25-5/2/09.
- Manuscripts (1) **Newman-Toker DE**, Hsieh YH, Camargo CA Jr., Pelletier AJ, Butchy GT, Edlow JA. Spectrum of dizziness visits to US emergency departments: cross-sectional analysis from a nationally-representative sample. Mayo Clinic Proceedings 2008 Jul;83(7):765-775.
- 6/08-2/09 Priti Sharma, M.B.B.S. (*served as her research preceptor, employer*): Worked on and helped complete several research projects on diagnostic evaluation of dizziness in the ED under my employment.
- Manuscripts (3) **Newman-Toker DE***, Sharma P, Chowdhury M, Clemons TM, Zee DS, Della Santina CC. Penlight-cover test: a new bedside method to unmask nystagmus. Journal of Neurology, Neurosurgery, and Psychiatry 2009 Aug;80:900-903.
- Gottesman RF, Sharma P, Robinson KA, Arnan M, Tsui M, Ladha K, **Newman-Toker DE***. Clinical characteristics of symptomatic vertebral artery dissection: a systematic review. The Neurologist 2012;18(5):245-54.
- Gottesman RF, Sharma P, Robinson KA, Arnan M, Tsui M, Saber-Tehrani A, **Newman-Toker DE**. Imaging characteristics of symptomatic vertebral artery dissection: a systematic review. The Neurologist 2012;18(5):255-60.
- 11/08-6/09 Timothy Niessen, M.D. (*served as his career advisor and primary research mentor for MPH*): Completed Masters of Public Health (MPH) Thesis under my direct supervision on chief complaint screening methods in the emergency department. MPH completed (6/09) at Johns Hopkins Bloomberg School of Public Health through the Johns Hopkins Clinical Research Training, Education and Career Development Program. Went on to Internal Medicine residency (7/09), Johns Hopkins University School of Medicine.
- Thesis (1) Chief Complaint Screening (Selected as one of four plenary session platform presentations at National Predoctoral Clinical Research Training Program Meeting at Washington University in St. Louis, 2009)
- 6/09-4/11 Seung Han Lee, M.D. (*served as his career advisor and primary research mentor during his post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision sponsored by the Korean National Government. Worked on and helped complete several research projects on diagnostic evaluation of dizziness, emphasizing stroke as a cause for dizziness.

- Abstracts (5) Lee SH, Stanton V, Rothman R, Crain B, Wityk R, **Newman-Toker DE**. Misdiagnosis of cerebellar hemorrhage: frequency of pseudo-gastroenteritis presentations to the emergency department. Poster presentation at 62nd Annual Meeting of American Academy of Neurology. Toronto, ON, CA, 4/10-17/10
- Zhou Y, Lee SH, Saber Tehrani AS, Robinson KA, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. 136th Annual Meeting of American Neurological Association. San Diego, CA, 9/25-28/11.
- Saber Tehrani AS, Omron R, Duval-Arnold J, Korley F, Lee SH, Tarnutzer AA, Lehmann C, Cohen M, Abbott P, Hsieh YH, **Newman-Toker DE**. Low-cost diagnostic gaming to measure symptom-specific diagnostic reasoning skills. Poster presentation at the 64th Annual Meeting of the American Academy of Neurology. New Orleans, LA, 4/21-28/12. *Selected for presentation at AB Baker Section on Neurologic Education 'Highlights in the Field' session.*
- Omron R, Saber Tehrani AS, Duval-Arnold J, Korley F, Lee SH, Tarnutzer AA, Lehmann C, Cohen M, Abbott P, Hsieh YH, **Newman-Toker DE**. The participation in a vertigo day resulted in better resident comfort with discharging patients without receiving a CT scan in patients with vestibular neuritis. Poster presentation at Society for Academic Emergency Medicine Annual Meeting. Chicago, IL, 5/9-12/12.
- Lee SH, Zhou Y, Saber Tehrani AS, Mantokoudis G, Ying SH, Robinson KA, Hsieh YH, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. Presented at Bárány Society XXVII International Congress. Uppsala, Sweden, 6/10-13/12.
- Manuscripts (3) Lee SH, **Newman-Toker DE**, Zee DS, Schubert MC. Compensatory saccade differences between outward versus inward head impulses in chronic unilateral vestibular hypofunction. *J Clin Neurosci*. 2014 Oct;21(10):1744-9.
- Tarnutzer AA, Lee SH, Robinson KA, Kaplan PW, **Newman-Toker DE**. Clinical and electrographic findings in epileptic vertigo and dizziness: a systematic review. *Neurology*. 2015 Apr 14;84(15):1595-1604.
- Tarnutzer AA, Lee SH, Robinson KA, Wang Z, Edlow JA, **Newman-Toker DE**. Emergency department misdiagnosis of cerebrovascular events in the era of modern neuroimaging: a meta-analysis. *Neurology*. 2017 Apr 11;88(15):1468-1477

8/10-8/11

Marrylin Zhou, M.D. (*served as her career advisor and primary research mentor during her post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision sponsored by the Chinese National Government. Worked on and helped complete several research projects on diagnostic evaluation of dizziness, emphasizing stroke as a cause for dizziness.

Abstracts (2) Zhou Y, Lee SH, Saber Tehrani AS, Robinson KA, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. 136th Annual Meeting of American Neurological Association. San Diego, CA, 9/25-28/11.

Lee SH, Zhou Y, Saber Tehrani AS, Mantokoudis G, Ying SH, Robinson KA, Hsieh YH, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. Presented at Bárány Society XXVII International Congress. Uppsala, Sweden, 6/10-13/12.

8/10-6/13

Ali S. Saber Tehrani, M.D. (*served as his career advisor, primary research mentor, and employer during his post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision. Served multiple roles as primary research coordinator for all projects. Led, worked on, and helped complete numerous research projects on diagnostic evaluation of dizziness, diagnostic error. Went on to Neurology residency (7/13), University of Illinois College of Medicine, Illinois.

Abstracts (17) Saber Tehrani AS, Lee H, Mathews SC, Shore A, Makary M, Pronovost P, **Newman-Toker DE**. 20-Year summary of US malpractice claims for diagnostic errors – deadly and costly. Platform presentation at the 2nd Annual Johns Hopkins Patient Safety Summit, 6/21/11. Presenter AS Saber Tehrani. [peer-reviewed publication in *BMJ Quality and Safety* 2013]

- Saber Tehrani AS, Hsieh YH, Edlow JA, Camargo CA, **Newman-Toker DE**. Co-complaints influence odds of stroke diagnosis in ED dizziness. 136th Annual Meeting of American Neurological Association. San Diego, CA, 9/25-28/11.
- Zhou Y, Lee SH, Saber Tehrani AS, Robinson KA, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. 136th Annual Meeting of American Neurological Association. San Diego, CA, 9/25-28/11
- Saber Tehrani AS, Lee H, Mathews SC, Shore A, Makary M, Pronovost P, **Newman-Toker DE**. 20-Year summary of US malpractice claims for diagnostic errors from 1985 to 2005. Platform presentation at 4th Annual Diagnostic Error in Medicine Conference, 10/25/11. [peer-reviewed publication in BMJ Quality and Safety 2013]
- Saati A, Ogunsanya W, Gross P, Twose C, Saber Tehrani AS, Lehmann HP, **Newman-Toker DE**. Clinically-applied computerized diagnostic decision support systems in the ED: a systematic review. Platform presentation at 4th Annual Diagnostic Error in Medicine Conference, 10/26/11.
- Saber Tehrani AS, Omron R, Duval-Arnold J, Korley F, Lee SH, Tarnutzer AA, Lehmann C, Cohen M, Abbott P, Hsieh YH, **Newman-Toker DE**. Low-cost diagnostic gaming to measure symptom-specific diagnostic reasoning skills. Poster presentation at 64th Annual Meeting of American Academy of Neurology. New Orleans, LA, 4/21-28/12. Selected for presentation at AB Baker Section on Neurologic Education 'Highlights in the Field' session.
- Omron R, Saber Tehrani AS, Duval-Arnold J, Korley F, Lee SH, Tarnutzer AA, Lehmann C, Cohen M, Abbott P, Hsieh YH, **Newman-Toker DE**. The participation in a vertigo day resulted in better resident comfort with discharging patients without receiving a CT scan in patients with vestibular neuritis. Poster presentation at Society for Academic Emergency Medicine Annual Meeting. Chicago, IL, 5/9-12/12.
- Mantokoudis G, Saber Tehrani A, Pula J, Guede C, Kerber K, Ying S, Blitz A, Rothman R, Hanley D, Zee D, Kattah J, **Newman-Toker D**. Physiologic device-based diagnosis of stroke in acute vertigo: proof-of-concept. Presented at Bárány Society XXVII International Congress. Uppsala, Sweden, 6/10-13/12. [peer-reviewed publication in Stroke 2013]
- Lee SH, Zhou Y, Saber Tehrani AS, Mantokoudis G, Ying SH, Robinson KA, Hsieh YH, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. Presented at Bárány Society XXVII Internat Congress. Uppsala, Sweden, 6/10-13/12
- Saber Tehrani A, Mantokoudis G, Pula J, Guede C, Kerber K, Ying S, Blitz A, Rothman R, Hanley D, Zee D, Kattah J, **Newman-Toker D**. Physiologic device-based diagnosis of stroke in acute vertigo: proof-of-concept. Poster presentation at 137th Annual Meeting of American Neurological Assn. Boston, MA, 10/7-9/12. [peer-reviewed publication in Stroke 2013]
- Saber Tehrani A, Mantokoudis G, Pula J, Guede C, Kerber K, Ying S, Blitz A, Rothman R, Hanley D, Zee D, Kattah J, **Newman-Toker D**. Physiologic device-based diagnosis of stroke in acute vertigo: proof-of-concept. Presented at Diagnostic Error in Medicine 2012, 5th Annual International Conf. Baltimore, MD, 11/11-14/12. Presenter AS Saber Tehrani.
- Saati A, Ogunsanya W, Gross P, Twose C, Saber Tehrani AS, Lehmann HP, **Newman-Toker DE**. Clinically-applied computerized diagnostic decision support systems in the ED: a systematic review. Poster presentation at Diagnostic Error in Medicine 2012, 5th Annual International Conf. Baltimore, MD, 11/11-14/12. Presenter A Saati.
- Omron R, Saber Tehrani AS, Duval-Arnold J, Korley F, Lee SH, Tarnutzer AA, Lehmann C, Cohen M, Abbott P, Hsieh YH, **Newman-Toker DE**. The participation in a vertigo day resulted in better resident comfort with discharging patients without receiving a CT scan in patients with vestibular neuritis. Poster presentation at Diagnostic Error in Medicine 2012, 5th Annual International Conf. Baltimore, MD, 11/11-14/12. Presenter R Omron.
- Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH, Rothman RE, Hanley DF, Zee DS, Kattah JC, **Newman-Toker DE**. Quantitative video-oculography for diagnosing stroke at the bedside in acute vertigo: an "ECG" for the eyes. Platform presentation at 39th Annual Meeting of North American Neuro-Ophthalmology Society. Snowbird, Utah. 2/9-14/13. Presenter AS Saber Tehrani [peer-reviewed publication in Stroke 2013]
- Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH,

- Rothman RE, Hanley DF, Zee DS, Kattah JC, **Newman-Toker DE**. Quantitative video-oculography for diagnosing stroke at the bedside in acute vertigo: an “ECG” for the eyes. Special platform presentation at 65th Annual Meeting of American Academy of Neurology. San Diego, CA, 3/16-23/13. Presenter AS Saber Tehrani [peer-reviewed publication in *Stroke* 2013]
- Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, **Newman-Toker DE**. Rising annual costs of dizziness presentations to US emergency departments. Poster presentation at 65th Annual Meeting of American Academy of Neurology. San Diego, CA, 3/16-23/13. Presenter AS Saber Tehrani [peer-reviewed publication in *Academic Emergency Medicine* 2013]
- Newman-Toker DE**, Kerber KA, Hsieh YH, Pula JH, Omron R, Saber Tehrani AS, Mantokoudis G, Zee DS, Hanley DF, Kattah JC. HINTS outperforms ABCD2 to identify stroke in acute vestibular syndrome. Oral presentation at Society for Academic Emergency Medicine 2013 Annual Meeting. Atlanta, GA, 5/14-18/13.
- Manuscripts (7) Gottesman RF, Sharma P, Robinson KA, Arnan M, Tsui M, Saber-Tehrani A, **Newman-Toker DE**. Imaging characteristics of symptomatic vertebral artery dissection: a systematic review. *The Neurologist* 2012;18(5):255-60.
- Newman-Toker DE**, Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH, Rothman RE, Hanley DF, Zee DS, Kattah JC. Quantitative video-oculography to help diagnose stroke in acute vertigo and dizziness: towards an “ECG” for the eyes. *Stroke* 2013;44(4):1158-61.
- Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, **Newman-Toker DE**. Rising annual costs of dizziness presentations to US emergency departments. *Academic Emergency Medicine* 2013 Jul;20(7):689-96.
- Herrick DB, Nakhasi A, Nelson B, Rice S, Abbott PA, Saber Tehrani AS, Rothman RE, Lehmann HP, **Newman-Toker DE**. Usability characteristics of self-administered computer-assisted interviewing in the emergency department—factors affecting ease of use, efficiency, and error. *Applied Clinical Informatics* 2013 Jun 19;4(2):276-92.
- Saber Tehrani AS, Lee HW, Mathews SC, Shore A, Makary M, Pronovost PJ, **Newman-Toker DE**. 25-year summary of US malpractice claims for diagnostic errors 1986-2010: an analysis from the National Practitioner Data Bank. *BMJ Quality and Safety* 2013 Aug;22(8):672-80.
- Newman-Toker DE**, Kerber KA, Hsieh YH, Pula JH, Omron R, Saber Tehrani AS, Mantokoudis G, Hanley DF, Zee DS, Kattah JC. HINTS outperforms ABCD2 to screen for stroke in acute continuous vertigo and dizziness. *Academic Emergency Medicine* 2013 Oct;20(10):987-96.
- Kattah JC, Dhanani SD, Pula JH, Mantokoudis G, Saber Tehrani AS, **Newman-Toker DE**. Vestibular signs of thiamine deficiency during the early phase of suspected Wernicke’s encephalopathy. *Neurology Clinical Practice* 2013;3:460-468.

10/11-4/13

- Georgios Mantokoudis, M.D. (*served as his career advisor and primary research mentor during his post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision sponsored by the Swiss National Science Foundation (Grant #PBBEP2 136573). Led, worked on, and helped complete numerous research projects on diagnostic evaluation of dizziness, vestibular physiology. Winner of one of two \$1000 Bárány Society travel scholarships (6/12, Uppsala, Sweden) for the best research presentation by a fellow for work on acute video-oculography that was conducted under my mentorship.
- Abstracts (7) Mantokoudis G, Saber Tehrani A, Pula J, Guede C, Kerber K, Ying S, Blitz A, Rothman R, Hanley D, Zee D, Kattah J, **Newman-Toker D**. Physiologic device-based diagnosis of stroke in acute vertigo: proof-of-concept. Presented at Bárány Society XXVII International Congress. Uppsala, Sweden, 6/10-13/12. Presenter G Mantokoudis [*peer-reviewed publication in Stroke* 2013]
- Lee SH, Zhou Y, Saber Tehrani AS, Mantokoudis G, Ying SH, Robinson KA, Hsieh YH, **Newman-Toker DE**. Anterior circulation stroke causing dizziness or vertigo: a systematic review. Presented at Bárány Society XXVII Internat Cong. Uppsala, Sweden, 6/10-13/12
- Saber Tehrani A, Mantokoudis G, Pula J, Guede C, Kerber K, Ying S, Blitz A, Rothman R, Hanley D, Zee D, Kattah J, **Newman-Toker D**. Physiologic device-based diagnosis of stroke

in acute vertigo: proof-of-concept. Presented at Diagnostic Error in Medicine 2012, 5th Annual International Conf. Baltimore, MD, 11/11-14/12. Presenter AS Saber Tehrani.

Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH, Rothman RE, Hanley DF, Zee DS, Kattah JC, **Newman-Toker DE**. Quantitative video-oculography for diagnosing stroke at the bedside in acute vertigo: an “ECG” for the eyes. Platform presentation at 39th Annual Meeting of North American Neuro-Ophthalmology Society. Snowbird, Utah. 2/9-14/13.

Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH, Rothman RE, Hanley DF, Zee DS, Kattah JC, **Newman-Toker DE**. Quantitative video-oculography for diagnosing stroke at the bedside in acute vertigo: an “ECG” for the eyes. Special platform presentation at 65th Annual Meeting of American Academy of Neurology. San Diego, CA, 3/16-23/13. Presenter AS Saber Tehrani [*peer-reviewed publication in Stroke 2013*]

Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, **Newman-Toker DE**. Rising annual costs of dizziness presentations to US emergency departments. Poster presentation at 65th Annual Meeting of American Academy of Neurology. San Diego, CA, 3/16-23/13. Presenter AS Saber Tehrani [*peer-reviewed publication in Academic Emergency Medicine 2013*]

Newman-Toker DE, Kerber KA, Hsieh YH, Pula JH, Omron R, Saber Tehrani AS, Mantokoudis G, Zee DS, Hanley DF, Kattah JC. HINTS outperforms ABCD2 to identify stroke in acute vestibular syndrome. Oral presentation at Society for Academic Emergency Medicine 2013 Annual Meeting. Atlanta, GA, 5/14-18/13.

Manuscripts (4) **Newman-Toker DE**, Saber Tehrani AS, Mantokoudis G, Pula JH, Guede CI, Kerber KA, Blitz A, Ying SH, Hsieh YH, Rothman RE, Hanley DF, Zee DS, Kattah JC. Quantitative video-oculography to help diagnose stroke in acute vertigo and dizziness: towards an “ECG” for the eyes. *Stroke* 2013;44(4):1158-61.

Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, **Newman-Toker DE**. Rising annual costs of dizziness presentations to US emergency departments. *Academic Emergency Medicine* 2013 Jul;20(7):689-96.

Newman-Toker DE, Kerber KA, Hsieh YH, Pula JH, Omron R, Saber Tehrani AS, Mantokoudis G, Hanley DF, Zee DS, Kattah JC. HINTS outperforms ABCD2 to screen for stroke in acute continuous vertigo and dizziness. *Academic Emergency Medicine* 2013 Oct;20(10):987-96.

Kattah JC, Dhanani SD, Pula JH, Mantokoudis G, Saber Tehrani AS, **Newman-Toker DE**. Vestibular signs of thiamine deficiency during the early phase of suspected Wernicke’s encephalopathy. *Neurology Clinical Practice* 2013;3:460-468.

5/11-12/12 Amir Saati, M.D. (*served as his career advisor and research mentor for his masters’ project in health sciences informatics*): Led, worked on, and helped complete a systematic review of clinical diagnostic decision support systems in the emergency department.

Abstracts (2) Saati A, Ogunsanya W, Gross P, Twose C, Saber Tehrani AS, Lehmann HP, **Newman-Toker DE**. Clinically-applied computerized diagnostic decision support systems in the ED: a systematic review. Platform presentation at 4th Annual Diagnostic Error in Medicine Conf, 10/26/11.

Saati A, Ogunsanya W, Gross P, Twose C, Saber Tehrani AS, Lehmann HP, **Newman-Toker DE**. Clinically-applied computerized diagnostic decision support systems in the ED: a systematic review. Poster presentation at Diagnostic Error in Medicine 2012, 5th Annual International Conference. Baltimore, MD. 11/11-14/12. Presenter A Saati.

5/11-12/12 Olawande (‘Wande’) Ogunsanya, M.D. (*served as his career advisor and research mentor for his masters’ project in health sciences informatics*): Led, worked on, and helped complete a systematic review of clinical diagnostic decision support systems in the emergency department.

Abstracts (2) Saati A, Ogunsanya W, Gross P, Twose C, Saber Tehrani AS, Lehmann HP, **Newman-Toker DE**. Clinically-applied computerized diagnostic decision support systems in the ED: a

systematic review. Platform presentation at the 4th Annual Diagnostic Error in Medicine Conference, 10/26/11.

Saati A, Ogunsanya W, Gross P, Twose C, Saber Tehrani AS, Lehmann HP, **Newman-Toker DE**. Clinically-applied computerized diagnostic decision support systems in the ED: a systematic review. Poster presentation at Diagnostic Error in Medicine 2012, 5th Annual International Conference. Baltimore, MD. 11/11-14/12.

- 7/14-6/16 Tatyana Lyapustina, M.D. (*served as her research mentor for her primary project linked to her MPH degree program*): Developed and completed a cost-effectiveness project related to diagnosis of stroke in acute dizziness and vertigo presentations to the emergency department.
- 3/15-6/16 Vahid Eslami, M.D. (*served as his career advisor, primary research mentor, and employer during his post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision. Served multiple roles as primary research coordinator for AVERT. Led, worked on, and helped complete several research projects on diagnostic evaluation of dizziness. Went on to Neurology residency (7/16) at University of Texas, Texas.
- 7/15-6/20 Jorge Otero-Millan, Ph.D. (*served as his career advisor, Division Director, and co-Mentor for his K award application*): Post-doctoral research fellow in our Neuro-Visual and Vestibular Division. Submitted a K99 award to NIH (National Eye Institute [NEI]) in 6/16 with my co-Mentorship. Secured a tenure track assistant professorship at University of California, Berkeley in 2020. Manuscripts (1) Parker TM, Farrell N, Otero-Millan J, Kheradmand A, McClenney A, **Newman-Toker DE**. Proof of Concept for an "eyePhone" App to Measure Video Head Impulses. Digit Biomark. 2020 Dec 30;5(1):1-8.
- 9/16-6/21 Mehdi Fanai, M.D. (*served as his career advisor, primary research mentor, and employer during his post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision. Served multiple roles as informatics and data analytics lead. Led, worked on, and helped complete several research projects on measurement of diagnostic errors and outcomes. Went on to Neurology residency (7/21) at St. Louis University School of Medicine, Missouri. Manuscripts (5) Mane KK, Rubenstein KB, Nassery N, Sharp AL, Shamim EA, Sangha NS, Hassoon A, Fanai M, Wang Z, **Newman-Toker DE**. Diagnostic performance dashboards: tracking diagnostic errors using big data. BMJ Qual Saf. 2018;27(7):567-70.
Newman-Toker DE, Schaffer AC, Yu-Moe CW, Nassery N, Saber Tehrani AS, Clemens GD, Wang Z, Zhu Y, Fanai M, Siegal D. Serious misdiagnosis-related harms in malpractice claims: the "Big Three" – vascular events, infections, & cancers. Diagnosis (Berl). 2019 Aug 27;6(3):227-240. Corrigendum to: Serious misdiagnosis-related harms in malpractice claims: The "Big Three" - vascular events, infections, and cancers. Diagnosis (Berl). 2020 May 16;8(1):127-128.
Newman-Toker DE, Wang Z, Zhu Y, Nassery N, Saber Tehrani AS, Schaffer AC, Yu-Moe CW, Clemens GD, Fanai M, Siegal D. Rate of diagnostic errors and serious misdiagnosis-related harms for major vascular events, infections, and cancers: toward a national incidence estimate using the "Big Three." Diagnosis (Berl). 2020 May 14;8(1):67-84.
Kotwal S, Fanai M, Fu W, Wang Z, Bery AK, Omron R, Tevzadze N, Gold G, Garibaldi BT, Wright SM, **Newman-Toker DE**. Real-world virtual patient simulation to improve diagnostic performance through deliberate practice: a prospective quasi-experimental study. Diagnosis (Berl). 2021 Mar 8;8(4):489-496.
Lieberman AL, Hassoon A, Fanai M, Badihian S, Rupani H, Peterson SM, Sebestyen K, Wang Z, Zhu Y, Lipton RB, **Newman-Toker DE**. Cerebrovascular disease hospitalizations following emergency department headache visits: A nested case-control study. Acad Emerg Med. 2022 Jan;29(1):41-50.
- 9/17-6/22 Shervin Badihian, M.D. (*served as his career advisor, primary research mentor, and employer during his post-doctoral fellowship*): Completed a post-doctoral clinical research fellowship under my direct supervision. Served multiple roles as primary research coordinator for AVERT. Led, worked on, and

helped complete several research projects on diagnostic evaluation of dizziness, diagnostic errors. Went on to Neurology residency (7/22) at Cleveland Clinic, Ohio.

Manuscripts (2) Kattah JC, Badihian S, Pula JH, Tarnutzer AA, Newman-Toker DE, Zee DS. Ocular lateral deviation with brief removal of visual fixation differentiates central from peripheral vestibular syndrome. *J Neurol*. 2020 Dec;267(12):3763-3772.

Liberman AL, Hassoon A, Fanai M, Badihian S, Rupani H, Peterson SM, Sebestyen K, Wang Z, Zhu Y, Lipton RB, **Newman-Toker DE**. Cerebrovascular disease hospitalizations following emergency department headache visits: A nested case- control study. *Acad Emerg Med*. 2022 Jan;29(1):41-50.

Parker TM, Badihian S, Hassoon A, Saber Tehrani AS, Farrell N, **Newman-Toker DE**, Otero-Millan J. Eye and head movement recordings using smartphones for telemedicine applications: measurements of accuracy and precision. *Front Neurol*. 2022 Mar 18;13:789-581.

Advisees: Pre-Doctoral (Medical Student & Undergraduate) Research Preceptorships

- 4/05-6/06 Lisa Guardabascio (now Lisa Cannon), M.D., JHU SOM 2006: *volunteer research elective, preceptorship; four poster presentations and one second-authored full-length manuscript*
 Abstracts (4) Guardabascio LM, Rothman RE, Zee DS, **Newman-Toker DE**. Chief complaint screening – a new method for symptom-oriented research in the Emergency Department. Poster presentation at the Society for Academic Emergency Medicine, May, 2006. *Acad Emerg Med* 2006 13(5 Supplement 1): S146.
Newman-Toker DE, Guardabascio LM, Zee DS, Rothman RE. Taking the history from a dizzy patient – why “What do you mean by dizzy?” should not be the first question you ask. Poster presentation at the Society for Academic Emergency Medicine, May, 2006. *Acad Emerg Med* 2006 13(5 Supplement 1): S79.
Newman-Toker DE, Guardabascio LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Rethinking the approach to the dizzy patient: why “What do you mean by dizzy?” should not be the first question you ask. Poster presentation at the North American Neuro-Ophthalmology Society Meeting, 2/07.
Newman-Toker DE, Guardabascio LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Rethinking the approach to the dizzy patient: why “What do you mean by dizzy?” should not be the first question you ask. Poster presentation at American Academy of Neurology, 5/07.
 Manuscripts (1) **Newman-Toker DE**, Cannon LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Imprecision in patient reports of dizziness symptom quality: a cross-sectional study conducted in an acute-care setting. *Mayo Clinic Proceedings* 2007 Nov; 82(11):1329-1340.
- 6/05-6/07 Matthew Stofferahn, M.D., JHU SOM 2007: *summer and ongoing volunteer research elective, preceptorship; two poster presentations and one third-authored full-length manuscript*
 Abstracts (2) **Newman-Toker DE**, Guardabascio LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Rethinking the approach to the dizzy patient: why “What do you mean by dizzy?” should not be the first question you ask. Poster presentation at the North American Neuro-Ophthalmology Society Meeting, 2/07.
Newman-Toker DE, Guardabascio LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Rethinking the approach to the dizzy patient: why “What do you mean by dizzy?” should not be the first question you ask. Poster presentation at American Academy of Neurology, 5/07
 Manuscripts (1) **Newman-Toker DE**, Cannon LM, Stofferahn ME, Rothman RE, Hsieh YH, Zee DS. Imprecision in patient reports of dizziness symptom quality: a cross-sectional study conducted in an acute-care setting. *Mayo Clinic Proceedings* 2007 Nov; 82(11):1329-1340.
- 6/06-10/07 Victoria Stanton, M.D. candidate, UCSF SOM: *visiting student, UCSF summer research scholarship, preceptorship followed by ongoing data analysis; four abstracts, one brief report (research letter), and two full-length manuscripts (one first-authored, one third-authored)*
 Abstracts (4) **Newman-Toker DE**, Stanton VA, Hsieh YH, Camargo CA Jr., Edlow JA, Lovett P, Goldstein JN, Abbuhl S, Lin M, Chanmugam A, Rothman RE. Diagnosing dizziness in the emergency department — physicians may rely too heavily on symptom quality. Results of a multicenter, quantitative survey. *American College of Emergency Physicians Research Forum*. 10/8-

- 11/07, Seattle, WA. Abstracts. *Ann Emerg Med*. 2007 Oct. [peer-reviewed publication in Mayo Clinic Proceedings 2007]
- Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo—a systematic review. Abstracts of Bárány Society XXV International Congress. Kyoto, Japan, 3/31-4/3/08. *J Vestib Research* 2008. [peer-reviewed publication in *J Gen Internal Med* 2008]
- Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo: a systematic review of observational studies. Platform presentation at 60th Annual Meeting of American Academy of Neurology. Chicago, 4/12-19/08. [peer-reviewed publication in *J Gen Internal Med* 2008]
- Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo: a systematic review of observational studies. SAEM 2008. [poster accepted but not presented; abstract published] [peer-reviewed publication in *J Gen Internal Med* 2008]
- Manuscripts (3) **Newman-Toker DE**, Stanton VA, Hsieh YH, Rothman R. Frontline providers harbor misconceptions about the bedside evaluation of dizzy patients [research letter]. *Acta Otolaryngologica* 2008 May;128(5):601-604.
- Stanton VA, Hsieh YH, Camargo CA Jr., Edlow JA, Lovett P, Goldstein JN, Abbuhl S, Lin M, Chanmugam A, Rothman RE, **Newman-Toker DE**. Overreliance on symptom quality in diagnosing dizziness: results of a multicenter survey of emergency physicians. *Mayo Clinic Proceedings* 2007 Nov; 82(11):1319-1328.
- Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo—a systematic review. *J Gen Internal Med* 2008 Dec;23(12):2087-2094.
- 9/06-3/07 Sarah Tighe, M.D., JHU SOM 2007: *volunteer research elective*
- 5/07-9/07 Fei Jamie Dy, M.D., JHU SOM 2010: *volunteer research preceptorship*
- Abstracts (3) **Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo—a systematic review. Abstracts of the Bárány Society XXV International Congress. Kyoto, Japan, 3/31-4/3/08. *J Vestib Research* 2008. [peer-reviewed publication in *J Gen Internal Med* 2008]
- Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo: a systematic review of observational studies. Platform presentation at 60th Annual Meeting of American Academy of Neurology. Chicago, 4/12-19/08. [peer-reviewed publication in *Journal of General Internal Medicine* 2008]
- Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo: a systematic review of observational studies. SAEM 2008. [poster accepted but not presented; abstract published] [peer-reviewed publication in *J Gen Internal Med* 2008]
- Manuscripts (1) **Newman-Toker DE**, Dy FJ, Stanton VA, Zee DS, Calkins H, Robinson KA. Primary cardiovascular disease causes true vertigo—a systematic review. *J Gen Internal Med* 2008 Dec;23(12):2087-2094.
- 6/08-1/09 Kathleen Lee, M.D., JHU SOM 2012 *volunteer research preceptorship*; worked on follow-up visit study related to diagnostic evaluation of dizziness in the ED
- 8/08-2/09 Minhaj Chowdhury, B.A. candidate JHU 2011 *volunteer research preceptorship*; worked on penlight-cover test project related to diagnostic evaluation of dizziness in the ED
- Manuscripts (1) **Newman-Toker DE**, Sharma P, Chowdhury M, Clemons TM, Zee DS, Della Santina CC. Penlight-cover test: a new bedside method to unmask nystagmus. *J Neurol, Neurosurg Psychiat* 2009 Aug;80:900-903.
- 7/09-12/10 Benjamin Nelson, B.A. candidate JHU 2011, Premedical Student research elective (7/09-8/09, 9/10-12/10): *paid research assistant, volunteer research preceptorship*; worked on automated medical interviewing project for diagnosis of dizziness and other symptoms

- Manuscripts (1) Herrick DB, Nakhasi A, Nelson B, Rice S, Abbott PA, Saber Tehrani AS, Rothman RE, Lehmann HP, **Newman-Toker DE**. Usability characteristics of self-administered computer-assisted interviewing in the emergency department—factors affecting ease of use, efficiency, and error. *Applied Clinical Informatics* 2013 Jun 19;4(2):276-92.
- 7/09-12/10 Daniel Herrick, B.A. Premedical Student, JHU Neurology Research Program Assistant, Brain Injury Outcomes Surveillance Division (7/09-8/09, 12/09-6/10): *paid research data analyst, volunteer research preceptorship*; worked on automated medical interviewing project for diagnosis of dizziness and other symptoms
 Abstracts (1) Nakhasi A, Herrick D, Rice S, **Newman-Toker DE**. Acceptability and usability of kiosk-type self-administered computer-assisted interviewing for medical diagnosis in acute care settings: towards work flow-sensitive diagnostic decision support in the ED. Presented at Agency for Healthcare Research and Quality (AHRQ) 2010 Annual Conf, 9/26-29/10. [*peer-reviewed publication in Applied Clinical Informatics 2013*]
 Manuscripts (1) Herrick DB, Nakhasi A, Nelson B, Rice S, Abbott PA, Saber Tehrani AS, Rothman RE, Lehmann HP, **Newman-Toker DE**. Usability characteristics of self-administered computer-assisted interviewing in the emergency department—factors affecting ease of use, efficiency, and error. *Applied Clinical Informatics* 2013 Jun 19;4(2):276-92.
- 12/09-6/10 Atul Nakhasi, B.S. Premedical Student research elective: *volunteer research preceptorship*; worked on automated medical interviewing project for diagnosis of dizziness and other symptoms
 Abstracts (1) Nakhasi A, Herrick D, Rice S, **Newman-Toker DE**. Acceptability and usability of kiosk-type self-administered computer-assisted interviewing for medical diagnosis in acute care settings: towards work flow-sensitive diagnostic decision support in the ED. Presented at Agency for Healthcare Research and Quality (AHRQ) 2010 Annual Conf, 9/26-29/10. [*peer-reviewed publication in Applied Clinical Informatics 2013*]
 Manuscripts (1) Herrick DB, Nakhasi A, Nelson B, Rice S, Abbott PA, Saber Tehrani AS, Rothman RE, Lehmann HP, **Newman-Toker DE**. Usability characteristics of self-administered computer-assisted interviewing in the emergency department—factors affecting ease of use, efficiency, and error. *Applied Clinical Informatics* 2013 Jun 19;4(2):276-92.
- 10/15-6/17 Maningbe Béréte Keïta, B.A. Pre-doctoral Student, JHU Neurology Research Program Assistant, Brain Injury Outcomes Surveillance Division: *paid research data analyst, research preceptorship*; worked on multiple cost-effectiveness projects related to diagnosis of stroke in acute dizziness and vertigo presentations to the emergency department. Grants: Society to Improve Diagnosis in Medicine; NIDCD Diversity Supplement to the AVERT clinical trial. Went on to PhD in Health Policy and Management at Johns Hopkins University School of Public Health.
- 12/16-present Nathan Farrell undergraduate engineering student. Worked on eye movement research using mobile phones at Johns Hopkins. Went on to work for our team as a mobile app programmer.
 Manuscripts (2) Parker TM, Farrell N, Otero-Millan J, Kheradmand A, McClenney A, **Newman-Toker DE**. Proof of Concept for an "eyePhone" App to Measure Video Head Impulses. *Digit Biomark.* 2020 Dec 30;5(1):1-8.
 Parker TM, Badihian S, Hassoon A, Saber Tehrani AS, Farrell N, **Newman-Toker DE**, Otero-Millan J. Eye and head movement recordings using smartphones for telemedicine applications: measurements of accuracy and precision. *Front Neurol.* 2022 Mar 18;13:789-581

- 12/16-present Max Parker undergraduate pre-medical student. Worked on eye movement research using mobile phones at Johns Hopkins. Went on to medical school at University of Florida School of Medicine. Manuscripts (2) Parker TM, Farrell N, Otero-Millan J, Kheradmand A, McClenney A, **Newman-Toker DE**. Proof of Concept for an "eyePhone" App to Measure Video Head Impulses. *Digit Biomark*. 2020 Dec 30;5(1):1-8.
Parker TM, Badihian S, Hassoon A, Saber Tehrani AS, Farrell N, **Newman-Toker DE**, Otero-Millan J. Eye and head movement recordings using smartphones for telemedicine applications: measurements of accuracy and precision. *Front Neurol*. 2022 Mar 18;13:789-581

Advisees: Other Career Advising (Students, Residents, Fellows, Graduate Students)

Publication Mentorship Other than Research Trainees

- 2004-2006 Raymond Cheong, JHU SOM Student
Cheong R, Wilson RK, Cortese ICM, **Newman-Toker DE**. Mothball Withdrawal Encephalopathy – Case Report and Review of Paradichlorobenzene Neurotoxicity. *Substance Abuse*, 2007 Mar; 27(4):63-67.
- 2004-2005 Robin Wilson, Johns Hopkins Adult Neurology Resident
Wilson R, Pardo-Villamizar C, **Newman-Toker DE**. When a fine diagnosis isn't good enough. Platform case presentation at Walsh Soc Mtg, 2/05. (*presenter DE Newman-Toker*)
- 2005-2006 James Castle, Johns Hopkins Adult Neurology Resident
Castle J, Sakonju A, Dalmau J, **Newman-Toker DE**. Anti-Ma2-associated encephalitis with normal FDG-PET: a case of pseudo-Whipple's disease. *Nature Clinical Practice Neurology* 2006 Oct; 2(10):566-572.
- 2006-2007 Ai Sakonju, Johns Hopkins Pediatric Neurology Resident
Sakonju A, **Newman-Toker DE**. You shake my nerves and you rattle my brain. Platform case presentation at the Walsh Society Meeting, 2/07. (*presenter A Sakonju*)
- 2007-2008 Michael Levy, Johns Hopkins Adult Neurology Resident
Levy M, **Newman-Toker DE***. Reversible chest tube Horner syndrome. *J Neuro-ophthalmol* 2008 Sep; 28(3):212-3.

Career Advisor

- 2/01-6/10 Aaron Berkowitz, M.D., JHU SOM; advisor during medical school and ongoing for residency selection and applications process; Ph.D. in Ethnomusicology, Harvard University
- 10/06-6/07 Ai Sakonju, M.D.; advisor during JHU SOM Pediatric Neurology Residency; went on to complete Neuromuscular Fellowship, University of Utah
- 10/10-6/13 Craig Monsen, M.D., JHU SOM; advisor during medical school for research and business career development; went on to start his own company, SymCat (<http://symcat.com/>)
- 7/17-present Maningbe Béréte Keïta, PhD (during doctoral program and afterwards)

Academic Advisor

- 11/10-5/14 Frederick Korley, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic advisor for graduate school and career counseling; doctoral dissertation committee member
- 10/11-5/19 Liana Rosenthal, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic advisor for graduate school and career counseling; doctoral dissertation committee member
- 11/12-5/15 Trevor Crowell, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic advisor for graduate school and career counseling; doctoral dissertation committee member
- 9/14-5/15 Roland Faigle, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic advisor for graduate school and career counseling; MHS completed 2015
- 9/16-5/20 Michelle Johansen, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic advisor for graduate school and career counseling; doctoral dissertation committee member
- 3/18-8/21 Kiemanh Pham, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic advisor for graduate school and career counseling; doctoral dissertation committee member
- 8/18-9/22 Rebecca Ojo, M.P.H., Doctor of Public Health Program, Health Policy & Management; academic advisor for graduate school and career counseling; doctoral dissertation committee member
- 9/19-present Ali Saber Tehrani, M.D., Graduate Training Program in Clinical Investigation (GTPCI); academic

mentor for graduate school and career counseling; doctoral dissertation committee member

Education Mentorship (Students, Residents, Fellows)

- 2006-2008 Katherine Peters, Johns Hopkins Adult Neurology Resident and Fellow (mentoring in education careers and small-group teaching during the Neurology Clerkship)
- 2007-2008 Joshua Ewen, Johns Hopkins Pediatric Neurology Resident and Fellow (mentoring in small-group teaching during 2nd year Neuropathology/pathophysiology Block)

Thesis Committees

- 5/09 Deanna Cettomai. Masters of Health Sciences (MHS) thesis, Johns Hopkins Bloomberg School of Public Health. Associations between retinal nerve fiber layer abnormalities and neurologists' assessments of optic disc pallor and relative afferent pupillary defects. Thesis Reader.
- 3/11 Ava Bittner. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Variability in Vision and Photopsias in Retinitis Pigmentosa are related to Disease Severity and Psychosocial Factors. Dissertation Committee Alternate.
- 2/12 Frederick Korley. Preliminary oral examination for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation Academic Advisor.
- 2/13 Rebecca Aslakson. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Palliative care and communication regarding prognosis in the intensive care unit. Dissertation Committee Alternate.
- 9/13 Frederick Korley. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. Academic Advisor.
- 11/13 Trevor Crowell. Preliminary oral examination for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation Academic Advisor.
- 2/14 Liana Rosenthal. Preliminary oral examination for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. Academic Advisor.
- 4/14 Andrea Dugas. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. Thesis Reader.
- 1/15 Trevor Crowell. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. Healthcare Utilization Among Persons Living with HIV with Attention to the Influences of Hepatitis Co-Infection and Elite Control. Academic Advisor.
- 7/17 Eboni Lance. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. Plasma Proteins Associated with Neurological Complications and Developmental Disorders in Pediatric Sickle Cell Disease.
- 5/19 Liana Rosenthal. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. Identification of Biomarkers and Modifiable Risk Factors for Parkinson's Disease Dementia.
- 3/20 Michelle Johansen. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. The Brain-Heart Axis: Investigation of Cardiac Structural Pathology and Association with Stroke Subtype and Patient Outcomes.
- 4/20 Rebecca Ojo. Preliminary oral examination for DrPH, Johns Hopkins Bloomberg School of Public Health. Health Policy and Management.
- 8/21 Kiemanh Pham. Final dissertation defense for PhD in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health. Graduate Training Program in Clinical Investigation. The Use of Geographic Information Systems and Spatial Analysis in Describing Patterns of Prehospital Response to High-Acuity Trauma in Howard County, Maryland.
- 9/22 Rebecca Ojo. Final dissertation defense for DrPH, Johns Hopkins Bloomberg School of Public Health. Health Policy and Management. Organizational Risk Tolerance: Characterizing the Impact of

System-Level Factors on Diagnostic Uncertainty and Decision Making.

Training grant participation

- 4/16-present Johns Hopkins Research Training Program in Biomedical Informatics and Data Science (National Library of Medicine [NLM] T15 training grant). Division of Health Sciences Informatics, Johns Hopkins University School of Medicine.
- 9/22-present Johns Hopkins “Mentored Research Pathway for Otolaryngology Residents and Medical Students” (National Institute on Deafness and Other Communication Disorders [NIDCD] R25 training grant, PIs John Carey and Amanda Lauer). Department of Otolaryngology Head and Neck Surgery, Johns Hopkins University School of Medicine.

Educational Program Building/Leadership

This section describes educational program building and leadership roles within the Johns Hopkins University School of Medicine (JHUSOM). Individual didactic lectures given in these courses are listed in the sections above and are considered as part of the aggregate total teaching and educational program building hours listed below.

7/02-7/10 Total Teaching & Educational Program Building (since joining JHUSOM faculty 7/02)
>1000 hours of face-time didactic classroom teaching and mentoring of medical students
>4000 hours of academic administration and curriculum development activities

2005-2010 Total Effort and Internal Funding for Teaching & Educational Program Building
JHU SOM: 22% (1/05 – 6/07); 40% (7/07 – 6/08); 66% (7/08 – 6/10); 28% (7/10-11/10)
Dept Neurology: 2.5-20% (7/02 – 6/10)

Course, Section/Block, & Strand Directorships (dates, name of educational program or curriculum, role)

- 9/02-7/10 JHU SOM 3rd-Year Neurology Clinical Clerkship; Course Length: 4 weeks, 10 cycles per year
Role: Clerkship Director (with E. O’Hearn 9/02-10/06, then B. Murinson 10/06-10/07)
- 9/02-7/10 JHU SOM 4th-Year Neurology Sub-Internship; Course Length: 4 weeks, year round
Role: Sub-Internship Director (with E. O’Hearn 9/02-10/06, then B. Murinson 10/06-10/07)
- 9/02-7/10 JHU SOM 4th-Year Neurology Elective; Course Length: 2-4 weeks, year round
Role: Neurology Elective Director (with E. O’Hearn 9/02-10/06, then B. Murinson 10/06-10/07)
- 1/03-12/09 JHU SOM 2nd-Year Pathophysiology Course, Neuro Block; Course Length: 2 weeks, 1 cycle/year
Role: Block Director (with Justin McArthur 2003-5, sole director thereafter)
Dates in Role: 1/03-12/09 (course combined with first-year neuroscience thereafter)
- 10/05-7/10 JHU SOM 1st-Year Genes to Society Course, Nervous System & Special Senses Section;
Course Length: 7 weeks, 1 cycle per year
Role: Section Curriculum Designer, Section Director
Dates in Role: 10/05-7/10 (planning 2005-2010, section first offered April-June, 2010)
- 10/05-11/10 JHU SOM 2nd-Year Transition to the Wards Course; Course Length: 4 weeks, 1 cycle per year
Role: Course Curriculum Designer, Course Director
Dates in Role: 10/05-11/10 (planning 10/05-12/09, first offered January-March, 2010)
- 3/07-12/10 JHU SOM 1st-4th Clinical Reasoning Horizontal Strand
Course Length: n/a (oversight across multiple courses throughout 4-year curriculum)
Role: Strand Developer, Strand Director
Dates in Role: 3/07-12/10 (planning 3/07-8/09; first implementation AY 2009-10)

Other Educational Program-Building and Curricular Activities

- 6/02 JHU Dept Medicine, ACGME Medical Residency Curriculum Workshop Participant
- 7/02-8/02 Accelerera Corporation/Astra Zeneca Corporation. Medical education video for migraine; content developer and actor
- 3/08-7/10 Developer of the Diagnostic Safety Curriculum (a component of the larger Patient Safety Curriculum) for the Neurology Basic Clerkship

Educational Extramural Sponsorship

- Current None
- Pending None

Previous

- 8/13/07-10/12/07 Neuroscience Teaching Fellowship (University of Rochester)

American Neurological Association (ANA) Teaching Fellowship
\$5,000
PI: Ralph Józefowicz, M.D.
Role: Teaching Fellow; 17% (9-week preceptorship)

1/1/09-12/31/09 The Complaint-Focused Neurologic History & Physical:
“20 Questions” Diagnostic Gaming to Build Diagnostic Reasoning Skills — Software Platform
Development & Pilot Testing in Clerkship Students
American Academy of Neurology (AAN) Education Research Grant
\$10,000
Role: PI; 2.5% (unfunded); Misdiagnosis of neurological conditions is common in frontline
healthcare settings. Prevention of morbidity from neurologic misdiagnosis requires diagnostic
education of non-neurologists. Passive forms of teaching (e.g., traditional lecture) have not been
shown to change physician behavior. Computer-based diagnostic case simulation capitalizes on
active engagement, repetition, and competition to solidify learning. Fully-adaptive, screen-based
simulators are prohibitively expensive. We believe intermediate solutions should capitalize on
extended multiple choice formats to offer educational interactivity at low programming cost.
Creation of an intermediate user (case developer) interface would enable rapid deployment of
new cases. We propose to build such a shell and populate it with cases related to a single “model”
symptom (dizziness), then pilot test the system’s usability and efficacy among medical students
during a neurology clerkship. The software platform will enable diagnostic case-scenario gaming
using a “20-questions” paradigm (e.g., “each element of history or exam you select costs time;
you have 20 minutes to make the correct diagnosis”).

CLINICAL ACTIVITIES

Certification

Medical, other state/government licensure

1999-2001 Massachusetts State Medical License, #159354
5/24/99-7/1/00 Massachusetts MCSR (5/24/99-7/1/00, #MT0372045A)
2001-present Maryland State Medical License #D57112
2001-2020 Maryland CDS, #M51768
1999-2017 Federal DEA License, #FN2763729 (prior #BT6325826)

Boards, other specialty certification

2000 American Board of Psychiatry and Neurology Diplomate (certified 4/00; recertified 2/11; #48337)

Clinical (Service) Responsibilities

2001-2005 Neuro-otology & Neuro-ophthalmology, outpatient clinic attending, 0.5 days per week
2002-2010 Neurology, inpatient attending, 4 weeks per year
2010-2014 Neurology, international, variable (up to 2 weeks per month; 2014, total ~12 weeks)
2017-present Neuro-otology, ‘tele-dizzy’ attending for JHM emergency department consults (variable)

Clinical Program Building/Leadership

2014-2015 Co-Director, Vestibular Division, Dept Neurology, The Johns Hopkins University School of
Medicine
2015-present Director, Division of Neuro-Visual and Vestibular Disorders (formerly “Vestibular Division”), Dept
Neurology, The Johns Hopkins University School of Medicine

Clinical Extramural Sponsorship

None

SYSTEM INNOVATION & QUALITY IMPROVEMENT ACTIVITIES

Innovation & QI Publications (*also included in research & educational publications above, number listed*)

Research Publications Original Science Publications (* = corresponding author)

1. **(RP #15)** Saber Tehrani AS, Lee HW, Mathews SC, Shore A, Makary M, Pronovost PJ, **Newman-Toker DE***. 25-year summary of US malpractice claims for diagnostic errors 1986-2010: an analysis from the National Practitioner Data Bank. *BMJ Qual Saf.* 2013 Aug;22(8):672-80.
2. **(RP #17)** Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, **Newman-Toker DE***. Rising annual costs of dizziness presentations to US emergency departments. *Acad Emerg Med.* 2013 Jul;20(7):689-96.
3. **(RP #22)** **Newman-Toker DE***, Moy E, Valente E, Coffey R, Hines A. Missed diagnosis of stroke in the emergency department: a cross-sectional analysis of a large population-based sample. *Diagnosis* 2014 Apr;1(2):155-166. Available at: <http://www.degruyter.com/view/j/dx.2014.1.issue-2/dx-2013-0038/dx-2013-0038.xml>.
4. **(RP #27)** Moy E, Barrett M, Coffey R, Hines A, **Newman-Toker DE**. Missed diagnoses of acute myocardial infarction in the emergency department: variation by patient and facility characteristics. *Diagnosis* 2015 Feb;2(1):29-40.
5. **(RP #28)** Cifra CL, Jones KL, Ascenzi JA, Bhalala US, Bembea MM, **Newman-Toker DE**, Fackler JC, Miller MR. Diagnostic errors in a PICU: insights from the morbidity and mortality conference. *Pediatr Crit Care Med.* 2015 Jun;16(5):468-76.
6. **(RP #31)** Thomas DB, **Newman-Toker DE***. Diagnosis is a team sport—partnering with allied health professionals to reduce diagnostic errors: a case study on the role of a vestibular therapist in diagnosing dizziness. *Diagnosis.* 2016 Jun 1;3(2):49-59.
7. **(RP #33)** Dumitrascu OM, Torbati S, Tighiouart M, **Newman-Toker DE**, Song SS. Pitfalls and rewards for implementing ocular motor testing in acute vestibular syndrome. *Neurologist.* 2017 Mar;22(2):44-47. [ISI JIF 2012 = 1.5]
8. **(RP #34)** **Newman-Toker DE***, Austin JM, Derk J, Danforth M, Graber ML. Are health care provider organizations ready to tackle diagnostic error? A survey of Leapfrog-participating hospitals. *Diagnosis.* 2017; 4(2): 73–78. DOI: [10.1515/dx-2016-0048](https://doi.org/10.1515/dx-2016-0048) [ISI JIF N/A]
9. **(RP #36)** Liberman AS, **Newman-Toker DE***. Symptom-Disease Pair Analysis for Diagnostic Error (SPADE): A conceptual framework and methodological approach for unearthing misdiagnosis-related harms using big data. *BMJ Quality and Safety.* 2018 Jul;27(7):557-566.
10. **(RP #37)** Mane KK, Rubenstein KB, Nassery N, Sharp AL, Shamim EA, Sangha NS, Hassoon A, Fanai M, Wang Z, **Newman-Toker DE***. Diagnostic performance dashboards: tracking diagnostic errors using big data. *BMJ Qual Saf.* 2018;27(7):567-70.
11. **(RP #39)** Gleason KT, Peterson S, Kasda E, Rusz D, Adler-Kirkley A, Wang Z, **Newman-Toker DE**. Capturing diagnostic errors in incident reporting systems: value of a specific ‘DX Tile’ for diagnosis-related concerns. *Diagnosis* 2018 Nov 27;5(4):249-251.
12. **(RP #40)** **Newman-Toker DE**, Schaffer AC, Yu-Moe CW, Nassery N, Saber Tehrani AS, Clemens GD, Wang Z, Zhu Y, Fanai M, Siegal D. Serious misdiagnosis-related harms in malpractice claims: the “Big Three” – vascular events, infections, & cancers. *Diagnosis (Berl).* 2019 Aug 27;6(3):227-240. Corrigendum to: Serious misdiagnosis-related harms in malpractice claims: The “Big Three” - vascular events, infections, and cancers. *Diagnosis (Berl).* 2020 May 16;8(1):127-128.
13. **(RP #41)** Liberman AL, Skillings J, Greenberg P, **Newman-Toker DE**, Siegal D. Breakdowns in the patient-provider encounter are a frequent source of diagnostic error among ischemic stroke cases included in a large medical malpractice claims database. *Diagnosis (Berl).* 2020 Jan 28;7(1):37-43.
14. **(RP #42)** **Newman-Toker DE***, Wang Z, Zhu Y, Nassery N, Saber Tehrani AS, Schaffer AC, Yu-Moe CW, Clemens GD, Fanai M, Siegal D. Rate of diagnostic errors and serious misdiagnosis-related harms for major vascular events, infections, and cancers: toward a national incidence estimate using the “Big Three.” *Diagnosis (Berl).* 2020 May 14;8(1):67-84.
15. **(RP #43)** Sharp AL, Baecker A, Nassery N, Park S, Hassoon A, Lee MS, Peterson S, Pitts S, Wang Z, Zhu Y, **Newman-Toker DE**. Missed acute myocardial infarction in the emergency department — standardizing measurement of misdiagnosis-related harms using the SPADE method. *Diagnosis (Berl).* 2020 Jul 24;8(2):177-186.

16. **(RP #44)** Gleason K, Dennison Himmelfarb CR, Wynna T, Villanuevaa M, Bondala P, Peterson S, Berg D, Jerde W, **Newman-Toker D**. Feasibility of patient-reported diagnostic errors following emergency department discharge: a pilot study. *Diagnosis (Berl)*. 2020 Oct 5;8(2):187-192.
17. **(RP #48)** Nassery N, Horberg MA, Rubenstein KB, Certa JM, Watson E, Somasundaram B, Shamim E, Townsend JL, Galiatsatos P, Pitts SI, Hassoon A, **Newman-Toker DE**. Antecedent treat-and-release diagnoses prior to sepsis hospitalization among adult emergency department patients: a look-back analysis employing insurance claims data using Symptom-Disease Pair Analysis of Diagnostic Error (SPADE) methodology. *Diagnosis (Berl)*. 2021 Feb 25;8(4):469-478.
18. **(RP #49)** Kotwal S, Fanai M, Fu W, Wang Z, Bery AK, Omron R, Tevzadze N, Gold G, Garibaldi BT, Wright SM, **Newman-Toker DE**. Real-world virtual patient simulation to improve diagnostic performance through deliberate practice: a prospective quasi-experimental study. *Diagnosis (Berl)*. 2021 Mar 8;8(4):489-496.
19. **(RP #50)** Horberg MA, Nassery N, Rubenstein KB, Certa JM, Shamim EA, Rothman R, Wang Z, Hassoon A, Townsend JL, Galiatsatos P, Pitts SI, **Newman-Toker DE**. Rate of sepsis hospitalizations after misdiagnosis in adult emergency department patients: a look-forward analysis with administrative claims data using Symptom-Disease Pair Analysis of Diagnostic Error (SPADE) methodology in an integrated health system. *Diagnosis (Berl)*. 2021 Apr 26. doi: 10.1515/dx-2020-0145.
20. **(RP #51)** Chang TP, Bery AK, Wang Z, Sebestyen K, Ko YH, Liberman AL, **Newman-Toker DE**. Stroke hospitalization after misdiagnosis of "benign dizziness" is lower in specialty care than general practice: a population-based cohort analysis of missed stroke using SPADE methods. *Diagnosis (Berl)*. 2021 Jun 21;9(1):96-106.
21. **(RP #52)** Ellenbogen MI, Prichett L, **Newman-Toker DE**, Brotman DJ. Characterizing the relationship between diagnostic intensity and quality of care. *Diagnosis (Berl)*. 2021 Jul 14;9(1):123-126.
22. **(RP #53)** Liberman AL, Hassoon A, Fanai M, Badihian S, Rupani H, Peterson SM, Sebestyen K, Wang Z, Zhu Y, Lipton RB, **Newman-Toker DE**. Cerebrovascular disease hospitalizations following emergency department headache visits: A nested case- control study. *Acad Emerg Med*. 2022 Jan;29(1):41-50.
23. **(RP #54)** Zhu Y, Wang Z, Liberman AL, Chang TP, **Newman-Toker D**. Statistical insights for crude-rate-based operational measures of misdiagnosis-related harms. *Stat Med*. 2021 Sep 10;40(20):4430-4441.
24. **(RP #55)** Sharp AL, Pallegadda R, Baecker A, Park S, Nassery N, Hassoon A, Peterson S, Pitts SI, Wang Z, Zhu Y, **Newman-Toker DE**. Are mental health and substance use disorders risk factors for missed acute myocardial infarction diagnoses among chest pain or dyspnea encounters in the emergency department? *Ann Emerg Med*. 2022 Feb;79(2):93-101.

Original Science Publications: Systematic Reviews (* = *corresponding author*)

1. **(SR #5)** Winters B, Custer J, Galvagno SM, Jr., Colantuoni E, Kapoor SG, Lee H, Goode V, Robinson K, Nakhasi A, Pronovost P, **Newman-Toker D**. Diagnostic errors in the intensive care unit: a systematic review of autopsy studies. *BMJ Qual Saf*. 2012;21(11):894-902. [ISI JIF 2012 2.4]
2. **(SR #6)** Custer JW, Winters BD, Goode V, Robinson KA, Yang T, Pronovost PJ, **Newman-Toker DE**. Diagnostic errors in the pediatric and neonatal intensive care unit: a systematic review. *Pediatr Crit Care Med*. 2015 Jan;16(1):29-36. [ISI JIF 2012 = 2.4]
3. **(SR #8)** Tarnutzer AA, Lee SH, Robinson KA, Wang Z, Edlow JA†, **Newman-Toker DE*†**. Emergency department misdiagnosis of cerebrovascular events in the era of modern neuroimaging: a meta-analysis. *Neurology*. 2017 Apr 11;88(15):1468-1477 [ISI JIF 2008 = 7.0] (†*Co-senior authorship*)

Peer-Reviewed (e.g. consensus statements, expert opinions) (* = *corresponding author*)

1. **(EP #2)** **Newman-Toker DE***, Pronovost PJ. Diagnostic errors: the next frontier for patient safety. *JAMA* 2009 Mar; 301(10):1060-62.
2. **(EP #5)** Weaver SJ, **Newman-Toker DE**, Rosen MA. Cognitive skill decay and diagnostic error: best practices for continuing education in healthcare. *J Contin Educ Health Prof* 2012 Sep;32(4):269-78.
3. **(EP #8)** **Newman-Toker DE***, McDonald KM, Meltzer DO. How much diagnostic safety can we afford... and how should we decide? A health economics perspective. *BMJ Qual Saf* 2013 22 Suppl 2 (2013), ii11-ii20.
4. **(EP #9)** **Newman-Toker DE***. A unified conceptual model for diagnostic errors: underdiagnosis, overdiagnosis, and misdiagnosis. *Diagnosis* 2014 1(1): 43-48.
5. **(EP #14)** Rao G, Epner PL, Bauer V, Solomonides A, **Newman-Toker DE**. Identifying and analyzing diagnostic paths: a new approach for studying diagnostic practices. *Diagnosis*. 2017 Jun 27;4(2):67-72.

6. **(EP #15)** Gleason KT, Davidson PM, Tanner EK, Day J, Sawyer M, Baker D, Baptiste D, Paine L, Rushton C, Dennison Himmelfarb CR, **Newman-Toker DE**. The critical role of nurses in diagnostic error prevention: a conceptual framework and a call to action. *Diagnosis*. 2017 Nov 27;4(4):201-210.
7. **(EP #16)** Berger ZD, Brito JP, Ospina NS, Kannan S, Hinson JS, Hess EP, Haskell H, Montori VM, **Newman-Toker DE**. Patient-centered diagnosis: sharing diagnostic decisions with patients in clinical practice. *BMJ*. 2017 Nov 1;359:j4218.
8. **(EP #17)** Pronovost PJ, Miller J, **Newman-Toker DE**, Ishii L, Wu, AW. We should measure what matters in bundled payment programs. *Ann Intern Med*. 2018 May 15;168(10):735-736.
9. **(EP #18)** Omron R, Kotwal S, Garibaldi B, **Newman-Toker DE**. The diagnostic performance feedback “calibration gap”—why clinical experience alone isn’t enough to prevent serious diagnostic errors. *Acad Emerg Med Educ Train* 2018 Sep 17;2(4):339-342.
10. **(EP #20)** Stunkel L, **Newman-Toker DE**, Biousse V. Diagnostic error of neuro-ophthalmic conditions—state of the science. *J Neuroophthalmol*. 2021 Mar 1;41(1):98-113.
11. **(EP #22)** Yousef EA, Sutcliffe KM, McDonald KM, **Newman-Toker DE**. Crossing Academic Boundaries for Diagnostic Safety: 10 Complex Challenges and Potential Solutions From Clinical Perspectives and High-Reliability Organizing Principles. *Hum Factors*. 2022 Feb;64(1):6-20.

Invited Reviews/Other Invited Articles

1. **(IR #3) Newman-Toker DE***, Pham JC, Winters BD, Pronovost PJ. Diagnostic errors in critical care settings – managing information overload. *ICU Management* 2009 Summer; 9(2):6-11.
2. **(IR #5) Newman-Toker DE***. Pitfalls in diagnostic reasoning in neurology. *Journal Watch Neurology*, September, 2010; (<http://neurology.jwatch.org/cgi/content/full/2010/907/2>).
3. **(IR #7) Newman-Toker DE***. From Possible to Probable to Sure to Wrong—Premature Closure and Anchoring in a Complicated Case. *AHRQ Web M&M. Morbidity & Mortality Rounds on the Web*, April, 2013; (<http://www.webmm.ahrq.gov/case.aspx?caseID=297>).
4. **(IR #8)** Lee CS, Nagy PG, Weaver SJ, **Newman-Toker DE**. Cognitive and system factors contributing to diagnostic errors in radiology. *AJR Am J Roentgenol* 2013 Sep;201(3):611-7.
5. **(IR #11)** Kerber KA, **Newman-Toker DE**. Misdiagnosing dizzy patients: common pitfalls in clinical practice. *Neurol Clin*. 2015 Aug;33(3):565-75, viii.
6. **(IR #18)** Saber Tehrani AS, Kattah JC, Kerber KA, Gold DR, Zee DS, Urrutia VC, **Newman-Toker DE**. Diagnosing stroke in acute dizziness and vertigo: pitfalls and pearls. *Stroke*, 2018 Mar;49(3):788-795.

Editorials

1. **(ED #1) Newman-Toker DE***, Makary MA. Measuring diagnostic errors in primary care – the first step on a path forward. *JAMA Intern Med*. 2013 Mar 25;173(6):425-6.
2. **(ED #2) Newman-Toker DE***, Edlow JA. High-stakes diagnostic decision rules for serious disorders: the Ottawa subarachnoid hemorrhage rule. *JAMA*. 2013 Sep 25;310(12).
3. **(ED #3) Newman-Toker DE***, Perry JJ. Acute diagnostic neurology: challenges and opportunities. *Acad Emerg Med*. 2015 Mar;22(3):357-61.
4. **(ED #4)** Gold D, **Newman-Toker DE**, Sharfstein JM. Neurology and the affordable care act. *JAMA Neurol*. 2015 Apr 20. doi: 10.1001/jamaneurol.2015.0083. [Epub ahead of print] PubMed PMID: 25894461.
5. **(ED #6) Newman-Toker DE***. Missed stroke in acute vertigo and dizziness: It is time for action, not debate. *Ann Neurol*. 2016 Jan;79(1):27-31.
6. **(ED #7) Newman-Toker DE***. Where is the ‘low-hanging fruit’ in diagnostic quality and safety? *Qual Saf Health Care*. 2018 Oct/Dec;27(4):234-236.
7. **(ED #8)** Wu A, Buckle P, Haut ER, Bellandi T, Koizumi S, Mair A, Øvretveit J, Power C, Sax H, Thomas EJ, **Newman-Toker D**, Vincent C. Supporting the emotional well-being of health care workers during the COVID-19 pandemic. *J Pat Safe Risk Manage*. 2020;25(3):93-96.
8. **(ED #10)** Edlow JA, Agrawal Y, **Newman-Toker DE**. Correct diagnosis for the proper treatment of acute vertigo-putting the diagnostic horse before the therapeutic cart. *JAMA Neurol*. 2022 Sep 1;79(9):841-843.

Letters, correspondence

1. **(LE #3) Newman-Toker DE***, Pronovost PJ. Diagnostic errors and patient safety – Reply. *JAMA* 2009 Jul; 302(3):259-260. [ISI JIF 2008 = 28.9]
2. **(LE #4) Newman-Toker DE***, Makary MA. Administrative overload as a cause of diagnostic error – Reply. *JAMA Intern Med* 173 (2013), 1927. [ISI JIF 2008 = 28.9]

3. **(LE #6)** Cifra CL, Jones KL, Bhalala US, Bembea MM, **Newman-Toker DE**, Fackler JC, Miller MR. Diagnostic errors in a PICU: insights from the morbidity and mortality conference – Reply. *Pediatr Crit Care Med*. 2015 Nov;16(9):896-7.
4. **(LE #7)** Thomas D, **Newman-Toker DE***. Avoiding 'HINTS positive/negative' to minimize diagnostic confusion in acute vertigo and dizziness. *J Acute Care Phys Ther* 2016;7(4):129-31. doi: 10.1097/jat.0000000000000042.
5. **(LE #8)** Gleason KT, Davidson PM, Dennison-Himmelfarb CR, Sawyer M, **Newman-Toker DE**. Don't forget the rest of the team – nurses and allied health professionals are needed to tackle diagnostic errors. *Ann Int Med* 2016 Oct 18;165(8):HO2-HO4 (web-only comment <http://annals.org.ezp.welch.jhmi.edu/aim/article/2569422/annals-hospitalists-inpatient-notes-reducing-diagnostic-error-new-horizon-opportunities>).
6. **(LE #9)** Liberman AL, Prabhakaram S, **Newman-Toker DE**. Response to “Psychiatric Hospitalization Increases Short-Term Risk of Stroke”. *Stroke*, 2017 Sep;48(9):e260.
7. **(LE #10)** Chang TP, **Newman-Toker DE**. The Link between BPPV and Sudden Hearing Loss in Administrative Data – Biological Basis or Diagnostic Deception? *Otology-Neurotology*, 2019 Jul;40(6):843-844.

Innovation & QI Efforts within JHM

2012-present **Diagnostic Safety, Quality, and Value Initiatives** (*see program building/leadership below*)

Innovation & QI Efforts Outside of JHM (*some also described elsewhere*)

2009-2012

Diagnostic Error in Medicine Conference (Planning Committee, Conference Chair)

I joined the Planning Committee for the 2nd Diagnostic Error in Medicine (DEM) conference in 2009. From 2010-2012 I served as Conference Chair and PI (5% effort) for the associated large conference grant (AHRQ R13HS019252) (Toronto [2010], Chicago [2011], Baltimore [2012]). Conference proceedings from my tenure as Chair were published in a supplement to the journal *BMJ Quality and Safety* (http://qualitysafety.bmj.com/content/22/Suppl_2.toc). The outcomes of this international conference effort were to (1) continue to grow the conference, which doubled in attendance (~115 to ~230) during my tenure as Chair, and has continued to grow and be held annually since then; (2) develop a Research Summit for key thought leaders in research related to diagnostic accuracy and error (*described below*); and (3) catalyze interest in medical misdiagnosis, which led to the founding of the Society to Improve Diagnosis in Medicine (*described below*).

2011-2021

Society to Improve Diagnosis in Medicine (Board of Directors, Committee Chair, Officer)

I am a founding member of SIDM and sit on its Board of Directors. I have served as Vice President of the Board (05/2017 – 09/2017), President-Elect (09/2017 – 10/2018), President (11/2018 – 10/2020), and Immediate Past President (11/2020-10/2021). I also served on the Policy Committee (Chair 2015-2018, member to present) and on the Research Committee (Chair 2012-2015, member to 2018) and the Research Training Fellowship Subcommittee. I commit ~2.5% unpaid effort to these initiatives. The outcomes of the society's efforts to date include (1) a robust committee infrastructure; (2) development of internet-based resources for educators (<http://www.improvediagnosis.org/?ClinicalReasoning>) and researchers (<http://www.improvediagnosis.org/?safetytoolkit>); (2) founding of the journal *Diagnosis* (DeGruyter, <http://www.degruyter.com/view/j/dx>); (3) initiation of a proposal for and fundraising campaign for an Institute of Medicine (IOM) report on Diagnostic Error in Healthcare (<https://www.iom.edu/Activities/Quality/DiagnosticErrorHealthCare.aspx>), which culminated in the publication of the National Academy of Medicine (NAM) report on Improving Diagnosis in Healthcare, September, 2015 (<http://www.nationalacademies.org/hmd/Reports/2015/Improving-Diagnosis-in-Healthcare.aspx>); and (4) new Congressional appropriations to support diagnostic safety and quality research and authorizing legislation for Centers of Diagnostic Excellence.

2012-present

Diagnostic Error in Medicine Research Summit (Summit Founder, Director, & Participant)

I initiated the annual Research Summit at the Diagnostic Error in Medicine meeting in 2012 and have served both as Director (2012, 2014) and as an invited participant (2013, 2015-present). The Summit is intended to identify research priorities, catalyze methods development, and spark collaborations related to diagnostic accuracy and error. A working group of 20-30 individuals has

collaborated to summarize the state of research in diagnostic error and opportunities for future advances through a workgroup structure that divides the problem into Burden, Causes, and Solutions (created under my leadership in 2014). The outcomes of this working group's efforts included publications, as well as outreach to engage organizations such as the Leapfrog group. In 2016, we began working with the Leapfrog Group to develop self-report measures and questions related to diagnostic safety for Leapfrog's annual safety survey of US hospitals; this has led to an initiative to construct diagnostic safety recommendations for hospitals engaged with Leapfrog.

2014-2015

IOM Report on Diagnostic Error in Healthcare (Proposal, Technical Expert)

As a member of SIDM's Board of Directors, we developed a strategic plan to garner national attention for this major public health problem by proposing an Institute of Medicine (IOM) report on the topic. After a successful proposal and fundraising campaign by SIDM, the IOM report was commissioned with co-sponsorship by the Agency for Healthcare Research and Quality, American College of Radiology, American Society for Clinical Pathology, Cautious Patient Foundation, Centers for Disease Control and Prevention, College of American Pathologists, The Doctors Company Foundation, Janet and Barry Lang, Kaiser Permanente National Community Benefit Fund at the East Bay Community Foundation, and the Robert Wood Johnson Foundation. I served as one of ~25 invited technical experts to the report, with a presentation to the committee in 8/14 (Washington, DC) focused on economic aspects of diagnostic errors. The published report from the National Academy of Medicine (NAM) on Improving Diagnosis in Healthcare (9/15) (<http://www.nationalacademies.org/hmd/Reports/2015/Improving-Diagnosis-in-Healthcare.aspx>) included more than 30 citations to my work, and incorporated my 'Unified Conceptual Model for Diagnostic Errors' (EP # 9) as an Appendix to the report.

2016-2017

Coalition to Improve Diagnosis (Committee Chair, Research Funding Collective Action)

The Coalition to Improve Diagnosis (CID), a group of nearly 40 major national healthcare stakeholders with a vested interest in improving diagnosis was convened by SIDM in 2015. In 2016, the group committed to three collective actions—raising awareness, identifying tools to improve diagnosis, and increasing research on diagnostic safety and quality. I have led the collective action on increasing research on diagnostic safety and quality. This included political advocacy work (raising Congressional awareness, working with donors, patients, and others to advocate for increased research funding and implementation of NAM report recommendations). In 2017, we secured Senate Appropriations bill language in support of this initiative, a major milestone in route to greater federal funding for diagnostic research.

2016-present

Society to Improve Diagnosis in Medicine Policy Action (Policy Committee Chair [2015-2018] and Member [2019 to present], Capitol Hill Advocate [2016 to present])

In my role as the Society to Improve Diagnosis in Medicine (SIDM) Policy Committee Chair, we began a concerted set of advocacy actions on Capitol Hill to help build Congressional support for Diagnostic Safety and Quality. Under my leadership as SIDM President (2018-2020), SIDM continued to apply and expand its policy action initiatives related on the research funding priority identified by the Coalition to Improve Diagnosis. The group published a white paper "Policy Roadmap" (<https://www.improvediagnosis.org/roadmap/>), and I began making routine visits to Capitol Hill to raise awareness alongside SIDM representatives. This led to a series of crucial successes for the field including (1) building awareness (Congressional briefings in both Senate [2018, 2021] and House [2019]); (2) annual appropriations for diagnostic error research directed to the Agency for Healthcare Research and Quality (AHRQ) beginning at \$2 million in 2018 and increasing year over year to \$8 million in 2022 to support 8 Diagnostic Centers of Excellence around the nation (<https://grants.nih.gov/grants/guide/rfa-files/RFA-HS-22-008.html>); and (3) authorizing legislation introduced to support sustained Congressional investments (Improving Diagnosis in Medicine Acts of 2019 [House], 2020 [Senate], 2022 [House, Senate]).

2016-2017

NQF Report on Improving Diagnostic Quality and Safety (Technical Expert)

I served as a member of the National Quality Forum's Improving Diagnostic Quality and Safety Committee, whose 1-year task was to develop a measurement framework for diagnostic quality

and safety. The committee's final report was published in September, 2017 (https://www.qualityforum.org/publications/2017/09/improving_diagnostic_quality_and_safety_final_report.aspx).

2018-2019 **NQF Report on Advancing Chief Complaint-Based Quality Measures (Technical Expert)**
I served as a member of the National Quality Forum's Advancing Chief Complaint-Based Quality Measurement Committee, whose 1-year task was to develop a measurement framework for chief complaint based measures in the ED. The committee's final report was published in 2019 (https://www.qualityforum.org/Publications/2019/06/Advancing_Chief_Complaint-Based_Quality_Measurement_Final_Report.aspx).

2018-present **NQF Avoid H.A.R.M. Quality Measure for Dizziness-Stroke (Measure Developer)**
I have led a measure development team that has been working to create a national quality metric for missed stroke in patients presenting with dizziness and vertigo. We began by developing a novel measurement method (Symptom-disease Pair Analysis of Diagnostic Error [SPADE]) to identify misdiagnosis-related harms from electronic health record or clinical billing code databases (PMID: 29358313). We then streamlined this approach to a readily operationalized numerator-denominator metric based on observed minus expected short-term stroke events. We call this the Avoid **H**ospitalization **A**fter **R**elease with a **M**isdiagnosis (Avoid H.A.R.M.) metric. Our measure has progressed to a third submission cycle to the National Quality Forum. On the first, it was rejected on quantitative grounds. We bolstered our analyses with national Medicare data and, on the second submission, the measure passed quantitative methods review, but was rejected by the clinical committee on the grounds of lack of sufficient evidence of an intervention that can 'move the needle.' We again bolstered our analyses with detailed new data on the impact of different forms of neuroimaging on patient harms as well as analyses to demonstrate enhanced measure precision using HCUP data. The revised measure will be resubmitted in January, 2023.

2019-2020 **NQF Report on Reducing Diagnostic Error: Measurement Considerations (Co-Chair)**
I served as one of two Co-Chairs of the National Quality Forum's Reducing Diagnostic Errors Committee, whose 1-year task was to refine the prior measurement framework for diagnostic safety and quality via specific use cases. The committee's final report was published in 2020 (https://www.qualityforum.org/Publications/2020/10/Reducing_Diagnostic_Error_Measurement_Considerations_-_Final_Report.aspx).

2021-2023 **NQF Neurology Standing Committee (Committee Member)**
I served as a member of the National Quality Forum's Neurology Standing Committee that oversees NQF's neurology measures. The committee reviews and provides guidance and recommendation to the NQF's Consensus Standards Approval Committee (CSAC) on new and renewal applications for neurology-related quality measures, including those for stroke.

Production of Guidelines and/or Protocols

2007-present **International Classification of Vestibular Disorders** (*also listed in publications, committees*)
Guideline/Protocol(s): Consensus Definitions/Diagnostic Criteria for Vestibular Symptoms & Disorders published in the Journal of Vestibular Research (JVR):

1. Vestibular Symptoms (senior author, JVR 2009);
2. Vestibular Migraine (senior author, JVR 2012, 2022);
3. Menière's disease (co-author, JVR 2015)
4. Benign Paroxysmal Positional Vertigo (BPPV) (co-author, JVR 2015)
5. Vestibular Signs: Nystagmus (senior author, JVR 2019)
6. Vascular Vertigo and Dizziness (second author, JVR 2022)
7. Acute Unilateral Vestibulopathy/Vestibular Neuritis (co-author, JVR 2022)
8. Vestibular Syndromes (lead author, in progress)

Role: International Working Group for Vestibular Disorders Classification of the International Bárány Society (member 2007-present; Co-Chair 2009-present); Effort: unpaid; Location(s) Adopted: ICD-11, vestibular migraine adopted by International Headache Society

Current Status: ongoing production, disease-by-disease (<http://www.jvr-web.org/Barany.html>)

2015 **American Academy of Neurology**
Guideline/Protocol(s): Guideline for Eye Movement Assessment of Acute Dizziness/Vertigo
Role: proposer; Effort: unpaid; Location(s) Adopted: n/a
Current Status: approved for development, but never launched

2021-present **Society for Academic Emergency Medicine**
Guideline/Protocol(s): GRACE3 Guideline for Diagnosis of Acute Dizziness in the ED
Role: committee member, subcommittee member; Effort: unpaid; Location(s) Adopted: pending
Current Status: in progress (publication expected early 2023)

Innovation & QI Program Building/Leadership

2012-2015 Diagnostic Safety, Quality, and Value Initiatives (AI Lead)

I serve as a core faculty member of the Johns Hopkins Armstrong Institute for Patient Safety & Quality (AI) and sit on the AI Leadership Council. I am the leader for diagnostic safety, quality, and value initiatives at AI. I committed 10% paid effort (funded by AI) to these initiatives. The outcomes of these efforts were (1) diagnostic error presentations to the JHM Board of Trustees and at the JHM Patient Safety Summit; (2) initiation of three diagnostic clinical workgroups linked to improving diagnosis of cancer, infections, and vascular events; (3) creation of a methods core group within AI for serving the clinical communities with methods expertise, developing methods, and submitting grants; (4) pending grants for improving diagnostic safety; and (5) creation of the AI Center for Diagnostic Excellence, described below.

2016-present Armstrong Institute Center for Diagnostic Excellence (Director)

The Armstrong Institute Center for Diagnostic Excellence is a novel resource within the Johns Hopkins Armstrong Institute for Patient Safety & Quality (AI). In July 2016, a founding \$5M philanthropic gift from Michael Armstrong officially launched the Center. The Center currently comprises three Clinical Workgroups dedicated to improving diagnosis of Cancer, Infections, and Vascular Events, as well as four Cores (Research Methods, Data Analytics, Team Science, and Education). The Center has both operational and research functions and is expected to expand to tackle misdiagnosis and inefficiency across the full clinical spectrum. At the Center, we envision a world where diagnoses are accurate, timely, and effectively communicated to patients, avoiding both diagnostic error and overdiagnosis. We see a future in which diagnostic processes are patient-centered, evidence-based, prompt, efficient, safe, and equitable. The Center's long-range goals to achieve this vision of Diagnostic Excellence include catalyzing efforts to (1) improve current diagnostic performance by raising awareness, engaging partners, prioritizing problems, implementing solutions, and measuring the impact of new diagnostic strategies; (2) develop the science of diagnostic safety by creating novel methods, metrics, and tools to improve diagnosis; and (3) enhance diagnostic research by building training capacity, organizing collaborative networks, and influencing funding policy. Over the 5-year period from 2018 to 2022, the Center secured grants worth more than \$10 million in total costs from federal and foundation sources. These included a \$4 million AHRQ R18 Center of Excellence grant (2022, PI Newman-Toker), three other sizeable grants (\$1.6 to \$2.5 million total costs) with Dr. Newman-Toker as PI, and multiple smaller grants for junior faculty, including three K or other career development awards.

Innovation & QI Extramural Sponsorship (*also listed above under Research Extramural Sponsorship*)

Current (in Reverse Chronological Order)

9/30/22-9/29/26 Armstrong Institute Center for Diagnostic Excellence-Pursuing Scalable System-Level Diagnostic Quality, Value and Equity by Applying Safety Science to Emergency Department Diagnosis
R18 HS 029350
Agency for Healthcare Research and Quality (AHRQ)

\$3,999,993

PIs: Newman-Toker D, McDonald K

Role: PI, 13%. This program supports our Center for Diagnostic Excellence at Johns Hopkins in its pursuit of improved ED diagnostic quality and safety by integrating Safety I and Safety II principles to eliminate preventable misdiagnosis-related harms.

- 10/26/21-12/31/22 National Diagnostic Performance Dashboard to Measure and Track Diagnostic Error Using Big Data
#5756 (Supplement)
Gordon & Betty Moore Foundation
\$221,419 (Supplement)
Role: PI, 4%. This study seeks to develop and disseminate novel measures for misdiagnosis-related harms for stroke, myocardial infarction, and sepsis. It will also build new informatics tools and statistical methods to facilitate exploratory data analysis to identify similar future measures for other disease states using the SPADE method.
- 9/15/21-3/14/23 Automated Vestibular Diagnosis Using Video-Oculography
Fox Squirrel Project
Natus, Incorporated
\$2,521,365
Role: PI, 30%. This study will develop an algorithm to automate expert VOG-based diagnosis of vestibular disorders & stroke.
- 11/21/20-12/31/22 Virtual Patient Education from Real Cases (ViPER) to Improve ED Diagnosis
DXQI Seed Grant
Society to Improve Diagnosis in Medicine (SIDM)
\$50,000
PI: Kotwal S
Role: Co-I, 0%. This study measures the impact of simulation-based education on ED diagnosis of dizziness.
- 7/1/20-6/30/24 Towards a National Diagnostic Excellence Dashboard—Partnering with Stakeholders to Construct Evidence-Based Operational Measures of Misdiagnosis-Related Harms
R01 HS27614
Agency for Healthcare Research and Quality (AHRQ)
\$1,598,351
Role: PI, 20-25%. This study seeks to leverage stakeholder input and Medicare claims analysis to develop the first NQF-endorsed measure of misdiagnosis-related harms for the symptom-disease pair of dizziness and stroke.
- 4/1/20-3/31/24 Center for Mobile Technologies to Achieve Equity in Cardiovascular Health (mTECH Center)
Strategically Focused Research Network 20SFRN35380046
American Heart Association (AHA)
\$2,500,000
PIs: Martin S, Newman-Toker D
Role: Co-PI, 15-20%. The Center will complete multiple projects related to reduce health disparities for stroke and cardiovascular diseases through the use of mobile technologies.
- 7/1/19-6/30/24 The Misdiagnosis of Cerebrovascular Disease in Emergent Headache Evaluations
K23 NS107643
NIH / National Institute for Neurological Disorders and Stroke (NINDS)
\$2,500,000
PIs: Liberman A
Role: Mentor, 0%. This study extends prior work in misdiagnosis of dizziness to develop novel measures for misdiagnosis-related harms for stroke in patients presenting with headaches.

9/30/18-7/31/23 Connected Emergency Care Patient Safety Learning Lab (CEC-PSLL)
R18 HS026640
Agency for Healthcare Research and Quality (AHRQ)
\$2,435,861
PIs: Levin S, Hinson J
Role: Co-Investigator, 5%; The CEC-PSLL seeks to reduce health and financial harm for patients with lower respiratory tract infection caused by a fragmented emergency care system. We intend to support and improve decision-making by emergency clinicians that relates to diagnosis, treatment, and disposition of patients with respiratory tract infections. This will be achieved through the development of clinical decision support tools that can be integrated into the electronic health record and easily shared among medical institutions.

Pending

1/1/25-12/31/30 **V.E.R.T.I.G.O. Trial** – **V**estibular **E**mergency **R**oom **T**eleconsults vs. **I**maging for better dia**G**nostic **O**utcomes
Patient Centered Outcomes Research Institute (PCORI)
\$30,940,669
Role: PI, 50%; This stepped wedge comparative effectiveness trial will compare remote, device-based tele-dizzy subspecialty consultations to best-available imaging their direct impact on emergency department diagnosis and patient outcomes, including stroke and quality of life.

Previous (in Chronological Order)

9/30/10-7/31/13 A Multiyear Grant to Support the Diagnostic Error in Medicine (DEM) Annual Conference
R13 (R13HS019252)
AHRQ
\$265,444
Role: PI, Conference Chair; 5%; This large conference grant supported the annual international Diagnostic Error in Medicine meeting from 2010-2012 (Toronto, Chicago, Baltimore).

3/1/16-2/28/17 Diagnostic Performance Dashboard to Reduce Diagnostic Error & Enhance Value Using Big Data
N/A
Kaiser Permanente Mid-Atlantic & Johns Hopkins Medicine
\$65,000
Role: PI, 0%; This project seeks to develop a prototype diagnostic performance dashboard to monitor diagnostic process, outcomes, and value for diagnosing stroke in acute dizziness.

5/1/16-4/30/18 Cost Effectiveness of an MRI-First Strategy for Diagnosing Acute Dizziness and Vertigo
(NCE to 12/31/18) Society to Improve Diagnosis in Medicine (SIDM)
\$80,000
Role: PI, 0%; This cost-effectiveness modeling analysis seeks to establish the projected national costs and health benefits of using an ‘MRI-first’ strategy for diagnosing stroke in dizziness.

1/15/18-4/15/18 Identifying Top Targets for Diagnostic Error Reduction: A Multi-Method Study of “The Big 3”
Society to Improve Diagnosis in Medicine (SIDM)
\$40,000
Role: PI, 10%. This study seeks to develop estimates of the total burden of misdiagnosis-related harms from three major disease categories – vascular events, infections, and cancer and the individual diseases within them.

5/1/18-4/30/21 National Diagnostic Performance Dashboard to Measure and Track Diagnostic Error Using Big Data
Gordon & Betty Moore Foundation #5756U24

\$2,397,410

Role: PI, 25%. This study seeks to develop and disseminate novel measures for misdiagnosis-related harms for stroke, myocardial infarction, and sepsis. It will also build new informatics tools and statistical methods to facilitate exploratory data analysis to identify similar future measures for other disease states using the SPADE method.

- 7/1/18-12/31/19 Patients Assigned to Research Teams with Nurses and ER providers to Enhance Diagnosis (PARTNERED)
Eugene Washington Award
Patient Centered Outcomes Research Institute (PCORI)
\$249,974
PI: Peterson S
Role: Senior Co-Investigator, 5%; This grant seeks to build capacity among patients and nurses for engaging in patient-centered research to improve diagnosis in the emergency department.
- 1/1/19-1/15/22 Video-oculography-based Emergency Room Tele-consults to Improve diagnostic Outcomes – The V.E.R.T.I.G.O. Study
Coverys Community Healthcare Foundation
\$330,890 (\$299,880 extramural)
Role: PI, 5%; This quasi-experimental quality improvement implementation study is intended to scale our novel eye-movement based diagnostic approaches, extending tele-dizzy consultations to two community hospitals and assessing their direct impact on patient outcomes.
- 2/1/19-10/31/19 Identifying Top Targets for Diagnostic Error Reduction: A Multi-Method Study of “The Big 3” (Cost Extension / Second Grant)
Society to Improve Diagnosis in Medicine (SIDM)
\$40,000
Role: PI, 10%. This study seeks to extend work on estimates of the total burden of misdiagnosis-related harms from three major disease categories – vascular events, infections, and cancer and the individual diseases within them.
- 5/1/20-4/30/21 In-Home Diagnostic Triage via Smartphone Video Virtual Check-In for Potential Stroke Symptoms
COVID-19 Rapid Response
American Heart Association (AHA)
\$200,000
Role: PI, 5%. This project adapts an existing sub-specialty consultation service for diagnosing strokes among patients with acute dizziness and vertigo from the emergency department to patients’ homes via mobile phone technology.
- 6/1/20-5/30/21 Maturation of a Partially Developed Performance Measure of Stroke Misdiagnosis in Hospital EDs
Quality Measure Innovation Grant 30009-1044
AARP
\$125,000
PI: Austin M
Role: Co-I, 5%. The goal of this project is to build upon prior work in developing a hospital-level performance measure of stroke misdiagnosis for hospital emergency departments.
- 6/1/20-11/30/21 Diagnostic Errors in the Emergency Department
EPC VI Contract (Topic ID 503-4262)
Agency for Healthcare Research and Quality (AHRQ)
\$700,000
Role: PI, 20-25%. This contract is to conduct a systematic review of the frequency and causes of diagnostic error in the ED.

10/20/20-6/30/22 A Patient-Reported Measure of Diagnostic Excellence
 Gordon & Betty Moore Foundation
 \$500,000
 PI: Gleason K
 Role: Co-I, 0%. This study seeks to develop a patient-reported measure of excellence in ED diagnosis. Role: Co-Investigator.

ORGANIZATIONAL ACTIVITIES

Institutional Administrative Appointments

2002-2010	Educational Policy and Curriculum Committee (EPCC) & Related Committees (JHU SOM)
	9/02-11/10 EPCC Member
	9/02-7/10 EPCC Clerkship Directors' Subcommittee Member
	9/02-11/10 Student Promotions Committee Member [9/02-9/04, 10/07-11/10]
	2/03 Simulation Center Development Committee Member
	8/05-7/06 Student Assessment and Program Evaluation (SAPE) Committee Member
	10/05-9/13 Simulation Center Advisory Board Member
	12/06-11/10 Genes to Society Integration Committee Member
	12/07-7/1 GTS Course Block Leaders Committee Member
	1/08-3/09 Grading Policy Committee Member
	3/08-12/10 Horizontal Strand Leaders Committee Member
	9/09-11/10 EPCC Clinical Years' Subcommittee Member
3/02-12/09	2 nd Year Neuro Block Planning Committee Member/Leader (leader 1/03)
4/02	Neurology Faculty Career Development Working Group Member
9/02-7/10	Neurology Dept Education Committee Member
2003-2007	Curriculum Reform Committees (JHU SOM, CRC,)
	11/03-10/06 Clinical Sciences Subcommittee Member
	11/03-1/05 Technology in Education Subcommittee Member
	2/04-1/05 Basic Science Subcommittee Member
	3/04-1/05 Measurement Subcommittee Member
	1/05-11/05 Mind-Brain-Behavior Subcommittee Member/Leader
	9/05-1/06 CRC Steering Committee Member
	10/05-6/06 Transition to the Wards Planning Committee Chairman
	10/05-10/06 Educational Methods Subcommittee Member
	11/05-9/06 Genes to Society (GTS) Steering Committee Member
	6/07-8/07 Active Learning Strategies Committee Member
2/04-12/09	2 nd Year Pathophysiology Course Focus Group Member
1/08-11/10	Transition to the Wards Curriculum Committee Chairman
	9/08-11/10 TTW Systems to Symptoms-Transition Workgroup Leader
	9/08-11/10 TTW Outcomes Workgroup Member
6/08-7/10	Nervous System & Special Senses Curriculum Committee Chairman
	6/08-7/10 NSS Stakeholders Committee Member
	9/08-7/10 NSS Special Sensory & Motor Workgroup Leader
	9/08-7/10 NSS Anatomy Workgroup Member
	9/08-7/10 NSS Multi-System Diseases Workgroup Member
	9/08-7/10 NSS Neuroscience Labs Workgroup Member
	9/08-7/10 NSS Clinical Skills Workgroup Member
11/09-6/12	Johns Hopkins Bloomberg School of Public Health Committee on Academic Standards (representative from the Graduate Training Program in Clinical Investigation [GTPCI])
7/10-8/21	Johns Hopkins Bloomberg School of Public Health GTPCI Advisory Council
1/12-6/13	JHU SOM Armstrong Institute for Patient Safety & Quality Small Grants Committee
4/11-4/15	Johns Hopkins Bloomberg School of Public Health GTPCI Admissions Committee
11/11-12/15	JHU SOM Armstrong Institute for Patient Safety & Quality Leadership Council (<i>committee closed</i>)
11/11-9/16	JHU SOM Armstrong Institute for Patient Safety & Quality, Leader Diagnostic Safety & Quality
10/14-6/14	Co-Director, Vestibular Division, Johns Hopkins Hospital, Dept Neurology

10/14-present Division Directors' Committee, Johns Hopkins Hospital, Dept Neurology
7/15-present Director, Neuro-Visual & Vestibular Division, JHH, Dept Neurology
10/16-present Director, Center for Diagnostic Excellence, JHM, Armstrong Institute

Editorial Activities

Editorial Board appointments

2014-present *Diagnosis*: Diagnosis focuses on how diagnosis determines the quality of medical care, how it can be advanced, how it is taught, and how and why it can fail, leading to diagnostic errors.

Journal Reviewer

2001-present Annals of Neurology
2007-present Journal of Neuro-Ophthalmology
2008-present Neurology
2008-present Stroke
2009-present Journal of the Neurological Sciences
2009-present Journal of the American Medical Association (JAMA)
2009-present The Neurologist
2010-present Eye
2010-present Journal of Neurology
2011-present Journal of the American Medical Informatics Association (JAMIA)
2012-present Audiology & Neurotology
2012-present Lancet
2013-present JAMA Internal Medicine
2014-present European Journal of Neurology
2014-present Joint Commission Journal on Quality & Patient Safety
2014-present Journal of Vestibular Research
2014-present European Journal of Emergency Medicine
2014-present Academic Emergency Medicine
2014-present Annals of the New York Academy of Sciences (Ann NYAS)
2014-present Journal of Patient Safety
2015-present Annals of Emergency Medicine
2015-present Case Reports in Otolaryngology
2015-present BMJ Case Reports
2015-present Otology & Neurotology
2016-present Neurology Clinical Practice
2017-present BMJ Neurology
2017-present Cerebrovascular diseases
2018-present British Medical Journal
2018-present PLOS One
2018-present Archives of Case Reports

Book Peer Review Activities

2009 Ad Hoc Peer Reviewer, Oxford University Press

Education-Related Peer Review

6/07-10/12 Grant Reviewer, AAN Education Research Subcommittee
2/08-3/08 Reviewer for American Academy of Ophthalmology (AAO) curriculum (COMPASS project), 7 neuro-ophthalmology topics in ocular motility disorders

Advisory Committees, Review Groups/Study Sections

Advisory, Internal Review and Search Committees (JHU SOM)

11/03 Neuropathology Residency Training Program Review Committee Member
11/04-2/05 Clinical Skills Director Search Committee Member & Interviewer
3/09-6/10 Leadership Development Advisory Council (LDAC)

Applicant Interviewing, Selection Committees

- 11/01-present Undergraduate Applicant Alumni Interviewer, Yale University (*interviews some years*)
7/02-present Fellowship Applicant Interviewer, JHU Neurology Vestibular Division (*interviews some years*)
12/02-present Neurology Residency Applicant Interviewer, JHU Neurology (*interviews some years*)
2/10-present Masters in Medical Informatics Applicant Interviewer, JHU Division of Health Sciences Informatics (DHSI) (*interviews some years*)

Grant Peer Review Activities

- 4/07 Grant Reviewer, Career Development Award, Dept Emergency Medicine, JHU SOM
6/07-10/12 Grant Reviewer, American Academy of Neurology (AAN) Education Research Subcommittee
1/12 Grant Reviewer, Armstrong Institute for Patient Safety & Quality Small Grants, JHUSOM
6/12 Grant Reviewer, Veterans Health Administration – Patient Safety Centers of Inquiry (PSCI)
11/14 Grant Reviewer, Veterans Health Administration – Patient Safety Centers of Inquiry (PSCI)
7/19 Grant Reviewer, Agency for Healthcare Research and Quality – Special Emphasis Panel (SEP) for RFA-HS-19-002 – Using Data Analytics to Support Primary Care and Community Interventions to Improve Chronic Disease Prevention and Management and Population Health (R18)
6/20 Grant Reviewer, Agency for Healthcare Research and Quality – Healthcare Safety and Quality Improvement Research (HSQR), ad hoc committee reviewer (July 10, 2020)
8/20-7/22 Grant Reviewer, Agency for Healthcare Research and Quality – Healthcare Safety and Quality Improvement Research (HSQR), standing study section reviewer

Scientific Abstract/Presentation Peer Review Activities

- 11/09 Scientific Abstract Reviewer, Neuro-ophthalmology/Neuro-otology Topic Area, American Academy of Neurology Annual Meeting 2010, Toronto, ON.

Professional Societies

- 1992-1995 Physicians for a National Health Program
1998-present American Academy of Neurology (AAN)
 1998-present Active Member
 9/10-present Fellow
 10/03-7/10 Consortium of Neurology Clerkship Directors Member
 4/08-3/12 Work Group Leader – “Guidelines for Focused Neurologic Exams” (to develop specifications for teaching the focused neurologic examination to medical students)
 3/07-10/12 Education Research Subcommittee Member
 6/07-4/13 Undergraduate Education Subcommittee Member
 4/08 Subcommittee for Education of the Non-Neurologist Guest Member (committee sunsetted thereafter)
 4/08-7/10 Consortium of Neuroscience Course Directors (Leadership group)
 6/07-present A.B. Baker Section Member (*section focused on neurologic education*)
 4/14-present Neuro-Ophthalmology, Neuro-Otology (NONO) Section Member
2001-2003 American Federation for Medical Research (AFMR)
 10/02-10/03 Trainee Education Committee Member
2002-present North American Neuro-Ophthalmology Society (NANOS)
 2002-present Active Member
 2/05-present Web Education Committee Member
 8/08-present Web Education Vice Chair
 2/07-present NOVEL/NANOS Curriculum Committee Member
 3/08-present Fellow, NANOS
 11/10-06/16 NANOS AAN Committee Member
2003-2013 Society for Academic Emergency Medicine (SAEM)
 2003-2013 Associate Member (2003-2007, 2013)
 2006-2013 Neurologic Emergencies Interest Group (2006-2007, 2013)
2007-present International Bárány Society
 10/07-present International Working Group for Vestibular Disorders Classification Member

	6/09-present	Co-Chair, International Working Group for Vestibular Disorders Classification
	2010-present	Active Member
2009-present	American Neurological Association	
	2009-present	Active Member
	10/13	Health Services Research Special Interest Group Co-Chair (junior)
	10/14	Health Services Research Special Interest Group Co-Chair (senior)
2011-present	Society to Improve Diagnosis in Medicine (SIDM)	
	2011	Founding Member
	2011-present	Active Member
	2011-2021	Board of Directors
	2012-2015	Research Committee, Chair (inaugural, 11/12-10/15, member to 10/18)
	2015-2019	Research Training Fellowship Subcommittee
	2015-present	Policy Committee, Chair (inaugural, 12/15-10/18), member to present)
	2017 (May-Sep.)	Vice President, Board of Directors (2017)
	2017-2018	President-Elect, Board of Directors (2017-2018)
	2018-2020	President, Board of Directors (2018-2020)
	2020-2021	Immediate Past President, Board of Directors (2020-2021)

Conference Organizer, Session Chair

- 3/08 North American Neuro-Ophthalmology Society (NANOS) “Stroke Symposium” — Session Co-Moderator and Speaker, Orlando, FL
- 4/09 American Academy of Neurology (AAN) Session 4SS.020 “Neurologic Education” — Session Co-Chair, Seattle, WA
- 10/09 Diagnostic Error in Medicine 2009 Conference (2nd Annual) — DEM Planning Committee Member (7/08-10/10); Session Chair “Reducing Diagnostic Error: Next Steps – Research & Education”; Invited Speaker, Los Angeles, CA [*details listed below under invited extramural talks other than Grand Rounds*]
- 4/10 American Academy of Neurology (AAN) Session 8AC.007 “Neuro-Otology” — Course Director, Invited Speaker, Toronto, Ontario, Canada [*details listed above under CME instruction*]
- 10/10 International Diagnostic Error in Medicine Conference (3rd Annual, 2010) — DEM Conference Chair & Planning Committee Chair (10/09-10/10); Session Chair “Setting the Agenda for Diagnostic Errors Research” and “Can Evidence-Based Medicine Help Reduce Diagnostic Error?,” Toronto, Ontario, Canada
- 10/11 International Diagnostic Error in Medicine Conference (4th Annual, 2011) — DEM Conference Chair & Planning Committee Chair (10/10-10/11); 5 platform presentations, 3 panels, Chicago, IL
- 11/12 International Diagnostic Error in Medicine Conference (5th Annual, 2012) — DEM Conference Chair & Planning Committee Chair (10/11-11/12); 5 platform presentations, 1 panel, Baltimore, MD
- 11/12 International Diagnostic Error in Medicine Conference (5th Annual, 2012) — Director, Research Summit
- 9/14 International Diagnostic Error in Medicine Conference (7th Annual, 2014) — Director, Research Summit

Consultantships

- 9/09 World Health Organization (WHO) Patient Safety. External consultant on first draft of “Patient Safety Research Curriculum Guide.”
- 9/11 Institut de Recherche Pierre Fabre. External consultant regarding development of pharmacologic agents for treatment of acute vertigo.
- 4/12 Best Doctors, Inc. External consultant regarding clinical research protocols to study diagnostic errors.
- 4/19 Victorian Managed Insurance Authority (Melbourne, Australia). Consultant to report, “Reducing the risk of diagnostic error in Victoria’s hospitals” (2019).

RECOGNITION

Awards, Honors

Teaching Awards and Recognition

- 5/00 Harvard University, Massachusetts Eye & Ear Infirmary: Runner Up, Fellow of the Year Teaching Award
This prize is awarded annually by the MEEI Ophthalmology residents to the best teaching fellow across all Divisions of the Ophthalmology Dept.
- 5/04 JHMI, SOM: 2nd Runner Up, Teacher of the Year for the Basic Sciences, Class of 2006

- 4/05 JHMI, SOM: LCME School-Wide Self-Study Survey Report Citations:
“Pathophysiology Generally well received with no group lower than 50% satisfaction and 5 of 7 above 65% satisfaction. In particular, Renal and Neurology received excellent reviews. The quality of teaching in these sections was consistently complemented [sic] as outstanding. Michael Choi and David Newman-Toker were named again and again.”
“Neurology followed with a satisfaction level of 74.2% (behind Emergency Medicine 80.2% and Internal Medicine 75.0%, and ahead of Pediatrics 67.6%, Psychiatry 63.5%, Surgery 62.1%, Ambulatory Medicine 59.1%, Obstetrics & Gynecology 53.8%, and Ophthalmology 44.9%). It is currently approximately a 4 week rotation with 3 weeks of inpatient service or consult service and a week of outpatient Neurology. Students enjoyed the variety of inpatient and outpatient care seen—a week of outpatient medicine is built into the course. Students felt “very welcome” by the attendings and residents. There was much “personal attention.” The course director, David Newman-Toker, was highlighted for his “great advances” and teaching ability.”
- 5/05 JHMI, SOM: 2nd Runner Up, Teacher of the Year for the Basic Sciences, Class of 2007
This prize is awarded annually by JHU medical students to the best teacher in the basic science year 2.
- 5/06 JHMI, SOM: Runner Up, Teacher of the Year for the Clinical Sciences, Class of 2006
This prize is awarded annually by JHU medical students to the best teacher in the clinical years.
- 3/07 JHMI, SOM: Nominee, Teacher of the Year for the Basic Sciences, Class of 2009
This prize is awarded annually by JHU medical students to the best teacher in the basic science year 2.
- 5/07 JHMI, Wilmer Eye Institute: Neil R. Miller Faculty Teaching Award 2007
This prize is awarded annually by JHU medical students to the best faculty teacher in the Ophthalmology Basic Clerkship.
- 5/07 JHMI, SOM: Student Marshal, Class of 2007
This honor is awarded annually by medical students to five educators who had a significant impact on their 4-year experience.
- 8/07 Rochester University, Rochester, NY (8/07-10/07): American Neurological Association’s Teaching Scholar Program, Fellowship Recipient.
The purpose of this program is to train neurologists to become master teachers and administrators for integrated neuroscience curricula in medical school. One such fellowship is offered at the University of Rochester per year. The American Neurological Association grant provides a \$5000 stipend to support the faculty development experience (also listed under educational extramural funding).
- 1/08 Harvard University, Boston, MA (1/08-5/08): Harvard Macy Institute Educators in the Health Professions Program
“The mission of the Harvard Macy Institute is to create and foster a community of scholars who work to promote innovative change in medical education. The goal of the Educators in Health Professions Program is to enhance the professional development of physicians, basic scientists and other healthcare professionals as educators. The program combines five major themes: Learning and teaching, curriculum, evaluation, leadership, and information technology. The program provides a select group of 55 healthcare professionals with the knowledge base and skills to enhance their expertise in both conducting an educational project of their own design and taking a leadership role in the educational activities at their home institutions.”
- 2/08 AAN A.B. Baker Section on Neurologic Education: Teacher Recognition Certificate
This is an American Academy of Neurology recognition honoring outstanding teachers of Neurology, nominated from within their Dept.
- 5/12 Mayo Clinic Dept Neurology, Rochester, MN: Visiting Professor of Neurologic Education
“The Department of Neurology at Mayo each year invites an outstanding educator to visit our institution as a Visiting Professor of Neurologic Education (VPNE) to highlight the importance of excellence of teaching in Neurology. This year our selection committee has chosen you for this honor in (2012).”

Other Awards and Recognition

- 5/91 Yale University: Graduation *Cum Laude*, Molecular Biophysics & Biochemistry
- 5/95 University of Pennsylvania School of Medicine: William T. Fitts, Jr. Memorial Prize
“This prize is awarded to a graduating student for excellence in the surgery of trauma.”

- 7/03 NIH: Office of Behavioral & Social Sciences Research Scholarship for the NIH Summer Training Institute on the Design and Conduct of Randomized Clinical Trials Involving Behavioral Interventions (Airlie, VA)
“The objective of this program is to provide a thorough grounding in the conduct of randomized clinical trials to researchers and health professionals interested in developing competence in the planning, design, and execution of clinical trials involving behavioral interventions. Due to the limited number of spaces in the course, priority will be given to individuals who already have their Ph.D. or M.D. (or equivalent degrees) and have at least two years of subsequent research experience. Applicants should not yet have achieved a tenured position at their institution. Beyond these eligibility criteria we are seeking researchers who have demonstrated research potential and experience and who will clearly benefit from behavioral randomized controlled trial training.”
- 5/07 JHMI, BSPH: Delta Omega Honorary Society in Public Health, Alpha Chapter, Johns Hopkins Bloomberg School of Public Health
“The Chapter elects students, faculty, and alumni nominated by their peers for their scholarly achievements and contributions to the advancement of public health. Only students meeting the highest academic standards and endorsed by the faculty are eligible for membership, and only those demonstrating a potential for significant contribution to the field of public health are elected to the Society. Election to membership in Delta Omega recognizes not only merit but also encourages further excellence and devotion to public health.”
- 3/08 American Academy of Neurology Leadership Development Program, Subcommittee Participant by Nomination and Special Invitation (Washington, DC)
“This program is designed to identify and support future leaders of the American Academy of Neurology (AAN). Participation in this program will increase the knowledge of the AAN and provide improved understanding of the roles, responsibilities, key principles and disciplines for effective leadership in our organization. Participants include Members of the Board of Directors, Committee and Subcommittee Chairs, and 15 select Committee or Subcommittee Members who are nominated and compete by application to participate in the program.”
- 3/08 North American Neuro-Ophthalmology Society (NANOS) Fellow (Orlando, FL)
““Fellow” status is awarded to active NANOS members in good standing who are board-certified specialists, trained in neuro-ophthalmology with a chief interest in clinical practice, teaching, or research in this domain. Individuals must have attended at least five annual meetings and are required to have demonstrated special achievement in clinical neuro-ophthalmology.”
- 4/09 American Neurological Association (ANA) Active Member (Minneapolis, MN)
“I am very pleased to inform you that you have been elected to the American Neurological Association as an Active member. Your election was based on your substantial academic contributions to neurology and neuroscience, and your promise for continued leadership in the field. After rigorous review by the Membership Advisory Committee, the Council of the Association approved the final selection. As you may know, the ANA is the world’s oldest neurological society and one of the earliest academic societies in the United States. In addition to serving as a collegial organization of academic neurologists, the ANA is proud to publish a first tier journal, the Annals of Neurology, host an annual meeting of the highest quality, and engage in a range of activities essential for academic neurology and the development of academic careers.”
- 12/09 Stroke (journal): Stroke Progress and Innovation Award, 2nd prize (for ‘HINTS’ article Stroke, 2009)
““Innovation” is defined broadly; it can be a new approach, a new methodology, new interpretation of existing data or new data with far reaching implications. The prize... consists of a cash award of \$2,500US, a trophy and a travel grant... to attend the International Stroke Conference of the American Heart Association.”
- 8/10 Bárány Society: Election to Member Status (Reykjavik, Iceland)
Election to membership by committee review in this international society of neuro-otologists is granted to those who have demonstrated important contributions to the field of vestibular research or clinical neuro-otology and are recognized internationally for these contributions.
- 8/10 Bárány Society Young Scientist Award (Reykjavik, Iceland)
Three awards are given biannually to the most promising young scientists in the field of vestibular research.

- 11/11 Johns Hopkins Medicine Leadership Development Program (Baltimore, MD)
A select group of participants for this 1-year leadership skills training program is chosen from more than 100 nominees identified by Dept Directors and Johns Hopkins Medicine leaders.
- 5/12 ICF Core Sets for Vertigo consensus conference, in collaboration with the WHO (Kloster Seeon, Germany)
A select group of 50 international experts in vestibular disorders were invited to participate in this 3-day consensus conference on determining the attributes of patient-centered outcomes that should be measured in patients with vertigo, dizziness, and vestibular disorders. Core sets are developed in collaboration with the World Health Organization.
- 11/12 Society to Improve Diagnosis in Medicine's Medal of Service Award (Baltimore, MD)
Granted to an individual who has made substantial and lasting contributions to the mission of the Society to Improve Diagnosis in Medicine (SIDM) and to the growth and development of the organization itself.
- 10/16 Named the Inaugural Director of the Armstrong Institute Center for Diagnostic Excellence (Baltimore, MD)
The Center's Mission is to innovate to achieve diagnostic excellence and accountability for Johns Hopkins, the region, and the world by eliminating preventable harms from diagnostic errors, optimizing patient outcomes and experience in diagnosis, and reducing waste in diagnostic assessment..
- 5/17 Named Vice President, Society to Improve Diagnosis in Medicine (Chicago, IL)
Named the inaugural Vice President of the Board of Directors.
- 9/17 Named President-Elect, Society to Improve Diagnosis in Medicine (announced 10/10/17 in Boston, MA)
Named the inaugural President-Elect of the Board of Directors, to succeed the organization's Founding President, Mark Graber as the second President of the Society.
- 4/18 Named one of the "125 Hopkins Heroes" at Johns Hopkins Medicine (Baltimore, MD)
As part of the 125th anniversary celebration of Johns Hopkins Medicine, named one of 125 current faculty, fellows, postdocs, staff, and students in the School of Medicine community who serve as a shining example of our core values through their work: Excellence & Discovery (Be the best); Leadership & Integrity (Be a role model); Diversity & Inclusion (Be open); Respect & Collegiality (Be kind). The competition was open to all School of Medicine employees and learners (numbering more than 40,000).
- 11/18 Elected President, Society to Improve Diagnosis in Medicine (New Orleans, LA)
Named the first Elected President of the Board of Directors, following the Founder.
- 10/21 Selected to Receive a Maryland Endowment Match for the David Robinson Professorship (Baltimore, MD)
Endowments were made through the Maryland E-Innovation Initiative (MEI), a state program created to spur basic and applied research in scientific and technical fields at the colleges and universities.

Invited Talks and Panels

Grand Rounds (64 total: 10 local [L] [intramural], 10 regional [R], 36 national [N], 8 international [I])

1. 1/02 "Preventing Misdiagnosis of Dizzy Patients in the Emergency Department - Designing a Systematic Approach to Bedside Diagnosis," Dept Emergency Medicine, University of Florida Health Science Center, Jacksonville, FL (N)
2. 1/02 "Building a New Model for Diagnosis of ED Dizzy Patients," Dept Neurology, Massachusetts General Hospital, Boston, MA (*note, this was an abbreviated Grand Rounds presentation where selected former residents were allowed to present research discoveries*) (N)
3. 3/04 "A New Approach to Evaluation of the Dizzy Patient," Dept Emergency Medicine, Saint Agnes Hospital, Baltimore, MD (R)
4. 5/05 "21st Century Neuro-Otology: Towards Automated Triage of the E.D. Dizzy Patient," Dept Neurology, Hospital University of Pennsylvania, Philadelphia, PA (N)
5. 12/05 "Triage and Initial Management of the Acutely Dizzy Patient," Dept Emergency Medicine, NewYork-Presbyterian Hospital, New York, NY (N)
6. 11/05 "Skew Deviation & the OTR. *Extra 'steps' and the old 'new' language of vertical & cyclovertical strabismus*" Moran Eye Center, Dept Ophthalmology, University of Utah School of Medicine, Salt Lake City (N)
7. 5/06 "Emergency Evaluation of the Acutely Dizzy Patient," Dept Internal Medicine, York Hospital, York, PA (R)
8. 7/06 "Emergency Evaluation of the Acutely Dizzy Patient," Dept Neurology, University of Utah Hospital, Salt Lake City, UT (N)
9. 11/06 "Diagnosing the Dizzy Patient: why 'What do you mean by dizzy?' should NOT be the first question you ask," Dept Neurology, The Johns Hopkins Hospital, Baltimore, MD (L)

10. 1/07 “Diagnosing the Dizzy Patient: why ‘What do you mean by dizzy?’ should NOT be the first question you ask,” Dept Neurosurgery, The Johns Hopkins Hospital, Baltimore, MD (L)
11. 5/07 “Diagnosing the Dizzy Patient: Why “What do you mean by ‘dizzy’?” should NOT be the first question you ask,” Dept Neurology, Massachusetts General Hospital, Boston, MA (N)
12. 9/07 “Diagnosing the Dizzy Patient: Why “What do you mean by ‘dizzy’?” should NOT be the first question you ask,” Dept Neurology, Strong Memorial Hospital, Rochester, NY (N)
13. 10/07 “Diagnosing the Dizzy Patient: Why “What do you mean by ‘dizzy’?” should NOT be the first question you ask,” Dept Neurology, University of Maryland Medical Center, Baltimore, MD (R)
14. 4/08 “Diagnosing the Acutely Dizzy Patient — A New Approach,” Dept Neurology, Michigan State University, East Lansing, MI (N)
15. 1/09 “Towards a New Approach to Diagnosing Dizziness in the Emergency Department: *Challenges of Translational, Symptom-Oriented Diagnostic Research in Frontline Healthcare Settings*” (Welch Center for Prevention, Epidemiology, & Clinical Research, Johns Hopkins University School of Medicine, Baltimore) (L)
16. 2/09 “Diagnosing the Acutely Dizzy Patient — A New Approach,” Dept Medicine, Greater Baltimore Medical Center, Baltimore, MD (R)
17. 7/09 “H.I.N.T.S. to I.N.F.A.R.C.T. — Finding the Cerebrovascular ‘Needle’ amidst the Acutely Dizzy ‘Haystack’,” Dept Neurology and Neuroscience, NewYork-Presbyterian Hospital, New York, NY (N)
18. 8/09 “Diagnosing the Acutely Dizzy Patient — A New Approach,” Dept Neurology, OSF Saint Francis Medical Center, Peoria, IL (N)
19. 11/09 “H.I.N.T.S. to I.N.F.A.R.C.T. — Finding the Cerebrovascular ‘Needle’ amidst the Acutely Dizzy ‘Haystack’,” Dept Neurology, Yale University School of Medicine, New Haven, CT (N)
20. 9/10 “H.I.N.T.S. to I.N.F.A.R.C.T. — Finding the Cerebrovascular ‘Needle’ amidst the Acutely Dizzy ‘Haystack’,” Dept Neurology, University of Pennsylvania School of Medicine, Philadelphia, PA (N)
21. 9/10 “H.I.N.T.S. to I.N.F.A.R.C.T. — Finding the Cerebrovascular ‘Needle’ amidst the Acutely Dizzy ‘Haystack’,” Dept Neurology, Emory University School of Medicine, Atlanta, GA (N)
22. 11/10 “H.I.N.T.S. to I.N.F.A.R.C.T. — Finding the Cerebrovascular ‘Needle’ amidst the Acutely Dizzy ‘Haystack’,” Dept Neurology, Columbia University Medical Center, New York, NY (N)
23. 6/11 “H.I.N.T.S. to I.N.F.A.R.C.T. Identifying Stroke in Patients with the Acute Vestibular Syndrome,” World Federation of Ukrainian Medical Associations, E-Grand Rounds (I)
24. 7/11 “H.I.N.T.S. to I.N.F.A.R.C.T. Identifying Stroke in Patients with the Acute Vestibular Syndrome,” Dept Neurology, Bharati Vidyapeeth Medical College, Pune, India (I)
25. 11/11 “Stroke in Acute Dizziness – H.I.N.T.S. to I.N.F.A.R.C.T.,” Dept Neurology, Schlosspark-Klinik, Berlin, Germany (I)
26. 3/12 “Stroke in Acute Dizziness – H.I.N.T.S. to I.N.F.A.R.C.T.,” Dept Emergency Medicine, University of Pennsylvania School of Medicine, Philadelphia, PA (N)
27. 5/12 “H.I.N.T.S. to I.N.F.A.R.C.T. Finding the Cerebrovascular Needle in the Acutely Dizzy Haystack,” Visiting Professor of Neurologic Education; Mayo Clinic Dept Neurology, Rochester, MN (N)
28. 5/12 “Diagnosing Stroke in Acute Dizziness: H.I.N.T.S. to I.N.F.A.R.C.T.,” Dept Neurology, West Virginia University School of Medicine, Morgantown, WV (N)
29. 7/12 “Diagnostic Errors: State of the Science Overview,” The Johns Hopkins Armstrong Institute Patient Safety Grand Rounds, Baltimore, MD (L)
30. 10/12 “H.I.N.T.S. to I.N.F.A.R.C.T.: Novel, Device-Based Stroke Diagnosis in Acute Vertigo,” Dept Emergency Medicine, University of Ottawa, Ottawa, Ontario, Canada (I)
31. 11/12 “Diagnostic Errors: State of the Science Overview,” Dept Neurology, OSF Saint Francis Medical Center, Peoria, IL (N)
32. 11/12 “A New Approach to Diagnosis of Dizziness and Vertigo.,” Invited international guest speaker, Dept Neurology, Seoul National University, Bundang Hospital. Seoul, Korea (I)
33. 11/12 “A New Approach to Diagnosis of Dizziness and Vertigo.,” Invited international guest speaker, Dept Neurology, Chonnam National University Hospital. Gwangju, Korea (I)
34. 2/13 “Diagnostic Errors: The Next Frontier for Patient Safety,” Dept Medicine, Greater Baltimore Medical Center, Baltimore, MD (R)
35. 11/13 “H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances Diagnosing Stroke in Acute Dizziness and Vertigo.,” Dept Emergency Medicine, Beth Israel Deaconess Medical Center/Harvard University, Boston, MA (N)
36. 2/14 “Diagnostic Errors: The Next Frontier for Patient Safety.,” Dept Pediatrics, The Johns Hopkins University School of Medicine, Baltimore, MD (L)

37. 3/14 "TiTrATE: A New Approach to Diagnosis and Initial Management of the Acutely Dizzy Patient.," Dept Emergency Medicine, University of Maryland Medical Center, Baltimore, MD (L)
38. 4/14 "The 5 Worst & 5 Best Ideas for Health Informatics to Improve Diagnostic Safety & Quality," Division of Health Sciences Informatics, The Johns Hopkins University School of Medicine, Baltimore, MD (I)
39. 6/14 "The 'HINTS Family' in Context: Diagnosing Acute Dizziness a by TiTrATE-ing Your Bedside Exam.," Dept Neurology, Cornell University Medical Center, New York, NY (N)
40. 9/14 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo.," Dept Neurology, Icahn School of Medicine at Mount Sinai, New York, NY (N)
41. 10/14 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo." Dept Emergency Medicine, Emory University School of Medicine, Atlanta, GA (N)
42. 10/14 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo." Depts Neurology & Emergency Medicine combined Grand Rounds, Alpert Medical School, Brown University, Providence, RI (N)
43. 3/15 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo." Dept Internal Medicine Grand Rounds, Johns Hopkins Bayview Medical Center, Baltimore, MD (L)
44. 3/15 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo." Dept Emergency Medicine Grand Rounds, Community Hospital of the Monterey Peninsula, Monterey, CA (N)
45. 5/15 "Diagnostic Errors: The New Frontier for Patient Safety: Insights & Implications for Quality, Value, & Diagnostic Innovation." Dept Internal Medicine Grand Rounds, Sinai Hospital, Baltimore, MD (R)
46. 5/15 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo." Dept Neurology, Beth Israel Hospital, New York, NY (N)
47. 10/15 "TiTrATE: A New Approach to Diagnosis and Initial Management of the Acutely Dizzy Patient." Depts Neurology & Emergency Medicine combined Grand Rounds, University of Maryland, Baltimore, MD (R)
48. 12/15 "TiTrATE: A New Approach to Diagnosis and Initial Management of the Acutely Dizzy Patient." Dept Neurology Grand Rounds, The Sandra and Malcolm Berman Brain & Spine Institute, Sinai Hospital, Baltimore, MD (R)
49. 7/16 "Diagnostic Errors: The New Frontier for Patient Safety." Armstrong Institute for Patient Safety and Quality, Johns Hopkins Hospital, Baltimore, MD (L)
50. 12/16 "Diagnostic Errors: The New Frontier for Patient Safety." Dept Internal Medicine, Baylor Scott & White Health, Dallas, TX (N)
51. 3/17 "Evidence-Based Bedside Diagnosis of Acute Dizziness and Vertigo: Oslerian Medicine Meets 21st Century Tech." Dept Medicine, The Johns Hopkins University School of Medicine, Baltimore, MD (L)
52. 3/17 "Diagnosis is a Team Sport: An Introduction to the Armstrong Institute Center for Diagnostic Excellence (a.k.a. the "AI D.X. Center")." Howard County General Hospital, Columbia, MD (R)
53. 7/17 "Preventing Misdiagnosis of Acute Dizziness and Vertigo in the ED: TiTrATE, HINTS, & the Future of the 'Eye ECG'." Kaiser Permanente Southern California Virtual Grand Rounds. (N) [virtual]
54. 1/18 "Preventing Harms from Missed Neurologic Emergencies: What will it take to change clinical practice?" Dept Neurology, The Johns Hopkins University School of Medicine, Baltimore, MD (L)
55. 8/18 "Preventing Harms from Missed Neurologic Emergencies: What will it take to change diagnostic practice?" Dept Emergency Medicine, Christiana Hospital, Wilmington, DE (N)
56. 1/19 "Diagnostic Errors Through the Lens of Acute Dizziness & Vertigo – What will it take to change clinical practice?" Dept Neurology, Mercy Medical Center, Baltimore, MD (R)
57. 1/19 "Diagnostic Errors Through the Lens of Acute Dizziness & Vertigo – What will it take to change clinical practice?" Dept Neurology, Montefiore Medical Center, New York, NY (N)
58. 3/19 "Evidence-Based Bedside Diagnosis of Acute Dizziness & Vertigo – Oslerian Medicine Meets 21st Century Tech." Dept Neurology, NYU Langone School of Medicine, New York, NY (N)
59. 4/19 "The Future of the "Eye ECG" to Diagnose Stroke in Acute Dizziness – Telemedicine, Tech-Based Triage, & Training." Dept Emergency Medicine, Royal Victorian Eye & Ear Hospital, Melbourne, Australia (I)
60. 9/19 "Diagnostic Errors Through the Lens of Acute Dizziness & Vertigo – What will it take to change clinical practice." Dept Neurology, Univ Texas Southwestern School of Medicine, Dallas, TX (N)
61. 5/20 "Misdiagnosing the Acutely Dizzy Patient: Common Pitfalls in Frontline Clinical Practice... and Bedside Diagnostic Pearls to Avoid Them." Dept Neurology, Univ Texas Health Science Center at San Antonio, San Antonio, TX (N) [virtual]

62. 6/20 “Diagnostic Errors: What Will it Take to Achieve Diagnostic Excellence? – Dizziness as a “Model System” for Care Transformation.” Dept Neurology, Mount Sinai Health System, New York, NY (N) [virtual]
63. 3/22 “Diagnosing the Acutely Dizzy Patient: HINTS & Optimized Neuroimaging to Avoid Missed Stroke in the ED.” Dept Emergency Medicine, Yale University School of Medicine, New Haven, CT (N) [virtual].
64. 3/22 “Diagnostic Errors: What Will it Take to Achieve Diagnostic Excellence? – Transforming Diagnosis Using the Four T’s— Teamwork, Training, Technology, and Tuning,” Dept Neurology, Beth Israel Deaconess Medical Center, Boston, MA (N) [virtual]

Keynote Addresses & Other Invited Talks and Panels (152 total: 8 regional, 85 national, 59 international)

1. 3/03 Panelist, Trainee Education Luncheon, “Keeping the Balance” (tips on balancing career and home life for the junior investigator), AFMR National Meeting
2. 5/06 Guest CME Speaker, Medical University of Ohio, Hot Topics 2006 – Emergency Neurology, “Emergency Evaluation of the Acutely Dizzy Patient” (*also listed under CME*)
3. 1/07 Guest CME Speaker, University of Maryland Health Center Annual CME Course 2007, “Triage and Initial Management of the Acutely Dizzy Patient” (*also listed under CME*)
4. 3/08 North American Neuro-Ophthalmology Society Annual Meeting, 2008, Stroke Symposium, “When is Acute Dizziness a Cerebrovascular Problem? *The Eyes Have It*” (*also listed under CME*)
5. 4/08 Guest Conference Speaker, Great Lakes Neuro-Ophthalmology Conference, Michigan State University, “Clinically-Relevant Neuroanatomy of Horizontal Gaze Pathways” and “Vertigo and the Pathophysiology of Bedside Vestibular Eye Signs”
6. 8/08 Invited Research Speaker, University of Rochester School of Medicine, “Towards a New Approach to Diagnosing Dizziness in the Emergency Department: *Challenges of Translational, Symptom-Oriented Research in Frontline Healthcare Settings*”
7. 9/08 Guest CME Speaker, Maryland Academy of Physician Assistants, Annual Meeting 2008, MAPA Trends in Patient Management 2008, “Workup of the Acute Dizzy Patient: *When is it a Cerebrovascular Problem?*” (*also listed under CME*)
8. 10/09 Acute vestibular syndrome—oculomotor signs more sensitive for stroke than MRI. Invited platform presentation, Derek Denny-Brown New Member Symposium, 134th Annual Meeting of the American Neurological Association. Baltimore, MD
9. 10/09 Understanding Diagnostic Error: Root Cause Analysis of a Case. Invited panelist (case discussant). Diagnostic Error in Medicine 2009. Los Angeles, CA
10. 10/09 Reducing Diagnostic Error: Interventional Studies Completed & In Progress. “Reducing Neurologic Misdiagnosis in Frontline Care Settings: Insights from ED Patients with Dizziness.” Invited speaker. Diagnostic Error in Medicine 2009. Los Angeles, CA
11. 10/09 Reducing Diagnostic Error: Next Steps – Research & Education. “Constructing the Agenda for Diagnostic Errors Research and Education – A Proposed Framework.” Invited speaker. Diagnostic Error in Medicine 2009. Los Angeles, CA
12. 10/09 Reducing Diagnostic Error: Next Steps – Research & Education. “Misdiagnosis of Common Symptoms: Overview of Prior Research and Opportunities for Further Study.” Invited speaker & breakout group leader. Diagnostic Error in Medicine 2009. Los Angeles, CA
13. 4/10 Clerkship and Program Directors’ Conference, “Teaching Focused Examination Skills in a Neurology Clerkship.” Invited Speaker, American Academy of Neurology, Annual Meeting 2010, Toronto, Ontario, Canada
14. 4/10 Patient Safety Colloquium: Diagnostic Errors in Neurology, “What are Diagnostic Errors and Why Are They So Difficult to Prevent?” Invited Speaker, American Academy of Neurology, Annual Meeting 2010, Toronto, Ontario, Canada
15. 4/10 Patient Safety Colloquium: Diagnostic Errors in Neurology, “Diagnostic Errors in Patients with Neurologic Disease.” Invited Speaker, American Academy of Neurology, Annual Meeting 2010, Toronto, Ontario, Canada
16. 4/10 Patient Safety Colloquium: Diagnostic Errors in Neurology. Invited Panelist, American Academy of Neurology, Annual Meeting 2010, Toronto, Ontario, Canada
17. 7/10 “Type vs. Timing and Triggers for Dizziness Diagnosis: Why ‘What do you mean by dizzy?’ Shouldn’t be the First Question You Ask.” Featured guest speaker and hands-on skills workshop leader, 2nd International Neuro-Otology Course and Meeting of the ABC Neurological Center, Mexico City, Mexico

18. 7/10 "H.I.N.T.S. to I.N.F.A.R.C.T.: Diagnosing Cerebrovascular Disease in Acutely Dizzy Patients." Featured guest speaker and hands-on skills workshop leader, 2nd International Neuro-Otology Course and Meeting of the ABC Neurological Center, Mexico City, Mexico
19. 7/10 "Towards a New Approach to Diagnosing Dizziness in the Emergency Department." Featured guest speaker and hands-on skills workshop leader, 2nd International Neuro-Otology Course and Meeting of the ABC Neurological Center, Mexico City, Mexico
20. 7/10 "Demonstrative Workshop of Clinical Neuro-otological Examination." Featured guest speaker and hands-on skills workshop leader, 2nd International Neuro-Otology Course and Meeting of the ABC Neurological Center, Mexico City, Mexico
21. 9/10 "How Neurologists Think III" (an interactive, participatory session on diagnostic errors in neurology). American Neurological Association, San Francisco, CA
22. 10/10 Setting the Agenda for Diagnostic Errors Research. Invited speaker and breakout group leader. Diagnostic Error in Medicine 2010. Toronto, Ontario, Canada
23. 12/10 "H.I.N.T.S. to I.N.F.A.R.C.T. — Bedside Clues to Stroke in Patients with Acute Dizziness." Keynote invited speaker, 5th UAE Medical Students' Conference, Ras Al Khaimah, United Arab Emirates
24. 4/11 "20 Questions" Diagnostic Gaming to Build Diagnostic Reasoning Skills – Software Platform Development. Live software demonstration, American Academy of Neurology 63rd Annual Meeting, Education Colloquium, Honolulu, HI
25. 4/11 How Do We Learn to Be Right? Clinical Reasoning, Diagnostic Accuracy, and Avoiding Misdiagnosis. Invited lecture, American Academy of Neurology 63rd Annual Meeting, Education Colloquium, Honolulu, HI
26. 7/11 "Clinically-Relevant Anatomy and Physiology of the Vestibular System." Invited international expert. Vertigo 360 Conference, held at three venues — All India Institute of Medical Sciences, New Delhi, India
27. 7/11 "Cerebrovascular Vertigo—When to Worry about an Acutely Dizzy Patient." Invited international expert. Vertigo 360 Conference, held at three venues — All India Institute of Medical Sciences, New Delhi, India
28. 7/11 "Clinically-Relevant Anatomy and Physiology of the Vestibular System." Invited international expert. Vertigo 360 Conference, held at three venues — Bangalore, India
29. 7/11 "Cerebrovascular Vertigo—When to Worry about an Acutely Dizzy Patient." Invited international expert. Vertigo 360 Conference, held at three venues — Bangalore, India
30. 7/11 "Clinically-Relevant Anatomy and Physiology of the Vestibular System." Invited international expert. Vertigo 360 Conference, held at three venues — Mumbai, India
31. 7/11 "Cerebrovascular Vertigo—When to Worry about an Acutely Dizzy Patient." Invited international expert. Vertigo 360 Conference, held at three venues — Mumbai, India
32. 10/11 "Diagnostic Error "Hot Topics" Debate." Invited speaker and panelist. Diagnostic Error in Medicine 2011. Chicago, IL
33. 10/11 "Dizziness and Stroke" (in "Critical Misdiagnosis with Common Symptoms"). Invited speaker and panelist. Diagnostic Error in Medicine 2011. Chicago, IL
34. 10/11 "Applying Cost-Effectiveness Analysis: Strategies to Reduce Misdiagnosis Among Patients Who Present With Dizziness" (in "How Much Diagnostic Safety can We Afford?"). Invited speaker and panelist. Diagnostic Error in Medicine 2011. Chicago, IL
35. 2/12 "Dispo: Who to Admit, Who to Treat and Release?" (in "You Spin Me Around: Acute Dizziness Identification and Management"). Invited speaker and panelist. International Stroke Conference 2012, New Orleans, LA
36. 5/12 "Finding the Cerebrovascular Needle in the Acutely Dizzy Haystack: The Eyes Have It". Invited medical neurosciences course lecturer, Visiting Professor of Neurologic Education; Mayo Clinic Dept Neurology, Rochester, MN
37. 7/12 "H.I.N.T.S. to I.N.F.A.R.C.T.: Novel, Device-Based Stroke Diagnosis in Acute Vertigo". Invited lecturer. University of Utah, Depts Neurology and Ophthalmology, Salt Lake City, UT
38. 7/12 "Diagnostic Accuracy: A closer look into improving patient outcomes". Invited panelist. Best Doctors Webinar (<http://www.bestdoctors.com/us/News-And-Media/Physicianwebinars/Diagnostic-Accuracy--A-closer-look-into-improving-.aspx>).
39. 7/12 "H.I.N.T.S. to I.N.F.A.R.C.T.: Novel, Device-Based Stroke Diagnosis in Acute Vertigo". Invited lecturer. University of California Los Angeles, Dept Neurology. Los Angeles, CA
40. 7/12 "Clinically-Relevant Anatomy and Physiology of the Vestibular System." Invited international expert. Vertigo 360 Conference, held at three venues — Lucknow, India

41. 7/12 "A New Approach to Diagnosing the Dizzy Patient." Invited international expert. Vertigo 360 Conference, held at three venues — Lucknow, India
42. 7/12 "Vestibular Neuritis & Acute Stroke: 'H.I.N.T.S. to I.N.F.A.R.C.T.'" Invited international expert. Vertigo 360 Conference, held at three venues — Lucknow, India
43. 7/12 "Clinically-Relevant Anatomy and Physiology of the Vestibular System." Invited international expert. Vertigo 360 Conference, held at three venues — Chennai, India
44. 7/12 "A New Approach to Diagnosing the Dizzy Patient." Invited international expert. Vertigo 360 Conference, held at three venues — Chennai, India
45. 7/12 "Vestibular Neuritis & Acute Stroke: 'H.I.N.T.S. to I.N.F.A.R.C.T.'" Invited international expert. Vertigo 360 Conference, held at three venues — Chennai, India
46. 7/12 "Clinically-Relevant Anatomy and Physiology of the Vestibular System." Invited international expert. Vertigo 360 Conference, held at three venues — Pune, India
47. 7/12 "Acute Vestibular Syndrome – Recent Advances VOG Technology." Invited international expert. Vertigo 360 Conference, held at three venues — Pune, India
48. 7/12 "Dizziness and Vertigo: Interactive Case Unknowns." Invited international expert. Vertigo 360 Conference, held at three venues — Pune, India
49. 9/12 "H.I.N.T.S. to I.N.F.A.R.C.T. – Novel, Device-Based Stroke Diagnosis in Acute Vertigo." Invited international guest speaker, International Forum on Rehabilitation. Beijing, China
50. 9/12 "H.I.N.T.S. to I.N.F.A.R.C.T. – Novel, Device-Based Stroke Diagnosis in Acute Vertigo." Invited keynote speaker, Chinese-American Forum on Dizziness. Beijing, China
51. 10/12 "Diagnostic Errors: State of the Science Overview." Visiting Professor special lecture, Dept Emergency Medicine, University of Ottawa, Ottawa, Ontario, Canada
52. 11/12 "Research Methods Summit: Misdiagnosis of Common Medical Symptoms." Invited speaker. Diagnostic Error in Medicine 2012, 5th International Conference. Baltimore, MD
53. 11/12 "Personal Accountability – What Can I Do?" Invited speaker. Diagnostic Error in Medicine 2012, 5th International Conference. Baltimore, MD
54. 11/12 "Teaching Residents about Ways to Reduce Diagnostic Error: Use of the Educational Milestones." Invited panelist. Diagnostic Error in Medicine 2012, 5th International Conference. Baltimore, MD
55. 11/12 "Diagnostic Safety & Quality: What Can We Do?" Invited speaker. Diagnostic Error in Medicine 2012, 5th International Conference. Baltimore, MD
56. 11/12 "Misdiagnosing the Dizzy Patient in Frontline Healthcare Settings: How did we get so bad at this... and what can we do about it?" Invited keynote speaker, Neuro-Otology Society of Australia. Sydney, Australia
57. 11/12 "H.I.N.T.S. to I.N.F.A.R.C.T.: Novel, Device-Based Stroke Diagnosis in the Acute Vestibular Syndrome." Invited keynote speaker, Neuro-Otology Society of Australia. Sydney, Australia
58. 11/12 "The Acutely Dizzy Patient: When is it a Cerebrovascular Problem?" Invited international guest speaker, Neuro-otology Master Class. Sydney, Australia
59. 11/12 "Misdiagnosing the Dizzy Patient in Frontline Healthcare Settings: How did we get so bad at this... and what can we do about it?" Invited keynote speaker, Korean Balance Society, Pre-Symposium. Seoul, Korea
60. 11/12 "Video-Oculography in Acute Dizziness and Vertigo: Recent Advances in vHIT." Invited keynote speaker, Korean Balance Society, Pre-Symposium. Seoul, Korea
61. 12/12 "Diagnosing Stroke in Acute Dizziness and Vertigo: H.I.N.T.S. to I.N.F.A.R.C.T." Invited keynote speaker, Korean Balance Society Symposium. Seoul, Korea
62. 11/13 "H.I.N.T.S. to I.N.F.A.R.C.T.: Advanced Concepts in Diagnosing Stroke in Acute Dizziness and Vertigo." Invited guest speaker, Dept Neurology Conference, Brigham & Women's/Partners, Harvard University. Boston, MA
63. 11/13 "Vertigo & Dizziness – Sorting it Out." Invited guest speaker, Dept Emergency Medicine Conference, Massachusetts General Hospital/Partners, Harvard University. Boston, MA
64. 1/14 "The HINTS Exam in Vertigo." Invited guest speaker, Emergency Medicine Journal Club, Washington University School of Medicine. Podcast (<http://emjclub.com/podcast/2014/1/25/can-the-hints-exam-differentiate-central-from-peripheral-vertigo>).
65. 2/14 "Dissecting Dizziness in the Real World Recent Advances in Differentiating Stroke from Benign Vestibular Disorders in the ED." Invited guest speaker, International Stroke Conference 2014. San Diego, CA
66. 3/14 "History, Hallpike, & HINTS: Diagnosis and Initial Management of the Acutely Dizzy Patient." Invited guest speaker, Maryland Academy of Physician Assistants, Annual Meeting 2014. Baltimore, MD

67. 4/14 "HINTS to Detect Stroke in Dizziness." Invited guest speaker, Symposium in Honor of Robert W. Baloh, MD. Philadelphia, PA
68. 5/14 "Diagnosing the Acutely Dizzy Patient: A New, Evidence-Based Approach." Keynote guest speaker, Atlantic Neurosciences Annual Conference 2014. Halifax, Nova Scotia, Canada
69. 5/14 "Vestibular Syndrome Definitions for the International Classification of Vestibular Disorders." Invited speaker, Bárány Society XXVIII International Congress. Buenos Aires, Argentina
70. 6/14 "Missed Diagnosis of Stroke in the Emergency Department." Invited guest speaker, Society to Improve Diagnosis in Medicine Webinar Journal Club
71. 6/14 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness & Vertigo." Invited guest speaker, Best Doctors Webinar
72. 8/14 "Prioritization of Diagnostic Error Problems & Solutions: Concepts, Economic Modeling, & Action Plan." Invited guest speaker, Institute of Medicine Committee on Diagnostic Error in Healthcare.
73. 9/14 "Jiggly-Wiggly Eyes (and Vision): Diagnosing Oscillopsia, Nystagmus, and Saccadic Intrusions." Invited international guest speaker, Neuro-ophthalmology & Neuro-otology Conference, Pune, India
74. 9/14 "Episodic Vestibular Syndrome: Vestibular Migraine and Dangerous Mimics." Invited international guest speaker, Neuro-ophthalmology & Neuro-otology Conference, Pune, India
75. 9/14 "H.I.N.T.S. to I.N.F.A.R.C.T.: Identifying Stroke in the Acute Vestibular Syndrome." Invited international guest speaker, Neuro-ophthalmology & Neuro-otology Conference, Pune, India
76. 9/14 "Diagnosing Acute Dizziness & Vertigo in the Modern Era—Hallpike, HINTS, and the Future of VOG in Diagnosis." Invited guest speaker, Emergency Medicine for the 21st Century, Boston, MA
77. 9/14 "Underdiagnosis vs. Overdiagnosis: Which Should We Be More Worried About?" Invited guest speaker and panelist, Diagnostic Error in Medicine 7th Annual Conference, Atlanta, GA
78. 10/14 "'Starting from Scratch' – Insights from the Diagnostic Errors Movement for Building a Research Program from the Ground Up." Invited guest speaker and panelist, American Neurological Association Annual Meeting, Baltimore, MD
79. 10/14 "Economic Aspects of Diagnostic Error – In Search of Greater 'Diagnostic Value'." Invited guest speaker and panelist, 25th McKenney Conference *Diagnostic Accuracy: Advice from the Experts*, Providence, RI
80. 10/14 "Dissecting Dizziness: H.I.N.T.S for Early Stroke Diagnosis." Invited guest speaker, 8th Annual *Time is Brain: Advances in Stroke Care* Conference, Wake Forest University Area Health Education Center, Raleigh, NC
81. 3/15 "The Future of Neurologic Diagnosis: Insights from Clinical, Health Services, & Safety Research." Special guest lecturer, Dept Neurology, Medical College of Wisconsin, Milwaukee, WI
82. 4/15 "Acute Vertigo & Dizziness: Some Recent Highlights (ca. 2013-15)." Year in Review Plenary Session, American Academy of Neurology Annual Meeting 2015, Washington, DC
83. 6/15 "H.I.N.T.S. to I.N.F.A.R.C.T.: Recent Advances in Diagnosing Stroke in Acute Dizziness and Vertigo." Canadian Association of Emergency Physicians Annual Meeting 2015, Edmonton, AB
84. 6/15 "Diagnostic Value: The Economics of High-Quality Diagnosis and a Value-Based Perspective on Diagnostic Innovation." Modern Healthcare Patient Safety & Quality Virtual Conference 2015.
85. 8/15 "Ti.Tr.A.T.E. — A New Approach to Diagnosing the Acutely Dizzy Patient." Featured guest speaker and hands-on skills workshop leader, Masterclass on Acute Vertigo & Emergency Neurotology, Clínica de Vértigo ABC, Mexico City, Mexico
86. 8/15 "Diagnostic Errors in Acute Dizziness & Vertigo: Pitfalls & Pearls." Featured guest speaker and hands-on skills workshop leader, Masterclass on Acute Vertigo & Emergency Neurotology, Clínica de Vértigo ABC, Mexico City, Mexico
87. 8/15 "The 'Eye ECG': Implications of Acute Video-Oculography in the ED." Featured guest speaker and hands-on skills workshop leader, Masterclass on Acute Vertigo & Emergency Neurotology, Clínica de Vértigo ABC, Mexico City, Mexico
88. 9/15 "Diagnostic Error & Diagnostic Value: The Economics of High-Quality Diagnosis and a Value-Based Perspective on Diagnostic Innovation." Mayo Clinic Delivery Science Summit 2015, Rochester, MN
89. 2/16 "The 5 Worst & 5 Best Ideas for Health Informatics to Improve Diagnostic Safety & Quality." Invited Guest Lecturer, IBM Watson Research Center, Yorktown Heights, NY
90. 2/16 "Tackling Diagnostic Errors: A New IOM Imperative for Patient Safety." Invited guest speaker, "Key Actions to Reduce Diagnostic Errors" Webinar, The Leapfrog Group
91. 4/16 "Diagnosing Acute Vertigo: Ti.Tr.A.T.E Your Exam." Featured guest speaker and hands-on skills workshop leader, International Course on Diagnosis and Treatment of Vestibular Disorders, Madrid, Spain

92. 4/16 “Misdiagnosing the Dizzy Patient: Common Pitfalls in Clinical Practice.” Featured guest speaker and hands-on skills workshop leader, International Course on Diagnosis and Treatment of Vestibular Disorders, Madrid, Spain
93. 4/16 “Video H.I.N.T.S.: Towards an ECG for the Eyes.” Featured guest speaker and hands-on skills workshop leader, International Course on Diagnosis and Treatment of Vestibular Disorders, Madrid, Spain
94. 6/16 “Diagnostic Research Methods: Brief Overview plus a Deeper Dive into Big Data for Diagnostic Error.” Invited guest speaker, Academy Health Annual Research Meeting, Boston, MA
95. 7/16 “Diagnostic Error: The New Frontier for Patient Safety.” Invited guest speaker. Webinar, The Leapfrog Group
96. 10/16 “Diagnosis is a Team Sport: Partnering with Nurses & Allied Health Professionals to Enhance Diagnostic Safety.” Keynote speaker. Armstrong Institute Annual Patient Safety Summit, Baltimore, MD
97. 10/16 “Diagnostic Performance Dashboards: Moving the Needle on Diagnostic Error.” Invited guest speaker. University of North Texas Health Science Center’s 2nd Annual Leading Innovation in Patient Safety Summit, Forth Worth, TX
98. 11/16 “Symptom-Disease Pair Measures of Diagnostic Error from ‘Big Data’.” Invited guest speaker, Diagnostic Error in Medicine Meeting Annual Research Summit, Hollywood, CA
99. 12/16 “Unified Conceptual Model for Diagnostic Errors.” Invited speaker, National Quality Forum Diagnostic Quality & Safety Measurement Framework Expert Panel, Washington, DC
100. 5/17 “Diagnostic Safety & Quality: What Can Hospitals Do? A Brief Introduction to Improving Diagnosis in Healthcare, Diagnostic Value, and the Future of Quality Reporting.” Invited guest speaker, The Leapfrog Group Hospital Advisory Committee, Chicago, IL
101. 7/17 “The 5 Worst & 5 Best Ideas for Health Informatics to Improve Diagnostic Safety & Quality.” Distinguished Lecturer, University of Maryland Summer Institute on Nursing Informatics, Baltimore, MD
102. 7/17 “Sinus Headaches vs. Migraines (& More): Clinical Pearls & Diagnostic Pitfalls in Headaches.” Invited guest speaker, American Rhinologic Society 6th Annual Summer Sinus Symposium, Washington, DC
103. 7/17 Improving Diagnosis in Health Care: Implementation Workshop. Session 1: Review Reactions to the Report on Improving Diagnosis in Health Care and Progress on Report Recommendation Goals 1- 4. Invited expert panelist, National Academy of Sciences, Washington, DC
104. 8/17 “Diagnosing Acute Vertigo: Ti.Tr.A.T.E. Your Exam”: Novel Telemedicine & Clinical Trial Applications.” Invited guest speaker, Reunión Iboamericana de Neuro-Otología, Lima, Peru
105. 8/17 “The Future of the “Eye ECG”: Novel Telemedicine & Clinical Trial Applications.” Invited guest speaker, Reunión Iboamericana de Neuro-Otología, Lima, Peru
106. 9/17 “The Diagnostic Cockpit... One Neurologist’s Perspective.” Invited guest speaker, The Academy for Radiology & Biomedical Imaging Research, Academy Symposium (“Building The Diagnostic Cockpit of the Future”), Rockville, MD
107. 10/17 “K to R: Some Words of Wisdom from a Long-and-Winding Road (alt. title: Random Musings of an Old-ish Man).” Invited guest speaker, American Academy of Neurology – National Institute for Neurological Disorders & Stroke Career Development Course, San Diego, CA
108. 11/17 “Avoiding Misdiagnosis in Neurologic Emergencies: What will it take to change clinical practice?” Invited keynote speaker, Neurological Emergencies Conference, Harvard Medical School, Boston, MA
109. 11/17 “Eliminating Harms from Diagnostic Error: The New Frontier for Patient Safety & Quality,” Invited speaker, A Woman’s Journey Seminar, Johns Hopkins University School of Medicine, Baltimore, MD
110. 11/17 “The Future of the “Eye ECG” to Diagnose Stroke in Acute Dizziness: Telemedicine, Tech-Based Triage, and Training.” Invited speaker/panelist, Johns Hopkins Research Symposium “Teaming with Technology Along the Care Spectrum” hosted by the Armstrong Institute and the Malone Center for Engineering in Healthcare, Johns Hopkins University School of Medicine, Baltimore, MD
111. 11/17 “Getting It Right the First Time: The Revolution in Diagnosis.” Invited expert panelist, Insight Night at RSNA, presented by U.S. News & World Report. Radiological Society of North America 2017 Annual Meeting, Chicago, IL
112. 2/18 “Leveraging Evidence, Big Data, & Technology to Eliminate Harms from Diagnostic Error – The Dizziness & Stroke Misdiagnosis Exemplar.” Safety Keynote Speaker, 28th Annual Health Care Risk Management Conference, New York, NY
113. 3/18 “Diagnostic Errors: The New Frontier for Patient Safety.” Keynote Speaker Johns Hopkins Aramco Health Patient Safety Symposium 2018, Dharan, Saudi Arabia

114. 3/18 “Diagnosis is a Team Sport.” Keynote Speaker Johns Hopkins Aramco Health Patient Safety Symposium 2018, Dharan, Saudi Arabia
115. 5/18 “Diagnostic Errors.” Invited expert speaker, A Woman’s Journey 2018, Baltimore, MD
116. 6/18 “Centers of Diagnostic Excellence to Improve Diagnosis.” Society to Improve Diagnosis in Medicine / Coalition to Improve Diagnosis Healthcare Senate Briefing, Washington, DC
117. 6/18 “Diagnostic Challenges: Peripheral vs. Central.” Invited Panel Moderator, International Bárány Society Teaching Day: What you need to know to be an otoneurologist/neurootologist, from basics to update, Uppsala, Sweden
118. 6/18 “Eliminating Misdiagnosis-Related Harms: Past, Present, & Future.” Invited Keynote Speaker, Maryland Improving Diagnosis Accuracy and Safety (MIDAS) Conference, hosted by the Maryland Patient Safety Center (MPSC), Elkridge, MD
119. 7/18 “Quantified HINTS... Tele-Consultation, Decision Support, & the Future of the Eye ECG.” Invited Speaker, Reunión Iboamericana de Neuro-Otología Annual Conference 2018, Bogotá, Colombia
120. 7/18 “Differential Diagnosis in AVS – Pitfalls & Pearls in Assessing Acute Vertigo.” Invited Speaker, Reunión Iboamericana de Neuro-Otología Annual Conference 2018, Bogotá, Colombia
121. 8/18 “The HINTS Family of Eye Movement Tests and the Future of the Eye ECG – Tele-Consults, Decision Support, & Automation.” Invited Speaker, Dizziness Center, Bern, Switzerland
122. 8/18 “Stroke Misdiagnosis: Context, Causes, and Clinical Decision Support.” Invited Speaker, European Diagnostic Error in Medicine meeting 2018. Bern, Switzerland
123. 10/18 “Teamwork, Training, Technology, & Tuning – Four T’s to Transform Diagnosis in Healthcare.” Keynote Speaker, Midwest Healthcare Quality Alliance Patient Safety Conference, Springfield, IL
124. 10/18 “Stroke Misdiagnosis – Decision Support & the Future of the Eye ECG.” Invited Speaker, Midwest Healthcare Quality Alliance Patient Safety Conference, Springfield, IL
125. 11/18 “‘Big Data’ to Improve Diagnosis – Novel Applications of Data Streams & Methods to Transform Diagnosis—The Stroke Exemplar.” Invited speaker, Diagnostic Error in Medicine 2018, 11th International Conference, New Orleans, LA
126. 11/18 “Armstrong Institute Center for Diagnostic Excellence at Johns Hopkins Medicine.” Invited speaker, Diagnostic Error in Medicine 2018, 11th International Conference, New Orleans, LA
127. 11/18 “Avoiding Misdiagnosis in Neurologic Emergencies: What will it take to change clinical practice?” Invited keynote speaker, Neurological Emergencies Conference, Harvard Medical School, Boston, MA
128. 3/19 “Acute Dizziness & Vertigo: Just Tell Me What to Do! – Ruling Out Dangerous Central Causes.” Invited guest speaker and hands-on skills workshop leader, North American Neuro-Ophthalmology Society Annual Meeting 2019, Las Vegas, NV
129. 4/19 “Teamwork, Training, Technology & Tuning – 4 T’s to Transform Diagnosis in Healthcare.” Keynote speaker, Australian Diagnostic Error in Medicine Meeting 2019, Melbourne, Australia
130. 4/19 “Research to Improve Diagnosis – Real-World Strategies for Operational Measurement of Diagnostic Performance.” Invited short course leader, Australian Diagnostic Error in Medicine Meeting 2019, Melbourne, Australia
131. 4/19 “Diagnosis is a Team Sport – Partnering with Nurses, Allied Health Professionals, & Patients to Enhance Diagnostic Safety & Quality.” Invited speaker, Medical Indemnity Protection Society Safety Webinar, Melbourne, Australia
132. 5/19 “Teamwork, Training, Technology & Tuning – 4 T’s to Transform Diagnosis in Healthcare.” Invited panelist, Association of Healthcare Journalists Conference 2019, Baltimore, MD
133. 5/19 “Man vs. Machine... Prepare to be Replaced.” Invited Plenary Speaker, American Academy of Neurology, Controversies in Neurology, AAN Annual Conference 2019, Philadelphia, PA
134. 7/19 “Diagnostic Errors with Serious Patient Harms – The ‘Big Three.’” Society to Improve Diagnosis in Medicine / Coalition to Improve Diagnosis Healthcare House Briefing, Washington, DC (N)
135. 9/19 “Diagnostic Errors – It’s the New Frontier for Patient Safety... but What Can We Do About It?” Health Services Research Group, University Hospitals, Cleveland, OH (N)
136. 9/19 “The 5 Worst and 5 Best Informatics Ideas to Improve Diagnosis in Healthcare.” Diagnostic Institute Retreat, University Hospitals, Cleveland, OH (N)
137. 9/19 “Reducing Harm by Getting Patients the Right Diagnosis at the Right Time.” (Epner, Newman-Toker, and Siegal), Modern Healthcare Webinar (N)
138. 11/19 “Diagnostic Errors and Patient Safety – What Can We Do?” Healthcare Innovation Program Symposium, Emory / Georgia Tech, Atlanta, GA (N)

139. 11/19 “The Diagnostic Value Equation: Why Actually Improving Diagnosis will Always Win on Both Quality & Cost.” Diagnostic Error in Medicine Plenary Presentation, Washington DC (N)
140. 11/19 “Diagnostic Errors: The Big Three – Vascular Events, Infections, & Cancers.” CRICO Webex (N) [virtual]
141. 7/20 “Diagnostic Error: From Evidence to Action.” Academy Health Annual Meeting in “Patient Safety’s Third Decade: Healthcare Improvement Powered by Research” moderated by Jeff Brady (N) [virtual]
142. 7/20 “What Pathologists Can Do to Improve Clinical Diagnosis – A Non-Pathologist’s Perspective.” Association of Pathology Chairs Annual Meeting 2020 (N) [virtual]
143. 9/20 “Tackling Serious Harms from Diagnostic Errors – A View Through the Lens of the ‘Big 3’.” Alaskan Improving Diagnostic Accuracy in Medicine Conference (N) [virtual]
144. 9/20 “Re-Imagining Bedside Diagnosis – The Tele-Dizzy Experience and the Critical Role of Quantification.” Alaskan Improving Diagnostic Accuracy in Medicine Conference (N) [virtual]
145. 5/21 “Defining the Landscape and Setting the Agenda for Diagnostic Errors: What Will it Take to Achieve Diagnostic Excellence?” iCompass Academy “Working Together to Improve Diagnosis” Conference 2021 (N) [virtual]
146. 5/21 “Overview of Diagnostic Errors in Clinical Practice – In Pursuit of Diagnostic Excellence.” In “What My Mistakes Have Taught Me,” Editor, Martin Samuels (N) [virtual]
147. 8/21 “The Evolving Landscape of Diagnostic Errors – Challenges and Opportunities in the Post-Pandemic Era.” The Doctors Company External Advisory Board (N) [virtual]
148. 9/21 “The Diagnostic Value Equation: Why Actually Improving Diagnosis will Always Win on Both Quality & Cost.” Alaskan Improving Diagnostic Accuracy in Medicine Conference (N) [virtual]
149. 10/21 “Four T’s to Transform Diagnosis: Teamwork, Training, Technology, and Tuning to Eliminate Missed Stroke in the ED.” Society to Improve Diagnosis in Medicine Annual Conference (N) [virtual]
150. 11/21 “Charting a Path Forward on the Road Towards Diagnostic Excellence.” Society to Improve Diagnosis in Medicine / Coalition to Improve Diagnosis Healthcare Senate Briefing, Washington, DC (N) [virtual]
151. 5/22 “Neurologic Misdiagnosis in the ED: Transforming Diagnosis through Technology-Enhanced Teamwork via Telemedicine.” Australia New Zealand Association of the Society to Improve Diagnosis in Medicine (ANZA-SIDM) and Victorian Managed Insurance Authority (VMIA) Webinar, Melbourne, Australia (I) [virtual]
152. 9/22 “A Tale of Two Studies: Setting the Stage to Demonstrate Health Benefits from Transformed ED Diagnosis of Dizziness/Vertigo.” Alaskan Improving Diagnostic Accuracy in Medicine Conference (N) [virtual]

Invited Intramural Talks and Panels Other than Grand Rounds/Keynote (72 total)

1. 8/98 “Posterior Circulation Ischemia,” Massachusetts General Hospital, Dept Internal Medicine, Noon Conference
2. 11/99 “Evaluation of Dizziness in the Urgent Care Setting I,” Massachusetts General Hospital, Chelsea Internal Medicine Group, Chelsea, MA, Special Lecture
3. 4/00 “Evaluation of Dizziness in the Urgent Care Setting II,” Massachusetts General Hospital, Chelsea Internal Medicine Group, Chelsea, MA, Special Lecture
4. 5/00 “Neuro-ophthalmic Diseases Masquerading as Benign Strabismus,” Massachusetts Eye & Ear Infirmary, Dept Ophthalmology, Annual Fellows’ Course
5. 7/00 “New Dizziness in the Urgent Care Setting – Stroke vs. No Stroke: A Cross-Sectional, Cohort Study,” JHU BSPH, Clinical Investigation Conference
6. 1/01 “Dizzy Database: Preliminary Plans & Prototype,” JHU SOM, Depts Neurology & Otolaryngology, Neuro-otology Conference
7. 4/01 “Medical Errors: Preventing Misdiagnosis of Dizzy Patients in the Emergency Department,” JHU SOM, Depts Neurology & Otolaryngology, Neuro-otology Conference
8. 6/01 “Medical Errors: Preventing Misdiagnosis of Dizzy Patients in the Emergency Room - Designing A Systematic Approach to Bedside Diagnosis,” JHU SOM, Dept Biomedical Engineering, Center for Hearing & Balance Seminar
9. 9/01 “Building A New Model for Diagnosis of Dizzy Patients in the Emergency Department,” JHU SOM, Dept Emergency Medicine, Emergency Dept Research Seminar
10. 2/02 “Improving Patient Safety & Diagnostic Errors in Dizziness—How Rules Have Failed Us,” JHU SOM, Division of Health Science Informatics, Informatics Seminar

11. 11/02 “Health-Related Quality of Life in Patients with Dizziness,” JHUSOM, Depts Neurology & Otolaryngology, Neuro-otology Conference
12. 1/03 “Building A New Model for Diagnosis of Dizzy Patients in the Emergency Department,” JHU SOM, Dept Neurology, Neuroscience Research Seminar
13. 1/03 “Building A New Model for Diagnosis of Dizzy Patients in the Emergency Department,” JHU BSPH, Clinical Investigation Research Seminar
14. 1/04 “A New Algorithm for Diagnosis of Dizzy Patients in the Emergency Department,” JHU SOM, Depts Neurology & Otolaryngology, Neuro-otology Conference
15. 5/04 “The Spiral Curriculum, A New Approach to Medical Education,” JHU SOM, Curriculum Reform Committee Meeting
16. 1/05 “Building a New Model for Diagnosis of Dizzy Patients in the Emergency Department,” JHU BSPH, Clinical Investigation Conference
17. 5/05 “Identifying ‘The Dizzy Patient’ in the Emergency Department,” JHU BSPH, Dept Health Policy & Management, Qualitative Research Methods Group
18. 9/05 “Why ‘What do you Mean By Dizziness?’ Shouldn’t Be the First Question You Ask,” JHU SOM, Depts Neurology & Otolaryngology, Neuro-otology Conference
19. 9/05 “Why ‘What do you Mean By Dizziness?’ Shouldn’t Be the First Question You Ask,” JHU SOM, Division of Health Science Informatics, Informatics Seminar
20. 3/06 “Building a New Approach to the ED Dizzy Patient... and Beyond,” JHU SOM, Dept Emergency Medicine, Research Committee Meeting
21. 5/06 “Why ‘What do you Mean By Dizziness?’ Shouldn’t Be the First Question You Ask,” JHU SOM, Dept Emergency Medicine, Research Day
22. 5/06 “Building a New Approach to the ED Dizzy Patient... and Beyond,” JHU BSPH, Dissertation Committee Meeting
23. 8/06 “Why ‘What do you Mean By Dizziness?’ Shouldn’t Be the First Question You Ask,” JHU SOM, Division of Health Science Informatics, Informatics Fellows’ Conference
24. 3/07 “Diagnosing Dizziness in the Emergency Department—Why “What do you mean by ‘dizzy?’” should NOT be the first question you ask,” JHU BSPH, Dissertation Defense
25. 7/07 “Why ‘What do you Mean By Dizziness?’ Shouldn’t Be the First Question You Ask,” JHU SOM, Division of Health Science Informatics, Informatics Fellows’ Conference
26. 8/08 “Towards a New Approach to Diagnosing Dizziness in the Emergency Department – Challenges of Translational, Symptom-Oriented Research in Frontline Healthcare Settings,” JHU SOM, Division of Health Science Informatics, Informatics Fellows’ Conference
27. 10/08 “Automated Medical Interviewing for Diagnostic Decision Support in the Emergency Department,” JHU SOM, Quality & Patient Safety Research Group
28. 6/09 “Transition to the Wards,” Bayview Curriculum Development Course Final Presentations, JHU SOM
29. 9/09 “Towards a New Approach to Diagnosing Dizziness in the Emergency Department – Challenges of Translational, Symptom-Oriented Research in Frontline Healthcare Settings,” JHU SOM, Division of Health Science Informatics, Informatics Fellows’ Conference
30. 11/10 “Towards a New Approach to Diagnosing Dizziness in the Emergency Department – Challenges of Translational, Symptom-Oriented Research in Frontline Healthcare Settings,” JHU SOM, Division of Health Science Informatics, Informatics Fellows’ Conference
31. 11/10 “H.I.N.T.S. to I.N.F.A.R.C.T. — Finding the Cerebrovascular ‘Needle’ amidst the Acutely Dizzy ‘Haystack’,” JHU SOM, Dept Neurology, Clinical Neurosciences Seminar
32. 9/11 “Towards a New Approach to Diagnosing Dizziness in the Emergency Department – Challenges of Translational, Symptom-Oriented Research in Frontline Healthcare Settings,” JHU SOM, Division of Health Science Informatics, Informatics Fellows’ Conference
33. 6/12 “Diagnostic Errors: State of the Science Overview,” Johns Hopkins Armstrong Institute Patient Safety Summit 2012
34. 2/14 “(How) Can Informatics Help Reduce Diagnostic Errors,” Johns Hopkins Clinical Informatics Leadership Group
35. 7/15 “D.I.S.C.O.V.E.R.: A New Johns Hopkins Initiative to Enhance Diagnostic Safety, Quality, and Value,” Johns Hopkins Armstrong Institute Special Seminar 2015
36. 9/15 “Diagnostic Safety, Quality, Value: An Opportunity for International Leadership by Johns Hopkins Medicine and JH Health System,” Johns Hopkins Hospital Clinical Directors’ Meeting

37. 10/15 "Diagnostic Safety, Quality, Value: An Opportunity for International Leadership by Johns Hopkins Medicine and JH Health System," Johns Hopkins Patient Safety & Quality Board Meeting
38. 2/16 "A Proposal for Tele-Dizzy Consultation in JHHS Emergency Departments in Maryland," Johns Hopkins Emergency Medicine Operations Group
39. 4/16 "Diagnostic Innovation at JHM: Update on AI's New 'DISCOVER' Center," Johns Hopkins Medicine, DISCOVER Working Group Meeting.
40. 5/16 "Diagnostic Decision Support to Eliminate Stroke Misdiagnosis," Johns Hopkins Medicine-IBM Watson Collaborative Partnership meeting
41. 5/16 "The Digital Neurologic Exam: How Sensors will Transform Frontline Neurologic Diagnosis," Johns Hopkins Neurology HEAD Talks Seminar Series, 2016
42. 5/16 "Diagnostic Error as an Important Focus of the Armstrong Institute," Johns Hopkins Armstrong Institute Research Networking Retreat, 2016
43. 10/16 "Some Words of Wisdom (alt.: Random Musings of an Old Man)," BIOS Lunch & Learn
44. 11/16 "The Armstrong Institute Center for Diagnostic Excellence: Better Outcomes through Better Diagnosis," Johns Hopkins Armstrong Institute Faculty Meeting
45. 12/16 "The Armstrong Institute Center for Diagnostic Excellence: Better Outcomes through Better Diagnosis," Johns Hopkins Clinical Research Network
46. 2/17 "Diagnosis is a Team Sport: Partnering with Nurses, Allied Health Professionals, & Patients to Enhance Diagnostic Safety & Quality," Armstrong Institute Patient Safety Webinar
47. 4/17 Armstrong Institute Center for Diagnostic Excellence: An Update on Upcoming Projects and Grants, with Some Reflections on the Center's First Year," Armstrong Institute Diagnostic Excellence Summit, 2017
48. 8/17 "Improving Diagnosis in Healthcare: An Emerging Public Health & Policy Imperative," Guest lecturer, Public Health Policy Course (300.610.01) Johns Hopkins Bloomberg School of Public Health
49. 8/17 "D.X. Center Strategic Plan Update: Working Together to Prioritize an Action Plan," Armstrong Institute Center for Diagnostic Excellence Strategic Planning Retreat 2017, Johns Hopkins University School of Medicine
50. 9/17 "Diagnostic Error and the Role of the Nurse on the Diagnostic Team," Office for Science and Innovation Special Workshop, Johns Hopkins University School of Nursing
51. 9/17 "A Brief Intro to Diagnostic Error: The New Frontier for Patient Safety & Quality," A Woman's Journey Host Committee, Johns Hopkins University School of Medicine
52. 11/17 "Preventing Acute Stroke Misdiagnosis in the ED using a Novel "Tele-Dizzy" Subspecialty Consultation Program: Novel Enterprise Technology Solutions for Clinical Care & Trials," Enterprise Technology Services Meeting, Johns Hopkins University School of Medicine
53. 11/17 "How much diagnostic safety can we afford?" Economics of Clinical Operations (ECO) Course, Johns Hopkins University School of Medicine
54. 5/18 "Improving Diagnosis in Healthcare – Engineering Challenges & Opportunities," Malone Center Faculty Retreat, Johns Hopkins University School of Medicine
55. 5/18 "Transforming Diagnosis: The Armstrong Institute Center for Diagnostic Excellence," Armstrong Institute internal showcase, Johns Hopkins University School of Medicine
56. 6/18 "Early Diagnosis to Prevent Major Stroke after Minor Stroke/TIA – A New Paradigm for Tackling Diagnostic Error," presentation to Google representatives, Johns Hopkins University School of Medicine
57. 7/18 "HSCRC/CRISP DUA Amendments to Allow Maryland-Wide Regional Data Sharing for Diagnostic Quality & Safety – MIDAS Proposal," Data Trust Clinical & Quality Sub-Council, Johns Hopkins University School of Medicine
58. 10/18 "The "Eye ECG" for Stroke Diagnosis," Johns Hopkins Clinical Research Network
59. 11/18 "Towards a Diagnostic Performance Dashboard to Monitor Diagnostic Errors," Learning Health Symposium, Johns Hopkins University School of Medicine and Kaiser Permanente Collaborative
60. 4/19 "Reclaiming Diagnostic Value by Addressing Diagnostic Errors The "Tele-Dizzy" & Stroke Exemplar," presentation to the Centers for Medicare and Medicaid Services
61. 11/18 "Tackling Diagnostic Errors –The Armstrong Institute Center for Diagnostic Excellence at JHM," presentation at the Armstrong Institute Safety Course / Observership
62. 1/19 "Diagnostic Errors: The New Frontier for Patient Safety," TIME Safety Course, Johns Hopkins University School of Medicine
63. 7/19 "Engaging with Patient and Nursing Partners in Acute Care Diagnostic Research," PCORI PARTNERED collaborative for patients, Johns Hopkins University School of Medicine

64. 1/20 “Diagnostic Errors: The New Frontier for Patient Safety,” TIME Safety Course, Johns Hopkins University School of Medicine
65. 1/20 “Diagnostic Errors: The New Frontier for Patient Safety,” Armstrong Institute Patient Safety and Quality Leadership Academy, Johns Hopkins Medicine
66. 4/20 “Diagnostic Strategy for the COVID-19 Pandemic: Bench to Bedside to Blueprint for Policymakers,” Diagnostic Excellence Summit, Johns Hopkins Medicine [virtual]
67. 10/20 “SIDM 2020 Lunch & Learn: Network with the Center for Diagnostic Excellence at Johns Hopkins Medicine,” Diagnostic Error in Medicine 2020 [virtual]
68. 2/21 “Re-Imagining Frontline Diagnosis of the Dizzy Patient – Diagnostic Excellence through Digital Revolution,” David Zee Lecture Series [virtual]
69. 3/21 “Diagnostic Errors: What Will it Take to Achieve Diagnostic Excellence? – Dizziness as a “Model System” for Care Transformation,” Armstrong Institute Patient Safety and Quality Leadership Academy, Johns Hopkins Medicine [virtual]
70. 6/21 “SPADE Method,” Diagnostic Overuse Working Group, Johns Hopkins Medicine [virtual]
71. 9/21 “The Armstrong Institute’s Center for Diagnostic Excellence: A 5-Year View of Progress Towards the Mission.” Armstrong Institute Center for Diagnostic Excellence, Johns Hopkins Medicine [virtual]
72. 2/22 “Diagnostic Errors: What Will it Take to Achieve Diagnostic Excellence? – Transforming Diagnosis Using the Four T’s— Teamwork, Training, Technology, and Tuning,” Armstrong Institute Patient Safety and Quality Leadership Academy, Johns Hopkins Medicine [virtual]

OTHER PROFESSIONAL ACCOMPLISHMENTS

Selected Press Articles and Media Appearances

- 11/07 Foundation for the Education and Research in Neurological Emergencies (FERNE) posts summary of Newman-Toker’s research on its website (http://www.ferne.org/Lectures/ferne_main.htm)
- 11/08 MD Consult press summary of Newman-Toker’s ANA meeting abstract on stroke misdiagnosis under the title “Dizziness Clouds Stroke Diagnosis in the Emergency Department” by journalist Betsy Bates
- 3/09 JHU SOM sends out press release regarding JAMA commentary under the title “Diagnostic Errors: The New Focus of Patient Safety Experts” by journalist Christen Brownlee (http://www.hopkinsmedicine.org/Press_releases/2009/03_10a_09.html) (<http://www.jhu.edu/~gazette/2009/16mar09/16diagnos.html>) (<http://nursing.advanceweb.com/Editorial/Content/Editorial.aspx?CC=195675>) (http://www.consumeraffairs.com/news04/2009/03/diagnosis_errors.html) (<http://www.diagnosticimaging.com/residents/article/113619/1388662?verify=0>)
- 3/09 Isabel Healthcare posts link to JAMA commentary on Diagnostic Errors at their website (<http://www.isabel.org.uk/home/default>)
- 3/09 Radio Interview, The People’s Pharmacy with Joe and Terry Graedon (radio show airing on national NPR affiliates), “Diagnostic Errors” in show #718: Health News Update (http://www.peoplespharmacy.com/archives/radio_shows/718_health_news_update.php)
- 8/09 Print/Web Interview, Bottom Line Daily Health News. Deaths By "Wrong Diagnosis" Exceed 40,000/Year— Misdiagnosis: Serious Mistakes More Common than Drug Errors by journalist Eleanor Gilman (http://www.bottomlinesecrets.com/article.html?article_id=49544).
- 8/09 Radio Guest Speaker, The People’s Pharmacy with Joe and Terry Graedon (radio show airing on national NPR affiliates), in show #737: Diagnostic Errors (<http://www.peoplespharmacy.com/2009/08/29/737-diagnostic-errors/>)
- 8/09 Print/Web Interview, The Legal Examiner. Misdiagnosis and Wrong Diagnosis by Doctors Cause 40,000 Deaths Each Year by journalist Wayne Parsons (<http://honolulu.legalexaminer.com/medical-malpractice/deaths-by-wrong-diagnosis-exceed-40000year.aspx?googleid=268982>)
- 9/09 Print/Web Interview, Consumer Reports on Health (20th Anniversary Issue Feature Story). Don’t be a diagnostic error! 10 common medical mix-ups and how to avoid them by journalist Patti Condon and editor Joel Keehn. Only named expert in the article was Dr. David Newman-Toker.
- 9/09 JHU SOM sends out press release regarding Stroke original research article about diagnosis of patients with acute dizziness under the title “Cheap, Quick Bedside “Eye Movement” Exam Outperforms MRI for Diagnosing Stroke in Patients with Dizziness” by journalist Christen Brownlee (http://www.hopkinsmedicine.org/Press_releases/2009/09_18_09.html) (<http://www.medicalnewstoday.com/articles/164584.php>) (<http://gazette.jhu.edu/2009/10/19/bedside-eye->

- [exam-outperforms-mri-for-diagnosing-stroke/](http://noticias.terra.com.br/ciencia/noticias/0,,OI4039290-EI8147,00-Exame+de+vista+pode+detectar+AVC+diz+estudo.html)) (<http://noticias.terra.com.br/ciencia/noticias/0,,OI4039290-EI8147,00-Exame+de+vista+pode+detectar+AVC+diz+estudo.html>)
- 9/09 Print/Web Interview, DOTMed.com. Eye Movement Exam More Accurate Than MRI in Stroke Prediction by journalist Brendon Nafziger (<http://www.dotmed.com/news/story/10309/>)
- 10/09 Print/Web Interview, SpectroscopyNow. Eye test betters MRI in stroke by journalist David Bradley (<http://www.spectroscopynow.com/coi/cda/detail.cda?id=22274&type=Feature&chId=3&page=1>)
- 10/09 Television Interview, ABC 7 News, WJLA Baltimore. Eye Exam Used to Find Strokes by journalist Rebecca McDevitt (<http://www.wjla.com/news/stories/1009/668136.html>)
- 10/09 Print/Web publicity, Medscape Medical News. What's hot at ANA 2009? By journalist Allison Gandy "Highlights will include a talk by David Newman-Toker, MD, on acute vestibular syndrome. Dr. Newman-Toker is from Johns Hopkins University School of Medicine in Baltimore; he will describe how oculomotor signs are more sensitive for stroke than magnetic resonance imaging." (http://www.medscape.com/viewarticle/710296_print)
- 10/09 Print/Web Interview, MedPage Today. ANA: Simple Signs Outperform MRI in Predicting Stroke by journalist Richard Robinson (<http://www.medpagetoday.com/Neurology/Strokes/16427>)
- 10/09 Print/Web Interview, Medscape Medical News. Bedside Eye Exam Outperforms MRI in Identifying Stroke by journalist Allison Gandy (<http://www.medscape.com/viewarticle/710698?src=mpnews&spon=18&uac=44471HG>)
- 10/09 Radio Interview, The People's Pharmacy with Joe and Terry Graedon (radio show airing on national NPR affiliates), "Dizziness Diagnosis" in show #745: Health News Update (<http://www.peoplespharmacy.com/2009/10/24/745-health-news-update/>)
- 11/09 Print/Web publicity, Elsevier Global Medical News. Eye Signs Detect Stroke Better Than Does MRI in Acute Vestibular Syndrome by journalist Jeff Evans (<http://www.medconnect.com.sg/tabid/92/s14/Ophthalmology/ct1/c34459/Eye-Signs-Detect-Stroke-Better-Than-Does-MRI-in-Acute-Vestibular-Syndrome/Default.aspx>)
- 12/09 Video/Web Interview. Global Medical News Network (GMNN). Differentiating Strokes by journalist Jeff Evans (<http://www.youtube.com/watch?v=A6uv1MFari8>)
- 12/09 Print Interview: US News and World Reports. Getting a Good Diagnosis by journalist Deborah Kotz (published in the print edition of US News and World Reports, December, 2009)
- 5/10 Podcast Interview: American Academy of Neurology. Acute Dizziness. Interview by physician Beau Bruce (<http://www.aan.com/rss/index.cfm?event=feed.items&channel=1>)
- 6/10 Print Interview, Ophthalmology Times. Visuo-vestibular diagnoses depend on exacting history of symptoms by journalist Liz Meszaros.
- 2011 Book Citation: Top Screwups Doctors Make and How to Avoid Them. Joe Graedon and Teresa Graedon. Cited extensively as an expert in diagnostic errors, Chapter 3, Diagnostic Disasters.
- 3/12 Print/Web Interview: Angie's List. My Doctor Saved My Life! by journalist Matthew Brady (<http://arizonaoncology.com/images/uploads/LifeSavers.pdf>)
- 8/12 Print/Web Interview: Johns Hopkins Patient Safety Team Finds Diagnostic "Fatal Flaws" in the ICU May Account for as Many Annual Deaths as Breast Cancer by journalist Shannon Swiger (http://www.hopkinsmedicine.org/news/media/releases/johns_hopkins_patient_safety_team_finds_diagnostic_fatal_flaws_in_the_icu_may_account_for_as_many_annual_deaths_as_breast_cancer)
- 10/12 Print/Web Interview: Armstrong Institute Annual Report 2012. Taking Stock of a Silent Killer by journalist Jamie Manfuso (http://www.hopkinsmedicine.org/armstrong_institute/downloads/Armstrong_Institute_annual_report_2012.pdf)
- 11/12 Print/Web Interview: American Association of Retired Persons. 5 Most Commonly Misdiagnosed Conditions in the ICU: Missed diagnoses can lead to potentially fatal errors by journalist Elizabeth Agnvall (<http://www.aarp.org/health/conditions-treatments/info-11-2012/common-diagnostic-errors-in-icu.html>)
- 3/13 Print/Web Interview: Shape Magazine. Is your doctor missing the mark? Karen Asp. (http://www.bestdoctors.com/~media/PR%20and%20Public%20Affairs/News/2013/SHAPE_MissingTheMark_2013_3_1.pdf)
- 3/13 Johns Hopkins Press Release: Is it a Stroke or Benign Dizziness? A Simple Bedside Test Can Tell. Regarding article in Stroke, 2013, showing proof of concept that device-based diagnosis of posterior circulation stroke in dizziness was possible. Stephanie Desmon. (<http://www.hopkinsmedicine.org/news/stories/>; http://www.hopkinsmedicine.org/news/media/releases/is_it_a_stroke_or_benign_dizziness_a_simple_bedside)

- test can tell) (associated with roughly a dozen internet and print media interviews and one national TV appearance)
- 3/13 National Television Interview: CBS This Morning. Stroke goggles: Can new tech diagnose a stroke? (<http://www.cbsnews.com/video/watch/?id=50142278n>; <http://www.youtube.com/watch?v=LfKTpn911RI>) (seen by 2.5 million viewers during CBS showing; rebroadcast by more than 20 local TV outlets)
- 3/13 Print/Web Publicity: Los Angeles Times. Goggles-and-laptop device might help detect some strokes. Eryn Brown. (<http://articles.latimes.com/2013/mar/05/news/la-heb-laptop-test-dizziness-stroke-20130305>)
- 4/13 Johns Hopkins Press Release: Diagnostic Errors More Common, Costly and Harmful Than Treatment Mistakes. Regarding article in British Medical Journal Quality and Safety, 2013, demonstrating the first thorough analysis of US medical malpractice claims for diagnostic errors, totaling ~\$40 billion over 25 years. (http://www.hopkinsmedicine.org/news/media/releases/diagnostic_errors_more_common_costly_and_harmful_than_treatment_mistakes) (associated with roughly a dozen internet and print media interviews, one streaming live video, and one national television appearance)
- 4/13 Print/Web Interview: Wall Street Journal. Adding Up Diagnosis Errors. (<http://online.wsj.com/article/SB10001424127887323551004578438692201899244.html>)
- 4/13 Internet Streaming Video Interview: Wall Street Journal Lunch Break (video clip). Diagnostic Errors Lead to Injury, Death for 160,000 Annually. (<http://live.wsj.com/video/diagnostic-errors-lead-to-injury-death-for-160000-annually/628237C8-4AD9-40C0-AD16-CD655E300555.html?KEYWORDS=lunch+break#!628237C8-4AD9-40C0-AD16-CD655E300555>)
- 4/13 National Television Interview: Fox Business Network (video clip). Your Health at Risk from Misdiagnosis? (<http://www.foxbusiness.com/on-air/willis-report/videos#p/157870/v/2322599238001>)
- 4/13 National Radio Interview: CBS Radio clip. (<http://mms.tveyes.com/Transcript.asp?StationID=6555&DateTime=4%2F23%2F2013+5%3A55%3A05+AM&Term=%22Johns+Hopkins%22&PlayClip=TRUE>)
- 4/13 Print/Web Interview: Washington Post. Diagnostic errors are leading cause of successful malpractice claims. (http://www.washingtonpost.com/national/health-science/diagnostic-errors-are-leading-cause-of-successful-malpractice-claims/2013/04/22/e9194154-ab7d-11e2-b6fd-ba6f5f26d70e_story.html)
- 4/13 Print/Web Interview: FOX News. Diagnostic errors more common – and more deadly – than other treatment errors. (<http://www.foxnews.com/health/2013/04/23/diagnostic-errors-more-common-and-more-deadly-than-other-treatment-errors/>)
- 4/13 Print/Web Interview: HealthLeaders Media. Diagnostic Errors Common, Costly, and Harmful. John Commins. (<http://www.healthleadersmedia.com/content/QUA-291407/Diagnostic-Errors-Common-Costly-and-Harmful>)
- 4/13 Print/Web Interview: Medscape. Diagnostic Errors Dominate Malpractice Payouts. Robert Lowes. (<http://www.medscape.com/viewarticle/803026>)
- 4/13 Print/Web Interview: New York Times. Why Doctors are Sued. Nicholas Bakalar. (<http://well.blogs.nytimes.com/2013/04/29/why-doctors-are-sued/>)
- 4/13 Print/Web Interview: AMA Medical News. Diagnostic errors are lead cause of medical liability payouts. Kevin O'Reilly. (<http://www.amednews.com/article/20130506/profession/130509971/4/>)
- 4/13 Print/Web Interview: Washington Post. Misdiagnosis is more common than drug errors or wrong-site surgery. Sandra Boodman. (http://www.washingtonpost.com/national/health-science/misdiagnosis-is-more-common-than-drug-errors-or-wrong-site-surgery/2013/05/03/5d71a374-9af4-11e2-a941-a19bce7af755_story.html)
- 7/13 Print/Web Interview: EMax Health. Severe Dizziness or Vertigo, Is It a Stroke or Something Else? Deborah Mitchell (<http://www.emaxhealth.com/1275/severe-dizziness-or-vertigo-it-stroke-or-something-else>)
- 8/13 Print/Web Interview: Washington Post. Stroke or ear infection? New goggles help doctors distinguish. Meeri Kim. (http://articles.washingtonpost.com/2013-08-05/national/41083535_1_goggles-strokes-ct-scans)
- 8/13 Print/Web Interview: Houston Chronicle. Doctors overconfident, study finds, even in hardest cases. Todd Ackerman. (<http://www.houstonchronicle.com/news/article/Doctors-overconfident-study-finds-even-in-4766096.php>)
- 9/13 National Television Interview: America Tonight, Al Jazeera Network. Medical Misdiagnosis (Lori Jane Gliha, Joie Chen) (http://archive.org/details/ALJAZAM_20130925_010000_America_Tonight# - min 44-55)
- 5/14 Podcast, Johns Hopkins Health Newsfeed (episodes aired on national NPR affiliates 5/13/14), “Who’s at Greatest Risk to Have Their Stroke Diagnosis Missed?,” Elizabeth Tracey (<http://podcasts.hopkinsmedicine.org/2014/05/13/may-13-2014-stroke-miss/>)

- 5/14 Podcast, Johns Hopkins Health Newsfeed (episodes aired on national NPR affiliates 5/14/14), “Stroke is Yet One More Condition Where Symptoms for Women and Minorities Differ from those of Men,” Elizabeth Tracey (<http://podcasts.hopkinsmedicine.org/2014/05/14/may-14-2014-gender-difference/>)
- 5/14 Podcast, Johns Hopkins Health Newsfeed (episodes aired on national NPR affiliates 5/15/14), “There is Hope for Making a Stroke Diagnosis Even When Atypical Symptoms are Seen” Elizabeth Tracey (<http://podcasts.hopkinsmedicine.org/2014/05/15/may-15-2014-seeing-stroke/>)
- 6/14 Print/Web Interview. Bottom Line Health. Protect Yourself from Having Your Stroke Missed In the ER. (<https://bottomlineinc.com/health/stroke/protect-yourself-from-having-your-stroke-missed-in-the-er>)
- 4/15 Print/Web Interview: New York Times. The Brain Tumor is Benign, but Threats Remain. Emily Dwass. (http://well.blogs.nytimes.com/2015/04/27/the-brain-tumor-is-benign-but-threats-remain/?_r=0)
- 10/15 Podcast, Johns Hopkins Health Newsfeed (episodes aired on national NPR affiliates 10/19/15), “Missed Strokes—Can eye movements help doctors avoid missing strokes?” Elizabeth Tracey (<http://podcasts.hopkinsmedicine.org/2015/10/15/october-19-2015-missed-strokes/>)
- 10/15 Podcast, Johns Hopkins Health Newsfeed (episodes aired on national NPR affiliates 10/20/15), “Early Strokes—Looking at eye movements to discern stroke may lead the way to early intervention” Elizabeth Tracey (<http://podcasts.hopkinsmedicine.org/2015/10/15/october-20-2015-early-strokes/>)
- 10/15 Podcast, Johns Hopkins Health Newsfeed (episodes aired on national NPR affiliates 10/21/15), “Diagnostic Errors—Chances are good you’ve been on the receiving end of a diagnostic medical error” Elizabeth Tracey (<http://podcasts.hopkinsmedicine.org/2015/10/15/october-21-2015-diagnostic-errors/>)
- 5/17 Print/Web Interview. Neurology Advisor. Improving Stroke Diagnosis Accuracy: An Interview With David Newman-Toker, MD, PhD. Tori Rodriguez. (<https://www.neurologyadvisor.com/topics/stroke/improving-stroke-diagnosis-accuracy-an-interview-with-david-newman-toker-md-phd/>)
- 7/17 Podcast Interview, The Curbsiders (running medical podcast show), #49 “Vertigo and Dizziness: How to Treat, Who to Send Home and Who Might Have a Stroke” (<http://thecurbsiders.com/medical-education/49-vertigo-dizziness-treat-send-home-might-stroke>)
- 10/17 Radio Interview, On the Record with Sheilah Kast (radio show airing on national NPR affiliates), “Medical Misdiagnosis, More Common Than You Think” (<http://wypr.org/post/medical-misdiagnosis-more-common-you-think>)
- 5/18 Print/Web Interview. Johns Hopkins Medicine Insight. First-of-Its-Kind System Spots and Measures Diagnostic Errors. Sarah Richards. (<https://www.hopkinsmedicine.org/news/articles/first-of-its-kind-system-spots-and-measures-diagnostic-errors>)
- 12/18 Print/Web Interview. Neurology Today. A Neurologist Takes on Medical Misdiagnoses at the Helm of the Society to Improve Diagnosis in Medicine — and Elsewhere. Lola Butcher. (https://journals.lww.com/neurotodayonline/subjects/neurocritical%20care/fulltext/2018/12060/a_neurologist_takes_on_medical_misdiagnoses_at_the.15.aspx)
- 7/19 Multiple Media Appearances (radio, television, print) describing recently released research on diagnostic error – Serious misdiagnosis-related harms in malpractice claims: the “Big Three” – vascular events, infections, & cancers. Diagnosis. 2019. Radio – 2,676 stations airing; 2,685 airings; over 15 million listeners reached; Television – 35 stations airing; over 375,000 total viewers reached.
- 7/19 Print/Web Interview. Medscape Medical News. 'Big Three' Diseases Account for Most Diagnostic Error Harm. Miriam Tucker. (<https://www.medscape.com/viewarticle/915531>)
- 8/19 Radio Interview, The People’s Pharmacy with Joe and Terry Graedon (radio show airing on national NPR affiliates), in show #1186: “What Happens When Doctors Make Diagnostic Errors?” (<https://www.peoplespharmacy.com/articles/show-1186-what-happens-when-doctors-make-diagnostic-errors>)
- 12/20 Radio Interview, The People’s Pharmacy with Joe and Terry Graedon (radio show airing on national NPR affiliates), in show #1239: “How Can We Prevent Diagnostic Disasters?” (<https://www.peoplespharmacy.com/articles/show-1239-how-can-we-prevent-diagnostic-disasters>)
- 11/21 Print/Web Interview. NIH News in Health. Dealing With Dizziness: Getting Help for a Balance Disorder. (<https://newsinhealth.nih.gov/2021/11/dealing-dizziness>)
- 2/22 Print/Web Interview. Bottom Line Health. A Missed Diagnosis. (<https://bottomlineinc.com/health/health-care-providers/a-missed-diagnosis>)
- 3/22 Print/Web Interview. Johns Hopkins University & Medicine. Research-Focused Professorship Drives Innovations in Stroke Diagnosis. Alexander Gelfand. (<https://giving.jhu.edu/story/dizzy-stroke-research/>)