

Michael G. Dwyer III

CONTACT INFORMATION

Buffalo Neuroimaging Analysis Center
The Jacobs Neurological Institute
State University of New York at Buffalo
100 High Street, Buffalo NY, 14203 USA

Voice: (716) 859-7065
Fax: (716) 859-7874
E-mail: mgdwyer@bnac.net
WWW: www.bnac.net

RESEARCH INTERESTS

Image analysis (including segmentation and quantification), non-conventional magnetic resonance imaging sequence analysis, unsupervised machine learning methods, data representation and integration, algorithm optimization for large datasets

PROFESSIONAL EXPERIENCE

Director of Technical Imaging Development

Buffalo, New York USA

Directly responsible for overseeing the technical development department of the Buffalo Neuroimaging Analysis Center, and in particular for providing the computational resources (both software and hardware) for accurate quantitative analysis of multidimensional magnetic resonance imaging datasets. Duties include designing and implementing analysis algorithms and supporting software, planning the center's technology infrastructure, and acting as manager and technical lead for a staff of 3 to 5 computer scientists plus a system administrator. Position confers direct accountability for the technical quality of analysis pipelines and for the integrity of the center's computing infrastructure.

Buffalo Neuroimaging Analysis Center (BNAC)

2003 – Present

Systems Specialist

Buffalo, New York USA

Was responsible for computer analysis of electroencephalogram (EEG) data used in the monitoring of patients with epilepsy, including co-registration of EEG data with magnetic resonance imaging data. A major focus of this activity was the spatial localization of epileptogenic sources in the brain. Other duties also included the maintenance of the technical infrastructure for the department, including database and networking resources.

Women's and Children's Hospital of Buffalo

2003 – 2004

Chief Technical Officer

Buffalo, New York USA

Was directly responsible for managing all technical aspects of the business, including software development. Specific responsibilities included development of web-based content management systems and interactive systems for clients, as well as the design and implementation of custom database solutions. Duties also included graphic design and both technical and commercial writing.

Digital Fusion Media Services, Inc.

2000 – 2003

SOFTWARE PROJECTS

Voxelwise MTR Change Detection

Technical Lead/Software Architect/Implementor

Designed and implemented a hidden Markov random field-based algorithm to semi-automatically quantify the volumes of statistically significant positive and negative MTR changes. This potentially provides a more direct view of focal areas of demyelination and remyelination in the brain.

Ischemic Penumbra Quantification

Technical Lead/Software Architect/Implementor

Designed and implemented a hidden Markov random field-based algorithm to semi-automatically quantify the volume of perfusion/diffusion mismatch (ischemic penumbra) on MRI images in acute ischemic stroke. The algorithm significantly outperforms standard threshold-based approaches.

Optic nerve diameter quantification

Technical Lead/Software Architect/Implementor

Designed and implemented a parametric shape-based registration algorithm to identify and extract features from the optic nerve. The software was designed to operate well at a high level of sub-voxel

precision and to be invariant to acquisition angle.

Unsupervised brain segmentation *Technical Lead/Software Architect/Implementor*
Designed and implemented an algorithm to automatically quantify volumes of specific brain tissue types in a single- or multi-dimensional magnetic resonance imaging dataset. The software was designed using a robust probabilistic framework, and is capable of performing well even given data differing from that used for the initial development.

Unsupervised lesion identification *Technical Lead/Software Architect/Implementor*
Designed and implemented an algorithm to automatically detect, classify, and quantify lesions in single- or multi-dimensional brain magnetic resonance imaging datasets of patients with multiple sclerosis. By designing the software to detect deviations from the norm rather than explicit abnormalities, this software is capable of detecting patterns of lesions it has not encountered before.

Lesion evolution quantification and visualization *Software Architect*
Designed and supervised the implementation of a system to quantify and visualize the evolution of multiple sclerosis lesions in brain magnetic resonance imaging datasets. This system is capable of 3-dimensionally visualizing changes in lesions from baseline to follow-up scans, and can produce reports of the volumes of the different possible types of change.

Diffusion quantification *Technical Lead/Software Architect/Implementor*
Designed and implemented a system to quantify molecular water diffusion in the brain via diffusion-tensor/diffusion-weighted magnetic resonance imaging, including a novel application of entropy measurement.

Magnetization transfer ratio quantification *Technical Lead/Implementor*
Redesigned a system for quantification of macromolecular concentration in brain tissues (via magnetization transfer weighted magnetic resonance imaging) to make it more robust and efficient.

Optic nerve damage quantification *Technical Lead/Software Architect*
Designed and supervised the implementation of software for quantification of optic nerve cross-sectional area and demyelination (as measured by magnetization transfer magnetic resonance imaging) for use in studying optic neuritis.

Lesion distribution quantification *Technical Lead/Software Architect/Implementor*
Designed and implemented a novel system for the quantification of lesion tissue distributions in brain magnetic resonance imaging datasets of patients with multiple sclerosis.

Unsupervised confluent lesion classifier *Software Architect*
Co-designed and supervised the implementation of machine-learning software capable of unaided classification of multiple sclerosis lesions on brain magnetic resonance imaging into confluent and non-confluent subtypes.

BNAC enterprise system *Technical Lead/Software Architect/Implementor*
Designed and implemented an enterprise system capable of expediting and enforcing the business rules of a large-scale magnetic resonance imaging analysis center. The system integrates analysis pipelines with a database back-end, allowing a relatively small number of operators to track and analyze thousands of MRIs per year.

Online PDF library *Technical Lead/Software Architect/Implementor*
Designed and implemented an online, cross-indexed full-text searchable database of scientific articles in PDF format to facilitate literature reviews and personnel training.

Three-dimensional MRI visualization tool *Technical Lead/Software Architect/Implementor*

Designed and implemented a system for three-dimensional visualization of high-resolution brain magnetic resonance imaging for use in evaluating epilepsy-related pathology, and capable of reslicing the dataset at arbitrary oblique angles.

EDUCATION

University at Buffalo, Buffalo, New York USA

Computer Science and Engineering (1999 - 2003)

TECHNICAL SKILLS General skills include a thorough understanding of algorithm complexity and design, statistical computing principles, multi-dimensional analysis, and software development best practices.

- **Languages:** Java, C++, C, Ruby, Matlab, LISP, bash, PHP, Visual Basic, Javascript
- **Software packages/frameworks:** VTK, ITK, Rails, Eclipse (including RCP), Matlab (including a number of toolboxes), Visual Studio, SPSS, MySQL, PostgreSQL, L^AT_EX, Microsoft Office, Microsoft Project, Adobe CS
- **Operating Systems:** UNIX/Linux, Microsoft Windows, OS X, some experience with QNIX (real-time OS).

PUBLICATIONS

Publications are listed in reverse chronological order. The first author listed is the principal/corresponding author who wrote the article. The last author listed is the second most important contributor, who served as a mentor/guide or corresponding author for the research. Remaining authors are listed in descending order based on their level of contribution.

1. Horakova D., Cox, J.L., Havrdova, E., Hussein, S., Dolezal, O., Cookfair, D., Dwyer, M.G., Seidl, Z., Bergsland, N., Zivadinov, R. *Evolution of different MRI measures in patients with active relapsing-remitting multiple sclerosis over 2 and 5 years. A case control study.* JNNP 2008;79:407-14. (CC; PBM)
2. Tjoa, C.W., Benedict, R.H., Dwyer, M.G., Carone, D.A., Zivadinov, R. *Regional Specificity of Magnetization Transfer Imaging in Multiple Sclerosis.* J Neuroimaging 2007 Nov 28 (Epub ahead of print).
3. Zivadinov, R., Banas, A.C., Yella, V., Abdelrahman, N., Weinstock-Guttman, B., Dwyer, M.G. *Comparison of Three Different Methods for Measurement of Cervical Cord Atrophy in Multiple Sclerosis.* AJNR Am J Neuroradiol 2008;29(2):319-25.
4. Benedict, R.H.B., Bruce, J., Dwyer, M.G., Weinstock-Guttman, B., Tjoa, C.W., Tavazzi, E., Munschauer, F.E., Zivadinov, R. *Diffusion weighted imaging predicts cognitive impairment in multiple sclerosis.* Mult Scler 2007;13:722-30.
5. Horakova, D., Cox, J.L., Havrdova, E., Hussein, S., Dolezal, O., Cookfair, D., Dwyer, M.G., Seidl, Z., Bergsland, N., Zivadinov, R. *Evolution of different MRI measures in patients with active relapsing-remitting multiple sclerosis over 2 and 5 years. A case control study.* JNNP 2008;79(4):407-414.
6. Dolezal, O., Balachandran, S., Seidl, Z., Vaneckova, M., Tekwe, C.I., Bergsland, N., Dwyer, M.G., Zivadinov, R. *Detection of cortical lesions is dependent on choice of slice thickness in patients with multiple sclerosis.* Int Rev Neurobiol 2007;79C:475-489.
7. Tekok-Kilic, A., Benedict, R.H., Weinstock-Guttman, B., Dwyer, M.G., Carone, D., Srinivasaraghavan, B., Yella, V., Abdelrahman, N., Munschauer, F.E., Bakshi, R., Zivadinov, R. *Independent contributions of cortical gray matter atrophy and ventricle enlargement for predicting neuropsychological impairment in multiple sclerosis.* Neuroimage 2007;36:1294-1300.
8. Tavazzi, E., Dwyer, M.G., Weinstock-Guttman, B., Lema, J., Bastianello, S., Bergamaschi, R., Cosi, V., Benedict, R.H.B., Munschauer, F.E., Zivadinov, R. *Quantitative diffusion weighted imaging measures in patients with multiple sclerosis.* Neuroimage 2007;36:746-754.

9. Parmenter, B.A., Zivadinov, R., Kerenyi, L., Gavett, R., Weinstock-Guttman, B., Dwyer, M.G., Garg, N., Munschauer, F.E., Benedict, R.H.B. *Validity of the Wisconsin Card Sorting and Delis-Kaplan Executive Function System (DKEFS) sorting tests in multiple sclerosis.* J Clin Exp Neuropsychol 2007;29:215-223.
10. Benedict, R.H.B., Bruce, J., Dwyer, M.G., Abdelrahman, N., Hussein, S., Weinstock-Guttman, B., Garg, N., Munschauer, F.E., Zivadinov, R. *Neocortical atrophy, third ventricular width, and cognitive dysfunction in multiple sclerosis.* Arch Neurol 2006;63:1301-1306
11. Fritz, D.A., Dwyer, M.G., Bagnato F., Watts, K.L., Bratina, A., Zorzon, M., Durastanti, V., Locatelli, L., Millefiorini, E., Zivadinov, R. *Effect of MRI coregistration on serial short-term brain volume changes in multiple sclerosis.* Neurol Res 2006;28:275-79.
12. Carone, D.A., Benedict, R.H.B., Dwyer, M.G., Srinivasaraghavan, B., Cookfair, D.L., Tjoa, C.W., Watts, K.L., Zivadinov, R. *Semiautomatic brain region extraction (SABRE) reveals superior cortical and deep gray matter atrophy in MS.* Neuroimage 2006;29(2):505-514.
13. Zivadinov, R., Grop, A., Sharma, J., Bratina, A., Tjoa, C.W., Dwyer, M.G., Zorzon, M. *Reproducibility and accuracy of quantitative MRI techniques to measure whole brain atrophy in relapsing-remitting multiple sclerosis.* J Neuroimaging 2005;15:27-36.
14. Zivadinov, R., Bagnato, F., Nasuelli, D., Bastianello, S., Bratina, A., Locatelli, L., Watts, K., Finamore, L., Grop, A., Dwyer, M.G., Catalan, M., Clemenzi, M., Millefiorini, E., Bakshi, R., Zorzon, M. *Letter to the Editor: Short-term brain atrophy changes in relapsing-remitting multiple sclerosis.* J Neurol Sci 2005;231(1-2):103-104.
15. Zivadinov, R., Bagnato, F., Nasuelli, D., Bastianello, S., Bratina, A., Locatelli, L., Watts, K., Finamore, L., Grop, A., Dwyer, M.G., Catalan, M., Clemenzi, M., Millefiorini, E., Bakshi, R., Zorzon, M. *Short-term brain atrophy changes in relapsing-remitting multiple sclerosis.* J Neurol Sci 2004;223:185-93.

PAPERS IN PRESS

Papers in press are listed in reverse chronological order. The first author listed is the principal/corresponding author writing the article. The last author listed is the second most important contributor, who serves as a mentor/guide or corresponding author for the research. Remaining authors are listed in descending order based on their level of contribution.

1. Dwyer, M.G., Bergsland, N., Saluste, E., Sharma, J., Jaisani, Z., Durfee, J., Abdelrahman, N., Minagar, A., Hoque, R., Munschauer, F.E., Zivadinov, R. *Application of hidden Markov random field (HMRF) approach for quantification of perfusion/diffusion mismatch in acute ischemic stroke.* Neurol Res (CC; PBM)
2. Zivadinov, R., Bergsland, N., Stosic, M., Sharma, J., Nussenbaum, F., Durfee, J., Hani, N., Abdelrahman, N., Jaisani, Z., Minagar, A., Hoque, R., Munschauer, F.E., Dwyer, M.G. *Use of perfusion- and diffusion-weighted imaging in differential diagnosis of acute and chronic ischemic stroke and multiple sclerosis.* Neurol Res (CC; PBM)
3. Benedict, R.H.B., Hussein, S., Englert, J., Dwyer, M.G., Abdelrahman, N., Cox, J.L., Munschauer, F.E., Weinstock-Guttman, B., Zivadinov, R. *Cortical atrophy and personality in multiple sclerosis.* Neuropsychology (CC; PBM)
4. Zivadinov, R., Reder, A., Filippi, M., Minagar, A., Stve, O., Lassmann, H., Racke, M., Dwyer, M.G., Frohman, E.M., Khan, O. *Mechanisms of action of disease-modifying agents and brain volume changes in multiple sclerosis.* Neurology (CC; PBM)

PAPERS IN PREPARATION

Papers in preparation are listed in reverse chronological order. The first author listed is the principal/corresponding author writing the article. The last author listed is the second most important contributor, who serves as a mentor/guide or corresponding author for the research. Remaining authors are listed in descending order based on their level of contribution.

1. Dwyer, M.G., Fritz, D.A., Bergsland, N.P., Hussein, S., Zivadinov, R. *Impact of spatial distribution of T2 and T1 lesions on clinical disability and processing speed in patients with multiple sclerosis.*
2. Dwyer, M.G., Fritz, D.A., Zivadinov, R. *A novel approach for unsupervised classification of lesions on multispectral MRI data.*
3. Fritz, D.A., Dwyer, M.G., Quadros, C., Hussein, S., Zivadinov, R. *T1 intensity differences from normal appearing white matter in hypointense lesions on MRI are related to clinical status in multiple sclerosis.*

PUBLISHED
ABSTRACTS

Published abstracts are listed in reverse chronological order. The first author listed is the principal/corresponding author who performed the majority of the research. The last author listed is the second most important contributor, who served as a mentor/guide for the research. Remaining authors are listed in descending order based on their level of contribution.

1. Zivadinov, R., Bergsland, N., Fritz, D., Hani, N., Nussenbaum, F., Weinstock-Guttman, B., Durfee, J., Abdelrahman, N., Hussein, S., DeBruijn, M., Cox, J.L., Dwyer, M.G.. *Atrophied T2 hyperintense lesion volume is highly predictive of disability progression. A 2-year longitudinal study using voxel-wise dynamic classification.* Proc Soc Magn Reson Med 2008 (in press)
2. Dwyer, M.G., Stosic, M., Hussein, S., Keleman, A., Wack, D., Zivadinov, R. *A voxel-wise random field theory-based magnetization transfer approach for detecting focal demyelination and remyelination in multiple sclerosis.* Proc Soc Magn Reson Med 2008 (in press)
3. Wack, D., Dwyer, M.G., Hussein, S., Caiola, C., Hojczyk, P., Durfee, J., Zivadinov, R. *Automated lesion discrimination and outlining.* Proc Soc Magn Reson Med 2008 (in press)
4. Dalaker, T.O., Larsen, J.P., Bergsland, N., Beyer, M., Alves, G., Dwyer, M.G., Tysnes, O.B., Benedict, R.H.B., Kelemen, A., Zivadinov, R. *Brain atrophy and white matter hyperintensities in early incident Parkinson disease. A large case-control study.* Proc Soc Magn Reson Med 2008 (in press)
5. Ramasamy, D.P., Dwyer, M.G., Cox, J.L., Stosic, M., Fritz, D., Zivadinov, R. *Different patterns of regional subcortical and cortical atrophy in patients with multiple sclerosis. A case control study.* Proc Soc Magn Reson Med 2008 (in press)
6. Dwyer, M.G., Bergsland, N., Saluste, E., Sharma, J., Jaisani, Z., Durfee, J., Abdelrahman, N., Minagar, A., Hoque, R., Munschauer, F.E., Zivadinov, R. *Application of Hidden Markov Random Field (HMRF) approach for quantification of perfusion/diffusion mismatch in acute ischemic stroke.* Neurology 2008;70 (Suppl 1):IN5-2.005, A416.
7. Dwyer, M.G., Stosic, M., Hussein, S., Keleman, A., Wack, D., Zivadinov, R. *A voxel-wise random field theory-based magnetization transfer approach for detecting focal demyelination and remyelination in multiple sclerosis.* Neurology 2008;70 (Suppl 1):P08.150, A466.
8. Zivadinov, R., Stosic, M., Vutla, B., Ambrus, J., Ramanathan, M., Munschauer, F.E., Hussein, S., Hashmi, K., Dwyer, M.G., Weinstock-Guttman, B. *Multiple sclerosis patients with presence of anti-phospholipid antibodies develop more severe brain damage over 3 years.* Neurology 2008;70 (Suppl 1):P08.164, A470.
9. Zivadinov, R., Cutter, G., Rossman, H., Weinstock-Guttman, B., Durfee, J., Cox, J.L., Remington, G., Perez, S., Dwyer, M.G., Racke, M., Shah, A., Frohman, E.M. *A randomized, open-label, parallel-group, multicenter study to determine the safety and efficacy of mycophenolate mofetil (Cellcept) in mono- and combination- therapy with interferon beta-1a (Avonex), in patients with relapsing-remitting multiple sclerosis.* Neurology 2008;70 (Suppl 1):P02.175, A94.
10. Stosic, M., Weinstock-Guttman, B., Munschauer, F.E., Abdelrahman, N., Hussein, S., Ramanathan, M., Durfee, J., Teter, B.E., Hojnacki, D., Dwyer, M.G., Cox, J.L., DeBruijn, M., Nussenbaum, F., Zivadinov, R. *Gray matter atrophy and destruction of T1 lesions are more*

frequent in familial cases with multiple sclerosis, and especially in those with first degree relatives. Neurology 2008;70 (Suppl 1):P08.153, A467.

11. Dalaker, T.O., Larsen, J.P., Bergsland, N., Beyer, M., Alves, G., Dwyer, M.G., Tysnes, O.B., Benedict, R.H.B., Kelemen, A., Zivadinov, R. *Extent of brain atrophy and white matter hyperintensities in early Parkinson Disease. A large case-control study.* Neurology 2008;70 (Suppl 1):P08.023, A437.
12. Bergsland, N., Dwyer, M.G., Stosic, M., Sharma, J., Nussenbaum, F., Durfee, J., Hani, N., Abdelrahman, N., Jaisani, Z., Minagar, A., Hoque, R., Munschauer, F.E., Zivadinov, R. *Use of perfusion- and diffusion-weighted imaging in differential diagnosis of acute and chronic ischemic and demyelinating lesions.* Neurology 2008;70 (Suppl 1):P08.183, A474.
13. Raj, B., Weinstock-Guttman, B., Teter, B., Stosic, M., Cox, J.L., Hussein, S., Durfee, J., Dwyer, M.G., Bergsland, N., Abdelrahman, N., Hojnacki, D., Munschauer, F.E., Zivadinov, R. *Presence of concomitant Th1-mediated concomitant diseases predicts more severe MRI outcome on non-conventional MRI measures in patients with multiple sclerosis.* Neurology 2008;70 (Suppl 1):P08.172, A472.
14. Durfee, J., Weinstock-Guttman, B., Stosic, M., Abdelrahman, N., Teter, B.E., Munschauer, F.E., Hussein, S., Dwyer, M.G., Cox, J.L., Hani, N., Nussenbaum, F., Zivadinov, R. *Cigarette smoking accelerates the evolution of brain atrophy and influences the severity of blood-brain-barrier disruption in multiple sclerosis.* Neurology 2008;70 (Suppl 1):P08.147, A465.
15. Antulov, R., Weinstock-Guttman, B., Cox, J.L., Hussein, S., Durfee, J., Dwyer, M.G., Bergsland, N., Abdelrahman, N., Stosic, M., Hojnacki, D., Munschauer, F.E., Miletic, D., Zivadinov, R. *Gender related differences in multiple sclerosis. A large cohort study of conventional and non-conventional MRI measures.* Neurology 2008;70 (Suppl 1):P08.144, A464.
16. Zivadinov, R., Ramasamy, D., Havrdova, E., Bergsland, N., Seidl, Z., Abdelrahman, N., Dwyer, M.G., Vaneckova, M., Horakova, D. *A longitudinal study of deep gray matter atrophy in patients with multiple sclerosis. A case control study.* Mult Scler 2007;13 (Suppl 2):P606:S182.
17. Zivadinov, R., Munschauer, F.E., Abdelrahman, N., Hussein, S., Ramanathan, M., Durfee, J., Teter, B.E., Hojnacki, D., Dwyer, M.G., Cox, J.L., De Brujin, M., Stosic, M., Nussenbaum, F., Weinstock-Guttman, B. *Conventional and non-conventional MRI characteristics of familial and sporadic multiple sclerosis.* Mult Scler 2007;13 (Suppl 2):P271:S79.
18. Ramasamy, D.P., Benedict, R.H.B., Dwyer, M.G., Stosic, M., Fritz, D., Zivadinov, R. *Extent of subcortical and cortical atrophy and disease severity in patients with multiple sclerosis. A case control study.* Mult Scler 2007;13 (Suppl 2):P601:S180.
19. Zivadinov, R., Frohman, T., Cox, J.L., Dwyer, M.G., Hussein, S., Salter, A., Conger, A., Frohman, E.M. *Relationship of brain MRI measures and retinal nerve fiber layer thickness, as assessed by OCT and GDx.* Mult Scler 2007;13 (Suppl 2):P291:S85-86.
20. Dwyer, M.G., Frohman, E.M., Hussein, S., Cox, J.L., Frohman, T., Salter, A., Conger, A., Zivadinov, R. *Optic nerve MRI measures and retinal nerve fiber layer thickness, as assessed by OCT and GDx.* Mult Scler 2007;13 (Suppl 2):P292:S86.
21. Zivadinov, R., Stosic, M., Abdelrahman, N., Teter, B.E., Munschauer, F.E., Hussein, S., Durfee, J., Dwyer, M.G., Cox, J.L., Hani, N., Nussenbaum, F., Weinstock-Guttman, B. *Cigarette smoking and MRI characteristics in multiple sclerosis.* Mult Scler 2007;13 (Suppl 2):P607:S182-183.
22. Cox, J.L., Ramanathan, M., Ramasamy, D.P., Weinstock-Gutman, B., Bergsland, N., Benedict, R.H.B., Dwyer, M.G., Zivadinov, R. *Reduced gray matter volume in multiple sclerosis carriers of APOE e4 allele. A voxel based morphometry study.* Mult Scler 2007;13 (Suppl 2):P285:S83-84.

23. Ramasamy, D.P., Ramanathan, M., Cox, J.L., Weinstock-Gutman, B., Bergsland, N., Benedict, R.H.B., Dwyer, M.G., Zivadinov, R. *Protective effect of Met66 allele of BDNF polymorphism on gray matter volume in patients with multiple sclerosis: A voxel based morphometry study.* Mult Scler 2007;13 (Suppl 2):P284:S83.
24. Zivadinov, R., Fritz, D., Hani, N., Nussenbaum, F., Weinstock-Guttman, B., Durfee, J., Abdelrahman, N., Hussein, S., De Brujin, M., Cox, J.L., Dwyer, M.G. *Voxel-wise dynamic classification of new, stable, resolving and atrophied T2 hyperintense lesion volumes in patients with multiple sclerosis. A 2-year longitudinal study.* Mult Scler 2007;13 (Suppl 2):P605:S182.
25. Dwyer, M.G., Hussein, S., Frohman, E.M., Frohman, T., Benedict, R.H.B., Zivadinov, R. *A robust shape-based approach to optic nerve segmentation and atrophy measurement using 1.5 and 3.0T MRI.* Mult Scler 2007;13 (Suppl 2):P290:S85.
26. Horakova, D., Racek, P., Havrdova, E., Liskova, P., Nytrova, P., Vaneckova, M., Seidl, Z., Dwyer, M.G., Bergsland, N., Zivadinov, R. *Predictive value of different cerebrospinal fluid parameters in RRMS. Results from 5-year clinical trial.* Mult Scler 2007;13 (Suppl 2):P718:S217.
27. Wack, D., Dwyer, M.G., Zivadinov, R. *Evaluation of stochastic discrimination to locate brain lesions on MR scans of MS patients.* HBM 2007 (in press).
28. Ramasamy, D.P., Fritz, D., Cox, J.L., Abdelrahman, N., Hussein, S., Dwyer, M.G., Zivadinov, R. *Extent of deep gray matter atrophy in patients with multiple sclerosis. A case control study.* J Neurol 2006;254(Suppl 3):O65,14.
29. Benedict, R., Ramasamy, D.P., Cox, J.L., Dwyer, M.G., Fritz, D., Munschauer, F.E., Weinstock-Guttman, B., Zivadinov, R. *Hippocampal volume does not correlate with memory impairment in multiple sclerosis.* J Neurol 2006;254(Suppl 3):O67,14.
30. Horakova, D., Dwyer, M.G., Havrdova, E., Cox, J.L., Dolezal, O., Bergsland, N., Rimes, B., Krasensky, J., Vaneckova, M., Zivadinov, R. *Is MRI a reliable tool for prediction of disability progression in patients with early relapsing-remitting multiple sclerosis? A 5-year longitudinal study.* J Neurol 2006;254(Suppl 3):O68,14-15.
31. Zivadinov, R., Yella, V., Cox, J.L., Abdelrahman, N., Hussein, S., Rimes, B., Dwyer, M.G. *Severity of spinal cord atrophy is moderately related to severity of brain MRI measures in patients with multiple sclerosis.* J Neurol 2006;254(Suppl 3):O181,45.
32. Dwyer, M.G., Dolezal, O., Hussein, S., Horakova, D., Havrdova, E., Cox, J.L., Zivadinov, R. *Development of central atrophy may lead to underestimation of lesion accrual in patients with multiple sclerosis.* J Neurol 2006;254(Suppl 3):P752,189.
33. Horakova, D., Cox, J.L., Havrdova, E., Hussein, S., Dolezal, O., Cookfair, D., Dwyer, M.G., Seidl, Z., Bergsland, N., Zivadinov, R. *Evolution of different MRI measures in patients with active relapsing-remitting multiple sclerosis over 2 and 5 years. A case control study.* J Neurol 2006;254(Suppl 3):P752,190.
34. Dwyer, M.G., Fritz, D., Cox, J.L., Ambwani, S., Saluste, E., Matyas, R., Zivadinov, R. *One third of the anterior portion of the optic nerve is susceptible to motion of different eye direction.* Proc Soc Magn Reson Med 2007;P2063:407.
35. Dwyer, M.G., Dolezal, O., Hussein, S., Horakova, D., Havrdova, E., Cox, J.L., Zivadinov, R. *Development of central atrophy may lead to underestimation of lesion accrual in patients with multiple sclerosis.* Proc Soc Magn Reson Med 2007;P2198:432.
36. Havrdova, E., Horakova, D., Pospisilova, L., Cox, J.L., Dwyer, M.G., Seidl, Z., Vaneckova, M., Zivadinov, R. *ApoE e4 positivity does not predict more severe clinical and mri outcome. A 5-year longitudinal study.* Neurology 2007;68 (Suppl 1):P04.079, A164.
37. Havrdova, E., Zivadinov, R., Krasensky, J., Dwyer, M.G., Novakova, I., Dolezal, O., Ticha, V., Svobodnik, A., Seidl, Z., Houzvickova, E., Horakova, D. *Intramuscular interferon beta-1a, azathioprine, and corticosteroid combination therapy in patients with relapsing-remitting multiple sclerosis: 5-year clinical efficacy results.* Neurology 2007;68 (Suppl 1):P06.089, A277.

38. Havrdova, E., Zivadinov, R., Krasensky, J., Dwyer, M.G., Novakova, I., Dolezal, O., Ticha, V., Svobodnik, A., Seidl, Z., Houzviczkova, E., Horakova, D. *Efficacy results from a randomised, double-blind, placebo-controlled study of intramuscular interferon beta-1a, azathioprine, and corticosteroid combination therapy in patients with relapsing-remitting multiple sclerosis.* *Mult Scler* 2006;12(Suppl 1):061,S11.
39. Zivadinov, R., Horakova, D., Dwyer, M.G., Dolezal, O., Krasensky, J., Bergsland, N., Cox, J.L., Novakova, I., Ticha, I., Balachandran, S., Svobodnik, A., Seidl, Z., Vaneckova, M., Havrdova, E. *MRI results from a randomised, double-blind, placebo-controlled study of intramuscular interferon beta-1a, azathioprine, and corticosteroid combination therapy in patients with relapsing-remitting multiple sclerosis.* *Mult Scler* 2006;12(Suppl 1):P701,S200.
40. Zivadinov, R., Cookfair, D.L., Munschauer, F.E., Garg, N., Dwyer, M.G., Cox, J.L., Hussein, S., Abdelrahman, N., Weinstock-Guttman, B. *Effect of Interferon beta-1a on changes of non-conventional MRI measures in patients with multiple sclerosis.* *Mult Scler* 2006;12(Suppl 1):P700,S199-200.
41. Zivadinov, R., Hussein, S., Abdelrahman, N., Cookfair, D.L., Meyer, M., Garg, N., Cox, J.L., Dwyer, M.G., Weinstock-Guttman, B. *Effect of glatiramer acetate on diffusion imaging in patients with multiple sclerosis.* *Mult Scler* 2006;12(Suppl 1):P371,S99.
42. Zivadinov, R., Yella, V., Dwyer, M.G., Hussein, S., Cox, J.L. *Evidence for cortical atrophy in patients with clinically isolated syndrome.* *Mult Scler* 2006;12(Suppl 1):P623,S175.
43. Zivadinov, R., Bergsland, N., Cox, J.L., Munschauer, F.E., Abdelrahman, N., Garg, N., Meyer, M., Dwyer, M.G., Hussein, S., Weinstock-Guttman, B. *Evidence for cortical atrophy in a large sample of patients with multiple sclerosis.* *Mult Scler* 2006;12(Suppl 1):P624,S175-176.
44. Fritz, D.A., Dwyer, M.G., Quadros, C., Abdelrahman, N., Yella, V., Hussein, S., Zivadinov, R. *T1 intensity differences to normal appearing white matter in hypointense lesions on MRI are related to clinical status in multiple sclerosis.* *J Neurol* 2006;253(Suppl 2):O104,26.
45. Dolezal, O., Balachandran, S., Seidl, Z., Vaneckova, M., Tekwe, C.I., Bergsland, N.P., Dwyer, M.G., Zivadinov, R. *Detection of cortical lesions is dependent on choice of slice thickness in patients with multiple sclerosis.* *J Neurol* 2006;253(Suppl 2):O107,27.
46. Dwyer, M.G., Benedict, R.H.B., Bergsland, N., Srinivasaraghavan, B., Zivadinov, R. *Impact of spatial distribution of T2 and T1 lesion volume on processing speed in patients with multiple sclerosis.* *J Neurol* 2006;253(Suppl 2):O111,28.
47. Dwyer, M.G., Hussein, S., Chandrasekhar, R., Abdelrahman, N., Bergsland, N.P., Zivadinov, R. *MTR characteristics of lesions with differing intensity and/or morphological patterns.* *J Neurol* 2006;253(Suppl 2):P220,56.
48. Dolezal, O., Tekwe, C.I., Horakova, D., Havrdova, E., Balachandran, S., Bergsland, N., Dwyer, M.G., Zivadinov, R. *Evolution of different brain atrophy measures in patients with relapsing-remitting multiple sclerosis over 2 years.* *J Neurol* 2006;253(Suppl 2):P226,57-58.
49. Dolezal, O., Tekwe, C.I., Horakova, D., Seidl, Z., Havrdova, E., Balachandran, S., Bergsland, N., Dwyer, M.G., Zivadinov, R. *Evolution of grey matter and central atrophy in early relapsing-remitting multiple sclerosis is most responsible for development of disability.* *J Neurol* 2006;253(Suppl 2):P227,58.
50. Zivadinov, R., Dolezal, O., Tekwe, C.I., Horakova, D., Dwyer, M.G., Balachandran, S., Bergsland, N., Havrdova, E. *A longitudinal study of cortical atrophy in patients with relapsing-remitting multiple sclerosis over a 2-year period.* *J Neurol* 2006;253(Suppl 2):P222,56-57.
51. Dwyer, M.G., Benedict, R.H.B., Srinivasaraghavan, B., Carone, D.A., Yella, V., Abdelrahman, N., Zivadinov, R. *Regional MRI measures and disability in multiple sclerosis.* *J Neurol* 2006;253(Suppl 2):P221,56.

52. Dwyer, M.G., Weinstock-Guttman, B., Munschauer, F.E., Hussein, S., Abdelrahman, N., Yella, V., Zivadinov, R. *Impact of spatial distribution of T2 and T1 lesion volume on disability and brain atrophy.* J Neurol 2006;253(Suppl 2):P321,81.
53. Benedict, R.H.B., Kilic, A., Hussein, S., Dwyer, M.G., Abdelrahman, N., Weinstock-Guttman, B., Zivadinov, R. *Correlation of morphological characteristics of T2 hyperintense lesions with neuropsychological testing in multiple sclerosis.* J Neurol 2006;253(Suppl 2):P323,82.
54. Zivadinov, R., Benedict, R.H.B., Srinivasaraghavan, B., Carone, D.A., Yella, V., Abdelrahman, V., Dwyer, M.G. *Regional MRI measures and disability in multiple sclerosis.* Proc Soc Magn Reson Med 2006;P2664:514.
55. Dwyer, M.G., Weinstock-Guttman, B., Munschauer, F.E., Hussein, S., Abdelrahman, N., Yella, V., Zivadinov, R. *Impact of spatial distribution of T2 and T1 lesion volume on disability and brain atrophy.* Proc Soc Magn Reson Med 2006;P972:212.
56. Abdelrahman, N., Weinstock-Guttman, B., Garg, N., Dwyer, M.G., Hussein, S., Bergsland, N., Munschauer, F.E., Zivadinov, R. *MRI characteristics of African-Americans vs. caucasian/hispanic Americans with relapsing-remitting and secondary-progressive multiple sclerosis.* Neurology 2006;66 (Suppl 2):P02.092,A96-7.
57. Yella, V., Dwyer, M.G., Banas, A., Abdelrahman, N., Zivadinov, R. *Spinal cord atrophy measurement in multiple sclerosis.* Neurology 2006;66 (Suppl 2):P02.091, A96.
58. Fritz, D.A., Weinstock-Guttman, B., Hussein, S., Dwyer, M.G., Tjoa, C.W., Abdelrahman, N., Munschauer, F.E., Garg, N., Zivadinov, R. *Value of brain atrophy and magnetization transfer MRI measures in predicting disability in patients with multiple sclerosis.* Neurology 2006;66 (Suppl 2):P02.097, A98.
59. Carone, D.A., Bruce, J., Benedict, R.H.B., Yella, V., Dwyer, M.G., Tjoa, C.W., Zivadinov, R. *Regional lesion volume predicts total and then regional gray matter atrophy in multiple sclerosis.* Neurology 2006;66 (Suppl 2):P02.101, A99.
60. Dwyer, M.G., Abdelrahman, N., Weinstock-Guttman, B., Srinivasaraghavan, B., Prakash, R., Hussein, S., Bergsland, N.P., Garg, N., Meyer, M.G., Munschauer, F.E., Zivadinov, R. *Quantitative analysis of lesion load progression in advanced multiple sclerosis.* Mult Scler 2005;11(Suppl 1);68,S14.
61. Zivadinov, R., Srinivasaraghavan, B., Abdelrahman, N., Hussein, S., Bergsland, N.P., Dwyer, M.G. *Extent of gray and white matter atrophy in patients with multiple sclerosis is inversely related to disease duration and disability.* Mult Scler 2005;11(Suppl 1);P556;S145.
62. Zivadinov, R., Srinivasaraghavan, B., Abdelrahman, N., Hussein, S., Dwyer, M.G. *Accuracy of brain segmentation with automated techniques.* Mult Scler 2005;11(Suppl 1);P554;S145.
63. Zivadinov, R., Weinstock-Guttman, B., Dwyer, M.G., Abdelrahman, N., Hussein, S., Fritz, D.A., Sarabjot, S., Munschauer, F.E. *Ring-enhancement pattern predicts more severe black hole lesion volume accumulation in relapsing-remitting multiple sclerosis.* Mult Scler 2005;11(Suppl 1);P559;S146.
64. Tjoa, C.W., Dwyer, M.G., Hussein, S., Zivadinov, R. *Brain segmentation inconsistency significantly impacts magnetization transfer measures.* Mult Scler 2005;11(Suppl 1);P561;S147.
65. Banas, A., Dwyer, M.G., Yella, V., Abdelrahman, N., Zivadinov, R. *Comparison of four different measures for evaluation of spinal cord atrophy in patients with multiple sclerosis.* Mult Scler 2005;11(Suppl 1);P563;S147.
66. Zivadinov, R., Cookfair, D., Weinstock-Guttman, B., Dwyer, M.G., Munschauer, F.E., Benedict, R.H.B. *Z-MRI composite scores better predict disease progression in patients with multiple sclerosis than individual MRI measures.* Mult Scler 2005;11(Suppl 1);P555;S145.
67. Chandrasekhar, R., Dwyer, M.G., Sampath, T., Lema, J., Srinivasaraghavan, B., Zivadinov, R. *Serial linking of T2 lesions in patients with multiple sclerosis.* Mult Scler 2005;11(Suppl 1);P564;S148.

68. Zivadinov, R., Chandrasekhar, R., Sampath, T., Prakash, R., Srinivasaraghavan, B., Abdelrahman, N., Dwyer, M.G. *Automated evaluation of confluent and non-confluent T2 lesion volume using supervised and unsupervised machine learning approaches.* Mult Scler 2005;11(Suppl 1);P557;S146.
69. Zivadinov, R., Tavazzi, E., Weinstock-Guttman, B., Bastianello, S., Bergamaschi, R., Cosi, V., Benedict, R., Munschauer, F.E., Dwyer, M.G. *Diffusion-weighted entropy in patients with multiple sclerosis.* Mult Scler 2005;11(Suppl 1);P560;S146.
70. Dwyer, M.G., Srinivasaraghavan, B., Watts, K., Abdelrahman, N., Hussein, S., Zivadinov, R. *Impact and extent of hypointense lesion volume misclassification on fully automated gray and white matter segmentation in patients with multiple sclerosis.* Mult Scler 2005;11(Suppl 1);P567;S149.
71. Dwyer, M.G., Bergsland, N.P., Zivadinov, R. *Application of automated magnetic resonance imaging database model in multiple sclerosis studies.* Mult Scler 2005;11(Suppl 1);P566;S148.
72. Tjoa, C.W., Dwyer, M.G., Abdelrahman, N., Zivadinov, R. *Quantitative magnetization transfer measures and different off-water resonance magnetization pulse frequency.* Mult Scler 2005;11(Suppl 1);P561;S147.
73. Zivadinov, R., Tavazzi, E., Srinivasaraghavan, B., Bastianello, S., Bergamaschi, R., Cosi, V., Dwyer, M.G. *Ring-enhancing lesions in multiple sclerosis: different patterns and their correlation with clinical disability.* Mult Scler 2005;11(Suppl 1);P558;S146.
74. Dwyer, M.G., Carone, D.A., Benedict, R.H., Srinivasaraghavan, B., Zivadinov, R. *Semi-automated brain region extraction using automatically aligned composite images with various degrees of brain atrophy.* Mult Scler 2005;11(Suppl 1);P565;S148.
75. Tjoa, C.W., Srinivasaraghavan, B., Carone, D.A., Dwyer, M.G., Benedict, R.H.B., Zivadinov, R. *Regional analysis of automated magnetization transfer in multiple sclerosis.* Proc Soc Magn Reson Med 2005;P1247:260.
76. Tavazzi, E., Dwyer, M.G., Weinstock-Guttman, B., Lema, J.M., Bastianello, S., Bergamaschi, R., Cosi, V., Benedict, R.H.B., Munschauer, F.E., Zivadinov, R. *Quantitative diffusion weighted imaging measures in multiple sclerosis patients.* Proc Soc Magn Reson Med 2005;P1366:281.
77. Christodoulou, C., Krupp, L.B., Dwyer, M.G., Melville, P., Scherl, W.F., Morgan, T., MacAllister, W.S., Zivadinov, R. *Relation of cognitive dysfunction to multiple neuroimaging measures in multiple sclerosis over time.* Neurology 2005;64 (Suppl 1):S26.003,A259-60.
78. Benedict, R.H.B., Dwyer, M.G., Weinstock-Guttman, B., Tjoa, C.W., Tavazzi, E., Munschauer, F.E., Zivadinov, R. *Diffusion weighted imaging measures are correlated with multiple cognitive domains in multiple sclerosis.* Neurology 2005;64 (Suppl 1):P04.123,A241-2.
79. Benedict, R.H.B., Tjoa, C.W., Srinivasaraghavan, B., Carone, D.A., Dwyer, M.G., Tavazzi, E., Munschauer, F.E., Weinstock-Guttman, B., Bakshi, R., Zivadinov, R. *Correlation of parcelated brain measures with neuropsychological testing in MS: comparing regional brain atrophy and magnetization transfer ratio.* Neurology 2005;64 (Suppl 1):P04.119,A240.
80. Carone, D.A., Benedict, R.H.B., Dwyer, M.G., Srinivasaraghavan, B., Tjoa, C.W., Watts, K.L., Zivadinov, R. *Diffuse regional atrophy in multiple sclerosis is mostly caused by gray matter destruction.* Neurology 2005;64 (Suppl 1):P04.104,A236.
81. Tavazzi, E., Dwyer, M.G., Lema, J.M., Srinivasaraghavan, B., Bastianello, S., Bergamaschi, R., Cosi, V., Zivadinov, R. *Two distinct types of ring-enhancing lesion in patients with multiple sclerosis.* Neurology 2005;64 (Suppl 1):P04.109,A237.
82. Bakshi, R., Benedict, R.H.B., Locatelli, L., Dwyer, M.G., Catalan, M., Weinstock-Guttman, B., Zivadinov, R. *Regional brain atrophy correlates with depression and quality of life in multiple sclerosis.* Neurology 2005;64 (Suppl 1):P04.121,A241.

83. Zivadinov, R., Watts, K.L., Srinivasaraghavan, B., Dwyer, M.G. *Skull stripping errors affect significantly the measurement of whole brain, grey and white matter atrophy.* Mult Scler 2004;10(Suppl 2);P550,S233.
84. Dwyer, M.G., Watts, K.L., Bagnato, F., Locatelli, L., Maggiore, C., Grop, A., Millefiorini, E., Zorzon, M., Zivadinov, R. *Quantitative evaluation of accuracy with different brain atrophy techniques.* Ann Neurol 2004;56(Suppl 8):P273,S65.
85. Watts, K.L., Dwyer, M.G., Srinivasaraghavan, B., Zivadinov, R. *Measurement of cerebral grey and white matter atrophy in patients with multiple sclerosis.* Ann Neurol 2004;56(Suppl 8):P272,S65.
86. Zivadinov, R., Dwyer, M., Watts, K.L. *Measurement of cerebral grey and white matter atrophy from various MRI pulse sequences using different segmentation algorithms.* J Neurol 2004;251(Suppl 3):P335,S89.
87. Zivadinov, R., Watts, K.L., Bagnato, F., Bratina, A., Dwyer, M.G., Zorzon, M., Clemenzi, L., Pierallini, A., Bakshi, R. *Effect of MRI coregistration on serial brain atrophy measurement in multiple sclerosis.* J Neurol 2004;251(Suppl 3):P331,S88.
88. Zivadinov, R., Dwyer, M.G., Ludwig, S.B., Watts, K.L. *Estimation of cerebral grey and white matter atrophy from various MRI pulse sequences.* International J of MS Care 2004;P08:66.
89. Zivadinov, R., Dwyer, M.G., Bagnato, F., Watts, K.L., Locatelli, L., Ludwig, S.B., Bratina, A., Poonen, T., Millefiorini, E. *Accuracy of segmentation with different brain atrophy techniques.* International J of MS Care 2004;P07:65.

CONFERENCE
PROCEEDINGS /
PRESENTATIONS

Presentations are listed in reverse chronological order. The first author listed is the principal/corresponding author who performed the research and presented the material. The last author listed is the second most important contributor, who served as a mentor/guide for the research. Remaining authors are listed in descending order based on their level of contribution.

1. Zivadinov, R., Yella, V., Cox, J.L., Abdelrahman, N., Hussein, S., Rimes, B., Dwyer, M.G. *Severity of spinal cord atrophy is moderately related to severity of brain MRI measures in patients with multiple sclerosis.* 17th meeting of European Neurological Society, Rhodos, Greece
2. Ramasamy, D.P., Fritz, D., Cox, J.L., Abdelrahman, N., Hussein, S., Dwyer, M.G., Zivadinov, R. *Extent of deep gray matter atrophy in patients with multiple sclerosis. A case control study.* 17th meeting of European Neurological Society, Rhodos, Greece
3. Benedict, R., Ramasamy, D.P., Cox, J.L., Dwyer, M.G., Fritz, D., Munschauer, F.E., Weinstock-Guttman, B., Zivadinov, R. *Hippocampal volume does not correlate with memory impairment in multiple sclerosis.* 17th meeting of European Neurological Society, Rhodos, Greece
4. Horakova, D., Dwyer, M.G., Havrdova, E., Cox, J.L., Dolezal, O., Bergsland, N., Rimes, B., Krasensky, J., Vaneckova, M., Zivadinov, R. *Is MRI a reliable tool for prediction of disability progression in patients with early relapsing-remitting multiple sclerosis? A 5-year longitudinal study.* 17th meeting of European Neurological Society, Rhodos, Greece
5. Havrdova, E., Zivadinov, R., Krasensky, J., Dwyer, M.G., Novakova, I., Dolezal, O., Ticha, V., Svobodnik, A., Seidl, Z., Houzvickova, E., Horakova, D. *Efficacy results from a randomised, double-blind, placebo-controlled study of intramuscular interferon beta-1a, azathioprine, and corticosteroid combination therapy in patients with relapsing-remitting multiple sclerosis.* 22nd Congress of the European Committee for Treatment and Research in Multiple Sclerosis, Madrid, Spain September 27-30, 2006.
6. Dolezal, O., Balachandran, S., Seidl, Z., Vaneckova, M., Tekwe, C.I., Bergsland, N.P., Dwyer, M.G., Zivadinov, R. *Detection of cortical lesions is dependent on choice of slice thickness in patients with multiple sclerosis.* 16th meeting of European Neurological Society, Lausanne, Switzerland May 27-31, 2006.

7. Dwyer, M.G., Benedict, R.H.B., Bergsland, N.P., Srinivasaraghavan, B., Zivadinov, R. *Impact of spatial distribution of T2 and T1 lesion volume on processing speed in patients with multiple sclerosis*. 16th meeting of European Neurological Society, Lausanne, Switzerland May 27-31, 2006.
8. Fritz, D.A., Dwyer, M.G., Quadros, C., Abdelrahman, N., Yella, V., Hussein, S., Zivadinov, R. *T1 intensity differences to normal appearing white matter in hypointense lesions on MRI are related to clinical status in multiple sclerosis*. 16th meeting of European Neurological Society, Lausanne, Switzerland May 27-31, 2006.
9. Dwyer, M.G., Abdelrahman, N., Weinstock-Guttman, B., Srinivasaraghavan, B., Prakash, R., Hussein, S., Bergsland, N., Garg, N., Meyer, M.G., Munschauer, F.E., Zivadinov, R. *Quantitative analysis of lesion load progression in advanced multiple sclerosis*. 21st Congress of the European Committee for Treatment and Research in Multiple Sclerosis and 10th Annual Meeting of the Americas Committee for Treatment and Research in Multiple Sclerosis, Thessaloniki, (Greece), September 28 - October 1, 2005.
10. Christodoulou, C., Krupp, L.B., Dwyer, M.G., Melville, P., Scherl, W.F., Morgan, T., MacAllister, W.S., Zivadinov, R. *Relation of cognitive dysfunction to multiple neuroimaging measures in multiple sclerosis over time*. 57th Annual Meeting of American Academy of Neurology, Miami Beach, FL, (USA) April 9 16, 2005.
11. Zivadinov, R., Dwyer, M.G., Bagnato, F., Watts, K.L., Locatelli, L., Ludwig, S.B., Bratina, A., Poonen, T., Millefiorini, E. *Accuracy of segmentation with different brain atrophy techniques*. 18th Annual Meeting of the Consortium of Multiple Sclerosis Centers, Toronto, Canada, June 2-6, 2004.
12. Zivadinov, R., Dwyer, M.G., Ludwig, S.B., Watts, K.L. *Estimation of cerebral grey and white matter atrophy from various MRI pulse sequences*. 18th Annual Meeting of the Consortium of Multiple Sclerosis Centers, Toronto, Canada, June 2-6, 2004.

COURSES TAUGHT / **Monthly Seminar Program: MRI in Multiple Sclerosis** 2005 – Present
 EDUCATIONAL RESPONSIBLE FOR LECTURING ON THE TOPICS OF THE PHYSICS OF MAGNETIC RESONANCE IMAGING, GENERAL IMAGE ANALYSIS TECHNIQUES, AND QUANTITATIVE ANALYSIS OF NON-CONVENTIONAL MRI SEQUENCES TO A TARGET AUDIENCE OF NEUROLOGISTS, MULTIPLE SCLEROSIS SPECIALISTS, NEURORADIOLOGISTS, PHYSICIANS, RESIDENTS, MEDICAL STUDENTS, AND RESEARCH SCHOLARS.
 ACTIVITIES

Monthly Preceptorship Program: MRI in Multiple Sclerosis 2004 – Present
 RESPONSIBLE FOR LECTURING ON THE TOPICS OF THE PHYSICS OF MAGNETIC RESONANCE IMAGING, GENERAL IMAGE ANALYSIS TECHNIQUES, AND QUANTITATIVE ANALYSIS OF NON-CONVENTIONAL MRI SEQUENCES TO A TARGET AUDIENCE OF PHARMACEUTICAL INDUSTRY REPRESENTATIVES.

SUPERVISED **Niels Bergsland (Undergraduate Student)** 2004 – Present
 TRAINEES UNIVERSITY AT BUFFALO, SCHOOL OF MEDICINE AND BIOMEDICAL SCIENCES, COMPUTER SCIENTIST, BUFFALO NEUROIMAGING ANALYSIS CENTER. *RESEARCH PROJECT: BUFFALO NEUROIMAGING ANALYSIS CENTER MRI DATABASE DEVELOPMENT.*

David Fritz (Undergraduate Student) 2005 – 2008
 UNIVERSITY AT BUFFALO, SCHOOL OF MEDICINE AND BIOMEDICAL SCIENCES, COMPUTER SCIENTIST, BUFFALO NEUROIMAGING ANALYSIS CENTER. *RESEARCH PROJECT: BUFFALO NEUROIMAGING ANALYSIS CENTER MRI SOFTWARE DEVELOPMENT.*

Sonal Ambwani (Master Student) 2005 – 2008
 UNIVERSITY AT BUFFALO, SCHOOL OF MEDICINE AND BIOMEDICAL SCIENCES, COMPUTER SCIENTIST, BUFFALO NEUROIMAGING ANALYSIS CENTER. *RESEARCH PROJECT: BUFFALO NEUROIMAGING ANALYSIS CENTER MRI DATABASE DEVELOPMENT.*

Srivats Balchandran (*Master Student*) 2005 – Present
University at Buffalo, School of Medicine and Biomedical Sciences, Computer Scientist, Buffalo Neuroimaging Analysis Center. *Research Project: Buffalo Neuroimaging Analysis Center MRI database development.*

Candice Quadros (*Master Student*) 2005 – 2006
University at Buffalo, School of Medicine and Biomedical Sciences, Research Assistant, Buffalo Neuroimaging Analysis Center. *Research Project: T1 hypointense lesion volume quantification in Multiple Sclerosis.*

Rameela Chandrasekhar (*PhD Student*) 2005
University at Buffalo, School of Medicine and Biomedical Sciences, Computer Scientist, Buffalo Neuroimaging Analysis Center. *Research Project: Software development for calculation of confluent T2-lesion volume.*

Thiru Sampath (*Master Student*) 2004
University at Buffalo, School of Medicine and Biomedical Sciences, Summer MRI Fellowship, Buffalo Neuroimaging Analysis Center. *Research Project: Software development for calculation of confluent T2-lesion volume.*

Kristina Jelnikar (*Graduate Student*) 2004
University at Buffalo, School of Medicine and Biomedical Sciences, Research Assistant, Buffalo Neuroimaging Analysis Center. *Research Project: Buffalo Neuroimaging Analysis Center MRI database development.*

RESEARCH
AGREEMENTS

Research Collaboration Agreement among General Electric Company, The State University of New York at Buffalo, Kaleida Health Systems and University Neurology, Inc.

Role: Co-investigator

Agency: General Electric Company

Aim: The research objectives of this research program are to investigate and develop MR, its applications and technology using GE's MR Systems. Specifically, the research program will include but not be limited to the following goals: (i) the advancement of applications and technical knowledge of MR equipment through a range of investigational subjects, including studies of MR using new acquisition, processing capabilities or protocols for various anatomic regions and indications; and (ii) the determination of differential clinical applications of MR including studies on the cost effectiveness of MR, the utility of MR in predicting or improving patient outcomes, and/or modifying patient management; and (iii) the provision of product planning inputs for the product system design, for upgrades, and for enhancements of the GE MR Systems; and (iv) the performance of studies relating to the development of an integrated examination encompassing imaging, data handling, data processing and other relevant acquisition and analytical capabilities; and (v) the clinical evaluation by the Department and Group of various Works-in-Progress (WIP) as may be requested from time to time by GE.

Period: June, 2005 – June, 2010