

**Full Name**

Darren Benjamin Orbach, MD PhD

**Mailing Address**

Brigham and Women’s Hospital  
Neuroradiology Section – PBB 354  
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Boston, MA 02115

**Education**

Princeton University, Princeton, NJ	1989	Philosophy	BA
Rockefeller University, 1230 York Avenue, NY, NY	1997	Biophysics	PhD
Cornell University Medical College, 1300 York Avenue, New York, NY	1998	Medicine	MD

Marine Biological Laboratory, Woods Hole, MA      June – August, 1991      Neural Systems and Behavior

**Clinical Training**

NYU Medical Center, 560 First Avenue, New York, NY

**Combined Neurology / Radiology / Neuroradiology Training Program**

July 1998 – June 1999	Internship
July 1999 – June 2001	Neurology Residency
July 2001 – June 2003	Diagnostic Radiology Residency
July 2003 – June 2005	Diagnostic and Interventional Neuroradiology Fellowship

**Neurointerventional Radiology Fellowship**

July 2005 – June 2006

**Research Experience and Interests**

*June – September 1988, July 1988 – January 1990: Rockefeller University.* Research internship. Optical imaging of visual cortex in cats and macaque monkeys, studying the topography of the ocular dominance columns, orientation patches, and motion processing. Mentors: Torsten Wiesel, Amiram Grinvald, Ralph Siegel

*June 1990 – June 1997: Rockefeller University.* Doctoral project. Thesis Title: The functional Architecture of Color Representation in Area V1 of the Macaque Cerebral Cortex: An Optical Imaging Study. Mentor: Ehud Kaplan

*July 1998- June 2006: NYU Medical Center.* Research focus on epilepsy and cerebrovascular disease. Studies assessing the efficacy of multiple subpial transections for refractory epilepsy, a study examining the relationship between psychogenic seizures and the sleep-wake cycle, a study focused on the use of CT angiography and 3D angioscopy for the assessment of carotid stent patency, and a study comparing signal-to-noise ratios in phased-array and high-field MR scanners versus traditional scanners.

*August 2006–Present: Brigham and Women’s Hospital, Children’s Hospital Boston, Harvard Medical School*

- Magnetic resonance encephalography (MRE). Development of high temporal-resolution MRI techniques to directly image cerebral electromagnetic fluxes. These may be detectable as changes in the magnitude or phase of the baseline nuclear precession induced by the MR magnetic field.
  - Localization-Related Epilepsy. Gradient-echo echo-planar MR images will be rapidly acquired simultaneously with EEG recordings in a cohort of medication-refractory epilepsy patients who

are surgical candidates. The cohort will be prescreened for the presence of well localized, high amplitude, and frequent interictal spikes and focal slow waves. MRE images will be analyzed for inhomogeneities in signal magnitude and phase that bear a temporal relationship to these EEG phenomena, and spectral analysis will be performed as well. The results of the MRE will be compared with preoperative MEG and with direct electrical cortical recordings acquired with subdural grids and depth electrodes. The immediate goal is the use of MRE to localize epileptogenic foci.

- Neuroimaging of Sleep. Extensions beyond epilepsy, such as MRE of brain activity in sleep, are under development as well.
- MR-Guided Focused Ultrasound. Feasibility study to evaluate the safety of transcranial MR-guided focused ultrasound in the treatment of brain lesions. Phased-array ultrasound transducers focusing on a predetermined target are used to noninvasively induce thermal ablation. Progress is imaged intraprocedurally via MR thermography.
  - Cerebral cavernous malformations

### **Hospital and Academic Appointments**

June 2005 – July 2006	Assistant Attending Radiologist, NYU Medical Center, New York, NY
June 2005 – July 2006	Clinical Assistant Attending Radiologist, Bellevue Hospital, New York, NY
January 2005 – March 2006	Attending Diagnostic Neuroradiologist (part-time), Saint Vincents Catholic Medical Center, New York, NY
August 2006 – present	Staff radiologist (diagnostic and interventional neuroradiology), Brigham and Women's Hospital, Boston, MA
August 2006 – present	Interventional neuroradiologist (courtesy staff), Children's Hospital Boston, Boston, MA
August 2006 – present	Interventional Neuroradiologist (consulting staff), Beth Israel Deaconess Medical Center, Boston, MA
August 2006 – present	Interventional Neuroradiologist (consulting staff), Dana Farber Cancer Institute, Boston, MA
August 2006 – present	Assistant Professor, Harvard Medical School, Boston, MA

### **Licensure and Certification**

2004	<i>American Board of Psychiatry and Neurology</i> , Board Certification in Neurology
2004	<i>American Board of Radiology</i> , Board Certification in Diagnostic Radiology
2005	<i>American Board of Radiology</i> , Certificate of Added Qualification in Neuroradiology
1999	Medical Licensure, New York
2006	Medical Licensure, Massachusetts

### **Professional Societies**

2001	American Academy of Neurology	Member
2003	New York Roentgen Society	Member
2005	American Society of Neuroradiology	Senior Member
2006	American College of Radiology	Member

### **Editorial Boards**

2002-2004	Ad Hoc Reviewer	<i>Epilepsia</i>
2004-present	Ad Hoc Reviewer	<i>American Journal of Neuroradiology</i>

### Awards and Honors

- 1985 National Merit Scholar  
1990 NIH/The Mellon Foundation, Medical Scientist Training Program MD-PhD Biomedical Fellowship  
1995 NIH National Eye Institute, Electrophysiology Section Young Investigator Award  
2002 Young Presidents' Organization, Inaugural Fellow

### Bibliography

#### Journal Articles

1. Sirovich L, Everson R, Knight BW, Kaplan E, O'Brien E, Orbach E. Modeling the functional organization of the visual cortex. *Physica D* 1996;96:355-66.
2. Orbach D, Romanelli P, Devinsky O, Doyle W. Late seizure recurrence after multiple subpial transections. *Epilepsia* 2001;42:1130-3.
3. Spencer S, Schramm J, Wyler A, O'Connor M, Orbach D, Krauss G, Sperling M, Devinsky O, Elger C, Lesser R, Mulligan L, Westerveld M. Multiple subpial transection for intractable partial epilepsy: An international meta-analysis. *Epilepsia* 2002;43:141-5.
4. Orbach D, Ritaccio A, Devinsky O. Psychogenic, non epileptic seizures associated with video-EEG verified sleep. *Epilepsia* 2003;44:64-8.
5. Romanelli P, Orbach D, Pacia S, Doyle W, Devinsky O. Surgical treatment of multifocal epilepsy involving eloquent cortex. *Epilepsia* 2003;44:718-23.
6. Lui YW, Nussbaum AO, Barr WB, Johnson G, Babb JS, Orbach DB, Kim A, Laliotis G, Devinsky O. Correlation of apparent diffusion coefficient with neuropsychological testing in temporal lobe epilepsy. *AJNR* 2005;26:1832-9.
7. Orbach DB, Pramanik BK, Lee J, Maldonado T, Riles T, Grossman RI. Evaluation of the stented carotid artery with CT angiography and CT virtual angioscopy. *Radiology* 2006;238:309-20.
8. Orbach DB, Wu C, Law M, Babb JS, Lee R, Padua A, Knopp EA. Comparing real world advantages for the clinical neuroradiologist between a high field (3T), a phased array (1.5T), and a single channel (1.5T) MR system. *J MRI* 2006;24:16-24.

#### Reviews

1. Orbach D, Hiesiger E. Chronic nonmalignant pain and the use of opioid analgesia (Analgesia opioidowa w bólu przewlekłym pochodzenia nienowotworowego). *Bol* 2001;2:13-24. [*Bol is a Polish journal of neurology.*]
2. Orbach DB, Nelson PK. Is endovascular embolization reliable as a long-term cure for ruptured cerebral aneurysms? *Nature Clinical Practice Neurology* 2006;2:420-421.

#### Book Chapters

1. Orbach D, Alastra AJG, Bose A, Nelson PK. Neurointerventional management of intracranial aneurysms. In: LeRoux PD, Winn HR, Newell DW, editors. *Management of cerebral aneurysms*. Philadelphia: WB Saunders; 2003 p. 925-50.
2. Orbach DB, Nelson PK. Endovascular management of intracranial aneurysms. In: R. Hurst R, Rosenwasser R, editors. *Interventional Neuroradiology*. New York: Taylor & Francis; 2006 - *in press*.

#### Clinical Communications

1. Orbach D, Hiesiger E. Shoulder pain relieved by root canal. *Neurology* 2001; 57:1712-3. (Selected on the merits of its educational value by the Dannemiller Memorial Educational Foundation for inclusion in the **AnalgesiaFile** journal).
2. Chatterjee A, Orbach D. Isolated foot weakness caused by a parasagittal metastatic parotid adenocarcinoma. *Neurology India* 2004;52:286-7.

#### Letters to the Editor

1. D. Orbach, D. Levine. Outcomes of anecro in acute ischemic stroke [letter]. *JAMA* 2000;284:1926.

#### Meeting Abstracts

1. O'Brien EV, Orbach D, Everson R, Samber R, Rossetto M, Sirovich L, Knight B, Kaplan E. Principal component analysis of intrinsic optical signals in mammalian visual cortex reveals functional architecture. Association for Research in Vision and Ophthalmology; 1994 May 1-5; Fort Lauderdale, Florida. *Investigative Ophthalmology & Visual Science* 35:1663.
2. O'Brien EV, Orbach D, Kaplan E, Everson R, Sirovich L, Knight B. Functional organization of mammalian striate cortex revealed by optical imaging and principal component analysis. Society for Neuroscience; 1994 November 13-18; Miami Beach, Florida. *Proceedings* 20:266.6.
3. Everson R, Sirovich L, Knight B, O'Brien EV, Orbach D, Kaplan E, Gordon J. Karhunen-Loeve principal component analysis of optical signals optimally extracts functional architecture of mammalian visual cortex. Society for Neuroscience; 1994 November 13-18; Miami Beach, Florida. *Proceedings* 20:266.5.
4. Everson R, Kaplan E, Knight B, O'Brien EV, Orbach D, Sirovich L. Functional organization of orientation, direction, and binocular patches in cat and macaque visual cortex revealed by optical imaging. Association for Research in Vision and Ophthalmology; 1995 April 30-May 4; Fort Lauderdale, Florida. *Investigative Ophthalmology & Visual Science* 36:3398.
5. Orbach D, O'Brien EV, Everson R, Kaplan E, Knight B, Sirovich L. Time course and wavelength dependence of the intrinsic optical signal in visual cortex investigated with a modified Karhunen-Loeve procedure. Association for Research in Vision and Ophthalmology; 1995 April 30-May 4; Fort Lauderdale, Florida. *Investigative Ophthalmology & Visual Science* 36:3398.
6. Kaplan E, O'Brien EV, Orbach D, Everson R, Gordon J. Time course and wavelength dependence of the intrinsic optical signal from the mammalian visual cortex investigated with principal components analysis. Society for Neuroscience; 1995 November 11-16; San Diego, California. *Proceedings* 21:162.8.
7. Everson R, Orbach D, Kaplan E, Knight B, Gordon J. Organization of striate visual cortex: Balance between function and wiring cost. Society for Neuroscience; 1996 November 16-21; Washington, DC. *Proceedings* 22:117.9.
8. Orbach D, Everson R, Kaplan E. Color & luminance processing in macaque V1: Spatial structure revealed by intrinsic optical imaging. Society for Neuroscience; 1996 November 16-21; Washington, DC. *Proceedings* 22:376.4.
9. Orbach D, Kaplan E, Everson R, Sirovich L, Knight B. Color columns in macaque V1: Two novel color systems are revealed by intrinsic optical imaging. Association for Research in Vision and Ophthalmology; 1997 May 4-8; Fort Lauderdale, Florida. *Investigative Ophthalmology & Visual Science* 38:71.
10. Prashanth AK, Orbach D, Knight B, Gabbay M, Sirovich L, Kaplan E. Functional organization of the cortex: Spatial frequency maps and orientation maps in the mammalian visual cortex. Society for Neuroscience; 1998 November 7-12; Los Angeles, California. *Proceedings* 24:305.4.
11. Sornborger A, Gegiu M, Orbach D, Sirovich L, Kaplan E. Cortical activity maps without differential imaging. Society for Neuroscience; 2000 November 4-9; New Orleans, Louisiana. *Proceedings* 26:550.1.

12. Romanelli P, Orbach D, Devinsky O, Doyle W. Long-term follow-up reveals late seizure recurrence following multiple subpial transections. American Epilepsy Society; 2000 December 1-6; Los Angeles, California.
13. Gegiu LM, Orbach D, Yokoo T, Sornberger A, Sirovich L, Kaplan E. The representation of color in area V1 of the macaque visual cortex – an optical imaging study. Association for Research in Vision and Ophthalmology; 2001 April 29-May 3; Fort Lauderdale, Florida. Investigative Ophthalmology & Visual Science 42.
14. Orbach D, Ritaccio A, Devinsky O. Non-epileptic seizures out of EEG-verified sleep. American Epilepsy Society; 2001 November 30-December 5; Philadelphia, Pennsylvania.
15. Jonas S, Figueroa M, Orbach D. Gavestinel (GV 150526): Neuroprotective success in rats and failure in ischemic stroke in humans, a scaling problem? 27th International Stroke Conference; 2002 February 7-9; San Antonio, Texas.
16. Haider JM, Kramer EL, Maguire GQ, Millan ER, Noz ME, Orbach DB, Zeleznik MP. Problems with two automatic methods for SPECT-SPECT and SPECT-MRI volume matching. American Association for Physics in Medicine; 2002 July 14-18; Montreal, Quebec.
17. Law M, Wu C, Orbach D, Oh S, Johnson G, Knopp EA. Comparison of SNR, CNR, image quality, and anatomic conspicuity between 1.5 and 3.0 Tesla for clinical neuroimaging. American Society of Neuroradiology; 2004 June 5-11; Seattle, Washington.
18. Orbach D, Law M, Wu C, Lee R, Johnson G, Knopp EA. Comparison of SNR and CNR between single-channel, multi-channel phase array coils at 1.5 T and a single-channel coil at 3.0 Tesla for clinical neuroimaging. Eastern Society of Neuroradiology; 2004 August 20-22; Boston, Massachusetts.
19. Law M, Wu C, Babb JS, Padua , Orbach D, Lee R, Knopp EA, Johnson G. Comparison of SNR and CNR between single-channel, multi-channel phase array coils at 1.5 T and a single-channel coil at 3.0 Tesla for clinical neuroimaging. Radiological Society of North America; 2004 November 28-December 3; Chicago, Illinois.
20. Orbach DB, Pramanik BK, Lee J, Maldonado T, Riles T, Grossman RI. Utility of CT angiography with virtual angioscopy versus doppler ultrasound in the examination of the stented carotid artery. American Society of Neuroradiology; 2005 May 21-27; Toronto, Ontario.