

Curriculum Vitae

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Education/Employment History

Professional Preparation

- University of Michigan, Biochemistry/Chemistry B.Sc., 1995
- University of Georgia Inorganic Chemistry Ph.D., 2000 (Michael K. Johnson)
- McGill University, Montreal Neurological Institute Post-Doctoral Fellow, 2005 (Heather D. Durham)

Work Experience and Appointments

- 1992-1995: Co-op student promoted to chemist Dupont Automotive Products, Flint
- 2005-2013: Assistant Professor of Chemistry, Brandeis University
- 2013: Associate Professor of Chemistry and Pharm. Sci., Northeastern University

Scholarship/Research/Creative Activity

Publications:

Presubmitted articles

Refereed articles (h-index 41)

79. Md Amin Hossain, Richa Sarin, Daniel P. Donnelly, Brandon C. Miller, Joseph P. Salisbury, Jeremy B. Conway, Samantha Watson, Jenifer N. Winters, Novera Alam, Durgalakshmi Sivasankar, Aparna C. Ponmudiyar, Tanvi Gawde, Sunanda Kannapadi, Jared R. Auclair, Lee Makowski, Gregory A. Petsko, Dagmar Ringe, David J. Greenblatt, Mary Jo Ondrechen, Yunqiu Chen, Roman Manetsch, **Jeffrey N. Agar**. "Protein crosslinking as a therapeutic strategy for SOD1-related ALS" PLoS Biology 2002 (responding to minor revisions).

78. Begoña G C Lopez, Ishwar N Kohale, Ziming Du, Ilya Korsunsky, Walid M Abdelmoula, Yang Dai, Sylwia A Stopka, Giorgio Gaglia, Elizabeth C Randall, Michael S Regan, Sankha S Basu, Amanda R Clark, Bianca-Maria Marin, Ann C Mladek, Danielle M Burgenske, Jeffrey N Agar, Jeffrey G Supko, Stuart A Grossman, Louis B Nabors, Soumya Raychaudhuri, Keith L Ligon, Patrick Y Wen, Brian Alexander, Eudocia Q Lee, Sandro Santagata, Jann Sarkaria, Forest M White, Nathalie Y R Agar, Multimodal platform for assessing drug distribution and response in clinical trials, Neuro-Oncology, Volume 24, Issue 1, January 2022, Pages 64–77, <https://doi.org/10.1093/neuonc/noab197>

77. Zhong AB, Muti IH, Eyles SJ, Vachet RW, Sikora KN, Bobst CE, Calligaris D, Stopka SA, **Agar JN**, Wu CL, Mino-Kenudson MA, Agar NYR, Christiani DC, Kaltashov IA, Cheng LL. Multiplatform Metabolomics Studies of Human Cancers With NMR and Mass Spectrometry Imaging. Front Mol Biosci. 2022 Apr 8;9:785232. doi: 10.3389/fmolb.2022.785232. PMID: 35463966; PMCID: PMC9024335.

76. Walid M Abdelmoula, Sylwia Stopka, Elizabeth C Randall, Michael Regan, Jeffrey N Agar, Jann N Sarkaria, William M Wells, Tina Kapur, Nathalie YR Agar “massNet: integrated processing and classification of spatially resolved mass spectrometry data using deep learning for rapid tumor delineation” *Bioinformatics* 38 (7), 2015-2021
75. Begoña GC Lopez, Ishwar N Kohale, Ziming Du, Ilya Korsunsky, Walid M Abdelmoula, Yang Dai, Sylwia A Stopka, Giorgio Gaglia, Elizabeth C Randall, Michael S Regan, Sankha S Basu, Amanda R Clark, Bianca-Maria Marin, Ann C Mladek, Danielle M Burgenske, **Jeffrey N Agar**, Jeffrey G Supko, Stuart A Grossman, Louis B Nabors, Soumya Raychaudhuri, Keith L Ligon, Patrick Y Wen, Brian Alexander, Eudocia Q Lee, Sandro Santagata, Jann Sarkaria, Forest M White, Nathalie YR Agar. “Multimodal platform for assessing drug distribution and response in clinical trials,” *Neuro-oncology* 24 (1) 65-77 (2022).
74. L Smith, **Jeffrey N Agar**, J Chamot-Rooke, P Danis, Y Ge, J Loo, L Pasa-Tolic, N Kelleher. “The Human Proteoform Project: A Plan to Define the Human Proteome,” *Science Advances* 7 (46), eabk0734 (2021).
73. Walid M Abdelmoula, Begona Gimenez-Cassina Lopez, Elizabeth C Randall, Tina Kapur, Jann N Sarkaria, Forest M White, **Jeffrey N Agar**, William M Wells, Nathalie YR Agar. “Peak Learning of Mass Spectrometry Imaging Data Using Artificial Neural Networks” *Nature communications* 12 (1), 1-13 (2021).
72. ND Schmitt, JM Berger, JB Conway, **JN Agar** “Increasing Top-Down Mass Spectrometry Sequence Coverage by an Order of Magnitude through Optimized Internal Fragment Generation and Assignment.” *Analytical Chemistry* 93 (16), 6355-6362 (2021).
71. Morgan Renee Packer, Jillian A Parker, Jean K Chung, Zhen-lu Li, Young Kwang Lee, Hugo Guterres, Trinity Cookis, Amin Hossain, Daniel P Donnelly, **Jeffrey N Agar**, Lee Makowski, Matthias Buck, Jay T Groves, Carla Mattos, “Raf promotes dimerization of the Ras G-domain” *PNAS*, 118(10): (2021).
70. Aluri KC, Hossain MA, Kanetkar N, Miller BC, Dowgiallo MG, Sivasankar D, Sullivan MR, Manetsch R, Konry T, Ekenseair A, **Jeffrey N Agar**. “Cyclic Thiosulfonates as a Novel Class of Disulfide Cleavable Cross-Linkers for Rapid Hydrogel Synthesis.” *Bioconjug Chem* 32(3):584-594 (2021).
69. Amanda R Clark, Elizabeth C Randall, Begoña GC Lopez, Michael S Regan, **Jeffrey N Agar**, Benjamin J Andreone, Chenghua Gu, Nathalie YR Agar “Spatial Distribution of Transcytosis Relevant Phospholipids in Response to Omega-3 Dietary Deprivation” *ACS Chemical Biology*, 16 (1), 106-115 (2020).
68. Kristina Srzentić, Luca Fornelli, Yury O. Tsybin, Joseph A. Loo, Henrique Seckler, **Jeffrey N. Agar**, Lissa C. Anderson, et. al., “Inter-laboratory Study for Characterizing Monoclonal Antibodies by Top-Down and Middle-Down Mass Spectrometry” *Journal of the American Society for Mass Spectrometry*, Journal of the American Society for Mass Spectrometry 31 (9), 1783-1802 (2020).
67. Krishna C. Aluri, Joseph P. Salisbury, Jochen H. M. Prehn and **Jeffrey N. Agar**, “Loss of angiogenin function is related to earlier ALS onset and a paradoxical increase in ALS duration.” *Scientific Reports* volume 10, Article number: 3715 (2020).
66. Jeffrey A. Hawkes, Juliana D’Andrilli, Rachel L. Sleighter, Hongmei Chen, Patrick G. Hatcher, Amna Ijaz, Maryam Khaksari, Simeon Schum, Lynn Mazzoleni, Rosey Chu, Nikola Tolic, William Kew, Nancy Hess, Jitao Lv, Shuzhen Zhang, He Chen, Quan

- Shi, Ryan H. S. Hutchins, Diana Catalina Palacio Lozano, Rémy Gavard, Hugh E. Jones, Mary J. Thomas, Mark Barrow, Helena Osterholz, Thorsten Dittmar, Carsten Simon, Gerd Gleixner, Stephanie M. Berg, Christina K. Remucal, Núria Catalán, Richard B. Cole, Beatriz Noreiga-Ortega, Gabriel Singer, Nikola Radoman, Nicholas D. Schmitt, Aron Stubbins, **Jeffrey N. Agar**, Phoebe Zito, David C. Podgorski. "An international laboratory comparison of dissolved organic matter composition by high resolution mass spectrometry: Are we getting the same answer?" *Limnology and Oceanography Methods*, Volume 18, Issue 6 Pages 235-258 (2020).
65. EC Randall, Begona GC Lopez , MS Regan, WM Abdelmoula, SS Basu , H Yoon, MC Haigis , **JN Agar**, NL Tran , WF Elmquist, FM White, JN Sarkaria, NYR Agar. "Localized metabolomic gradients in patient-derived xenograft models of glioblastoma." *Cancer Research* 80 (6), 1258-126764 (2020).
64. Schmitt, N. **Agar, J.N.** Hannah J.W. "Dysregulation of Very Long Chain Fatty Acid Metabolism Causes Membrane Saturation and UPR Induction via Ole1 Dysfunction." *Molecular Biology of the Cell*. 31 (1), 7-17 (2020).
63. Lloyd M Smith, Paul M Thomas, Michael R Shortreed, Leah V Schaffer, Ryan T Fellers, Richard D LeDuc, Trisha Tucholski, Ying Ge, **Jeffrey N Agar**, Lissa C Anderson, Julia Chamot-Rooke, Joseph Gault, Joseph A Loo, Ljiljana Paša-Tolić, Carol V Robinson, Hartmut Schlüter, Yury O Tsybin, Marta Vilaseca, Juan Antonio Vizcaíno, Paul O Danis, Neil L Kelleher "A five-level classification system for proteoform identifications" *Nature Methods* 16 (10), 939-940 (2019).
62. DP Donnelly, **JN Agar**, SA Lopez "Nucleophilic substitution reactions of cyclic thiosulfonates are accelerated by hyperconjugative interactions" *Chemical Science* 10 (21), 5568-5575 (2019).
61. WM Abdelmoula, MS Regan, BGC Lopez, EC Randall, S Lawler, AC Mladek, MO Nowicki, BM Marin, **JN. Agar**, KR Swanson, T Kapur, JN Sarkaria, W Wells, NYR Agar Automatic 3D Non-linear Registration of Mass Spectrometry Imaging and Magnetic Resonance Imaging Data. *Analytical chemistry* 91 (9), 6206-6216 (2019).
60. D Guo, K Bemis, C Rawlins, **JN Agar**, O Vitek "Unsupervised segmentation of mass spectrometric ion images characterizes morphology of tissues" *Bioinformatics* 35 (14), i208-i217 (2019).
59. Daniel P. Donnelly, Catherine M. Rawlins, Caroline J. DeHart, Luca Fornelli, Luis F. Schachner, Ziqing Lin, Jeremy Wolff, Jennifer L. Lippens, Iain D. G. Campuzano, Jared R. Auclair, Ljiljana Paša-Tolić, Julia Chamot-Rooke, Paul O. Danis, Lloyd M. Smith, Yury O. Tsybin, Joseph A. Loo, Ying Ge, Neil L. Kelleher, Agar J.N. "Best Practices and Benchmarks for Mass Spectrometry of Intact Proteins" *Nature Methods* 16 (7), 587 (2109).
58. Nicholas Schmitt, Catherine M. Rawlins, Elizabeth C. Randall, Jared R. Auclair, Jane-Marie Kowalski, Paul J. Kowalski, Ed Luther, Nathalie Y.R. Agar, **Agar JN.** Genetically Encoded Fluorescent Proteins Enable High-Throughput Assignment of Cell-cohorts Directly from MALDI-MS Images. *Analytical chemistry* 91 (6), 3810-3817 (2019).
57. E Randall, G Zadra, P Chetta, B Lopez, S Syamala, S Basu, **JN Agar**, M Loda, C Tempny, F Fennessy, and NYR Agar. "Molecular characterization of prostate cancer with associated Gleason score using mass spectrometry imaging. *Molecular Cancer Research* 17 (5), 1155-1165 (2019).

56. Clark AR, Calligaris D, Regan MS, Pomeranz Krummel D, **Agar JN**, Kallay L, MacDonald T, Schniederjan M, Santagata S, Pomeroy SL, Agar NYR, Sengupta S.. "Rapid discrimination of pediatric brain tumors by mass spectrometry imaging." *J Neurooncol*. 2018 Nov;140(2):269-279. doi: 10.1007/s11060-018-2978-2. Epub 2018 Aug 20. PMID:30128689
55. Randall EC, Emdal KB, Laramy JK, Kim M, Roos A, Calligaris D, Regan MS, Gupta SK, Mladek AC, Carlson BL, Johnson AJ, Lu FK, Xie XS, Joughin BA, Reddy RJ, Peng S, Abdelmoula WM, Jackson PR, Kolluri A, Kellersberger KA, **Agar JN**, Lauffenburger DA, Swanson KR, Tran NL, Elmquist WF, White FM, Sarkaria JN, Agar NYR. "Integrated mapping of pharmacokinetics and pharmacodynamics in patient-derived xenograft models of glioblastoma." *Nat Commun*. 2018 Nov 21;9(1):4904. doi: 10.1038/s41467-018-07334-3. PMID:30464169.
54. Donnelly DP; Dowgiallo, MG; Salisbury, JP; Aluri, KC; Iyengar S; Chaudhari, M; Mathew, M; Miele, I; Auclair, JR; Lopez, SA; Manetsch, R; **Agar J.N.** "Cyclic Thiosulfates and Cyclic Disulfides Selectively Crosslink Thiols While Avoiding Modification of Lone Thiols" *Journal of the American Chemical Society*, Jun 20;140(24):7377-7380. doi: 10.1021/jacs.8b01136. Epub 2018 Jun 11. PMID: 29851341.
53. Basu SS, Randall EC, Regan MS, Lopez BGC, Clark AR, Schmitt ND, **Agar JN**, Dillon DA, Agar NYR. *Anal Chem*. "In Vitro Liquid Extraction Surface Analysis Mass Spectrometry (ivLESA MS) for Direct Metabolic Analysis of Adherent Cells in Culture" (2018) *Analytical Chemistry* 2018 Apr 17;90(8):4987-4991. doi: 10.1021/acs.analchem.8b00530. Epub 2018 Apr 2. PMID:29608279
52. Ruedi Aebersold, **Agar J.N.**, I Jonathan Amster, Mark S Baker, Carolyn R Bertozzi, Emily S Boja, Catherine E Costello, Benjamin F Cravatt, Catherine Fenselau, Benjamin A Garcia, Ying Ge, Jeremy Gunawardena, Ronald C Hendrickson, Paul J Hergenrother, Christian G Huber, Alexander R Ivanov, Ole N Jensen, Michael C Jewett, Neil L Kelleher, Laura L Kiessling, Nevan J Krogan, Martin R Larsen, Joseph A Loo, Rachel R Ogorzalek Loo, Emma Lundberg, Michael J MacCoss, Parag Mallick, Vamsi K Mootha, Milan Mrksich, Tom W Muir, Steven M Patrie, James J Pesavento, Sharon J Pitteri, Henry Rodriguez, Alan Saghatelian, Wendy Sandoval, Hartmut Schlüter, Salvatore Sechi, Sarah A Slavoff, Lloyd M Smith, Michael P Snyder, Paul M Thomas, Matthias Uhlén, Jennifer E van Eyk, Marc Vidal, David R Walt, Forest M White, Evan R Williams, Therese Wohlschläger, Vicki H Wysocki, Nathan A Yates, Nicolas L Young & Bing Zhang. "How many human proteoforms are there?" *Nature Chemical Biology*. Feb 14;14(3):206-214. doi: 10.1038/nchembio.2576 PMID: 29443976 (2018).
51. Richard D. LeDuc, Veit Schwämmle, Michael R. Shortreed, Anthony J. Cesnik, Stefan K. Solntsev, Jared B. Shaw, Maria J. Martin, Juan A. Vizcaino, Emanuele Alpi, Paul Danis, Neil L. Kelleher, Lloyd M. Smith, Ying Ge, **Agar J.N.**, Julia Chamot-Rooke, Joseph Loo, Ljiljana Pasa-Tolic, and Yury O. Tsybin. "ProForma: a Standard Proteoform Notation." *Journal of Proteome Research* Mar 2;17(3):1321-1325. doi: 10.1021/acs.jproteome.7b00851. PMID: 2939773950 (2018).
50. Pavlopoulos S, Pelekoudas DN, Benchama O, Rawlins CM, **Agar J.N.**, West JM, Malamas M, Zvonok N, Makriyannis A. "Secretion, isotopic labeling and deglycosylation of N-Acylethanolamine acid amidase for biophysical studies." *Protein*

- Expr Purif.* May;145:108-117. doi: 10.1016/j.pep.2017.12.005. PMID: 2925368849 (2018).
49. Wang YA, Wu D, Auclair JR, Salisbury JP, Sarin R, Tang Y, Mozdierz NJ, Shah K, Zhang AF, Wu SL, **Agar J.N.**, Love JC, Love KR, Hancock WS. "Integrated Bottom-Up and Top-Down Liquid Chromatography-Mass Spectrometry for Characterization of Recombinant Human Growth Hormone Degradation Products." *Anal Chem.* Dec 5;89(23):12771-12777. doi:10.1021/acs.analchem.7b03026. PMID: 29096433 (2017).
48. Shao G., **Agar, J.N.**, and Giese R.W. Aqueous Acetonitrile Cold Phasing: A New Way to Begin QuEChERS. *J. Chromatography A* Jul 14;1506:128-133. doi: 10.1016/j.chroma.2017.05.045. PMID: 28558907 (2017).
47. Schmitt ND, **Agar J.N.** Parsing Disease-relevant Protein Modifications from Epiphenomena: Perspective on the Structural Basis of SOD1-Mediated ALS. *J Mass Spectrom.* Jul;52(7):480-491 doi:10.1002/jms.3953. PMID: 28558143 **Featured Article and Cover Article** (2017).
46. Quijada JV, Schmitt ND, Salisbury JP, Auclair JR, **Agar J.N.** Heavy Sugar and Heavy Water Create Tunable Intact Protein Mass Increases for Quantitative Mass Spectrometry in Any Feed and Organism. *Analytical Chemistry* Nov 15; 88(22):11139-11146 (2016).
45. Salisbury, J.P., Sirbulescu, R.F., Moran, B.M., Auclair, J.R., Zupanc, G.K.H. & **Agar, J.N.** The central nervous system transcriptome of the weakly electric brown ghost knifefish (*Apteronotus leptorhynchus*): de novo assembly, annotation and proteomics validation. *BMC Genomics* Mar 11;16:166. doi:10.1186/s12864-015-1354-2. (2015).
44. Rawlins, C.M., Salisbury, J.P., Feldman, D.R., Isim, S., Agar, N.Y.R., Luther, E., & **Agar, J.N.** Imaging and mapping of tissue constituents at the single cell level using MALDI MSI and Quantitative Laser Scanning Cytometry. *Methods in Molecular Biology* (2015).
43. Salisbury, J.P., Liu, Q. & **Agar, J.N.** QUDeX-MS: hydrogen/deuterium exchange calculations for mass spectra with resolved isotopic fine structure. *BMC Bioinformatics*, 15(1), 403 (2014).
42. Dang, X., *et al.*, Brodbelt, J.S., **Agar, J.N.**, Paša-Tolić, L., Kelleher, N.L. & Young, N.L. The First Pilot Project of the Consortium for Top Down Proteomics: A Status Report. *Proteomics*, 14(10), 1130-1140 (2014).
41. Auclair, J.R., Salisbury, J.P., Johnson, J.L., Petsko, G.A., Ringe, D., Bosco, D.A., Agar, N.Y., Santagata, S., Durham, H.D. & **Agar, J.N.** Artifacts to avoid while taking advantage of top-down mass spectrometry based detection of protein S-thiolation. Artifacts to avoid while taking advantage of top-down mass spectrometry based detection of protein S-thiolation. *Proteomics*. 14(10), 1152-1157 (2014).
40. Rotunno MS, Auclair JR, Maniatis S, Shaffer SA, **Agar J.N.**, Bosco DA. Identification of a misfolded region in superoxide dismutase 1 that is exposed in amyotrophic lateral sclerosis. *The Journal of Biological Chemistry.* Oct 10; 289(41):28527-38 (2014).
39. Liu, Q., Easterling, M. L., **Agar, J. N.** Resolving isotopic fine structure to detect and quantify natural abundance-and hydrogen/deuterium exchange-derived isotopomers. *Analytical Chemistry*, 86(1), 820–825 (2014).

38. Liu, Q., Cobb, J. S., Johnson, J. L., Wang, Q., **Agar, J. N.** Performance Comparisons of Nano-LC Systems, Electrospray Sources and LC-MS-MS Platforms. *Journal of Chromatographic Science*, 52(2), 120–127 (2014).
37. Salisbury, J. P., Boggio, K. J., Hsu, Y. W., Quijada, J., Sivachenko, A., Gloeckner, G., Kowalski, P. J., Easterling, M. L., Rosbash, M., **Agar, J. N.** A rapid MALDI-TOF mass spectrometry workflow for *Drosophila melanogaster* differential neuropeptidomics. *Molecular Brain*, 6(1), 60 (2013).
36. Liu, X. K., Ide, J. L., Norton, I., Marchionni, M. A., Ebling, M. C., Wang, L. Y., Davis, E., Sauvageot, C. M., Kesari, S., Kellersberger, K. A., Easterling, M. L., Santagata, S., Stuart, D. D., Alberta, J., **Agar, J. N.**, Stiles, C. D., Agar, N. Y. Molecular imaging of drug transit through the blood-brain barrier with MALDI mass spectrometry imaging. *Science Reports*, 3, 2859 (2013).
35. Auclair, J. R., Johnson, J. L., Liu, Q., Salisbury, J. P., Rotunno, M. S., Petsko, G. A., Ringe, D., Brown, R., Bosco, D. A., **Agar, J. N.** Post-translational modification by cysteine protects cu/zn-superoxide dismutase from oxidative damage. *Biochemistry*, 52(36), 6137–6144 (2013).
34. Auclair, J. R., Brodtkin, H. R., D'Aquino, J. A., Petsko, G. A., Ringe, D., **Agar, J. N.** Structural consequences of cysteinylolation of cu/zn-superoxide dismutase. *Biochemistry*, 52(36), 6145–6150 (2013).
33. Smith, L., Kelleher, N. L., Linial, M., Goodlett, D., Langridge-Smith, P., Goo, Y. A., Safford, G., Bonilla, L., Kruppa, G., Zubarev, R., Rontree, J., Chamot-Rooke, J., Garavelli, J., Heck, A., Loo, J., Penque, D., Hornshaw, M., Hendrickson, C., Pasa-Tolic, L., Borchers, C., Chan, D., Young, N., **Agar, J. N.**, Masselon, C., Gross, M., McLafferty, F., Tsybin, Y., Ge, Y., Sanders, I., Langridge, J., Whitelegge, J., Marshall, A. Proteoform: a single term describing protein complexity. *Nature Methods*, 10(3), 186–187 (2013).
32. Auclair, J. R., Somasundaran, M., Green, K. M., Evans, J. E., Schiffer, C. A., Ringe, D., Petsko, G. A., **Agar, J. N.** Mass spectrometry tools for analysis of intermolecular interactions. *Methods in Molecular Biology*, 896, 387–398 (2012).
31. Kabashi, E., **Agar, J. N.**, Strong, M. J., Durham, H. D. Impaired proteasome function in sporadic amyotrophic lateral sclerosis. *AMYOTROPHIC LATERAL SCLEROSIS*, 13(4), 367–371 (2012).
30. Wang, W., Perovic, I., Chittuluru, J., Kaganovich, A., Nguyen, L. T., Liao, J., Auclair, J. R., Johnson, D., Landeru, A., Simorellis, A. K., Ju, S., Cookson, M. R., Asturias, F. J., **Agar, J. N.**, Webb, B. N., Kang, C., Ringe, D., Petsko, G. A., Pochapsky, T. C., Hoang, Q. Q. A soluble α -synuclein construct forms a dynamic tetramer. *Proceedings of the National Academy of Science*, 108(43), 17797–17802 (2011).
29. Brodtkin, H. R., Novak, W. R., Milne, A. C., D'Aquino, J., Alejandro, Karabacak, N.M., Goldberg, I. G., **Agar, J. N.**, Payne, M. S., Petsko, G. A., Ondrechen, M. J., Ringe, D. Evidence of the Participation of Remote Residues in the Catalytic Activity of Co-Type Nitrile Hydratase from *Pseudomonas putida*. *Biochemistry*, 50(22), 4923–4935 (2011).
28. Auclair, J. R., Boggio, K. J., Petsko, G. A., Ringe, D., **Agar, J. N.** Strategies for stabilizing superoxide dismutase (SOD1), the protein destabilized in the most common form of familial amyotrophic lateral sclerosis. *Proceedings of the National Academy of Science*, 107(50), 21394–21399 (2010).

27. Agar, N. Y., Kowalski, J. M., Kowalski, P. J., Wong, J. H., **Agar, J. N.** Tissue preparation for the in situ MALDI MS imaging of proteins, lipids, and small molecules at cellular resolution. *Methods in Molecular Biology*, 656, 415–431 (2010).
26. Bosco, D. A., Morfini, G., Karabacak, N. M., Song, Y., Gros-Louis, F., Pasinelli, P., Goolsby, H., Fontaine, B. A., Lemay, N., McKenna-Yasek, D., Frosch, M. P., **Agar, J. N.**, Julien, J. P., Brady, S. T., Brown, R. Wild-type and mutant SOD1 share an aberrant conformation and a common pathogenic pathway in ALS. *Nature Neuroscience*, 13(11), 1396–1403 (2010). Featured in Nature Neuroscience “News and Views.”13(11) 1303-1304 (2010).
25. Li, L., Karabacak, N. M., Cobb, J. S., Wang, Q., Hong, P., **Agar, J. N.** Memory-efficient calculation of the isotopic mass states of a molecule. *Rapid Communications in Mass Spectrometry*, 24(18), 2689–2696 (2010).
24. Karabacak, N. M., Easterling, M. L., Agar, N. Y., **Agar, J. N.** Transformative effects of higher magnetic field in Fourier transform ion cyclotron resonance mass spectrometry. *Journal of American Society for Mass Spectrometry*, 21(7), 1218–1222 (2010).
23. Cobb, J. S., Easterling, M. L., **Agar, J. N.** Structural characterization of intact proteins is enhanced by prevalent fragmentation pathways rarely observed for peptides. *Journal of American Society for Mass Spectrometry*, 21(6), 949–959 (2010).
22. Agar, N. Y., Malcolm, J. G., Mohan, V., Yang, H. W., Johnson, M. D., Tannenbaum, A., **Agar, J. N.**, Black, P. M. Imaging of meningioma progression by matrix-assisted laser desorption ionization time-of-flight mass spectrometry. *Analytical Chemistry*, 82(7), 2621–2625. Accelerated and Featured Publication (2010).
21. Molnar, K. S., Karabacak, N. M., Johnson, J. L., Wang, Q., Tiwari, A., Hayward, L. J., Coales, S. J., Hamuro, Y., **Agar, J. N.** A common property of amyotrophic lateral sclerosis-associated variants: destabilization of the copper/zinc superoxide dismutase electrostatic loop. *The Journal of Biological Chemistry*, 284(45), 30965–30973 (2009).
20. Karabacak, N. M., Li, L., Tiwari, A., Hayward, L. J., Hong, P., Easterling, M. L., **Agar, J. N.** Sensitive and specific identification of wild type and variant proteins from 8 to 669 kDa using top-down mass spectrometry. *Molecular and Cellular Proteomics*, 8(4), 846–856 (2009).
19. Li, L., Kresh, J. A., Karabacak, N. M., Cobb, J. S., **Agar, J. N.**, Hong, P. A hierarchical algorithm for calculating the isotopic fine structures of molecules. *Journal of American Society for Mass Spectrometry*, 19(12), 1867–1874 (2008).
18. Wang, Q., Johnson, J. L., Agar, N. Y., **Agar, J. N.** Protein aggregation and protein instability govern familial amyotrophic lateral sclerosis patient survival. *PLOS BIOLOGY*, 6(7), 1508-1526 (2008). Editors' Choice: PLoS Biology 6 (7), “The Threat of Instability: Neurodegeneration Predicted by Protein Destabilization and Aggregation Propensity” by Elizabeth M Meiering. Article also featured in Forbes, Washington Post, Alzheimer’s Forum, etc.
17. Kabashi, E., **Agar, J. N.**, Hong, Y., Taylor, D. M., Minotti, S., Figlewicz, D. A., Durham, H. D. Proteasomes remain intact, but show early focal alteration in their composition in a mouse model of amyotrophic lateral sclerosis. *Journal of Neurochemistry*, 105(6), 2353–2366 (2008).

16. Morris, A. M., Watzky, M. A., **Agar, J. N.**, Finke, R. G. Fitting neurological protein aggregation kinetic data via a 2-step, minimal/"Ockham's razor" model: the Finke-Watzky mechanism of nucleation followed by autocatalytic surface growth. *Biochemistry*, 47(8), 2413–2427 (2008).
15. Agar, N. Y., Yang, H. W., Carroll, R. S., Black, P. M., **Agar, J. N.** Matrix solution fixation: histology-compatible tissue preparation for MALDI mass spectrometry imaging. *Analytical Chemistry*, 79(19), 7416–7423 (2007).
14. Taylor, D. M., Gibbs, B. F., Kabashi, E., Minotti, S., Durham, H. D., **Agar, J. N.** Tryptophan 32 potentiates aggregation and cytotoxicity of a copper/zinc superoxide dismutase mutant associated with familial amyotrophic lateral sclerosis. *The Journal of Biological Chemistry*, 282(22), 16329–16335 (2007).
13. Smith, A. D., Jameson, G. N., Dos Santos, P. C., **Agar, J. N.**, Naik, S., Krebs, C., Frazzon, J., Dean, D. R., Huynh, B. H., Johnson, M. K. NifS-mediated assembly of [4Fe-4S] clusters in the N- and C-terminal domains of the NifU scaffold protein. *Biochemistry*, 44(39), 12955–12969 (2005).
12. Taylor, D., Kabashi, E., **Agar, J. N.**, Minotti, S., Durham, H. Proteasome activity or expression is not altered by activation of the heat shock transcription factor Hsf1 in cultured fibroblasts or myoblasts. *Cell Stress & Chaperones*, 10(3), 230-241 (2005).
11. Taylor, D., Minotti, S., **Agar, J. N.**, Durham, H. Overexpression of metallothionein protects cultured motor neurons against oxidative stress, but not mutant Cu/Zn-Su peroxide dismutase toxicity. *Neurotoxicology*, 25(5), 779-792 (2004).
10. Kabashi, E. *, **Agar, J. N.***, Taylor, D. M., Minotti, S., Durham, H. D. Focal dysfunction of the proteasome: a pathogenic factor in a mouse model of amyotrophic lateral sclerosis. *Journal of Neurochemistry*, 89(6), 1325–1335 (2004).
9. Antonicka, H; Leary, SC; **Agar, J.N.**; *et al.* Mutations in COX10 result in a defect in mitochondrial heme A biosynthesis and account for multiple, early-onset clinical phenotypes associated with isolated COX deficiency. *Human Molecular Genetics* 12(20), 2693-2702 (2003).
8. Krebs, C., **Agar, J. N.**, Smith, A. D., Frazzon, J., Dean, D. R., Huynh, B. H., Johnson, M. K.. IscA, an alternate scaffold for Fe-S cluster biosynthesis. *Biochemistry*, 40(46), 14069–14080 (2001).
7. Smith, A. D., **Agar, J. N.**, Johnson, K. A., Frazzon, J., Amster, I. J., Dean, D. R., Johnson, M. K. Sulfur transfer from IscS to IscU: the first step in iron-sulfur cluster biosynthesis. *Journal of the American Chemical Society*, 123(44), 11103–11104 (2001). Editors' Choice: Highlights of the recent literature; "Biochemistry Construction Sites," Science, 295: 5552, (2001).
6. Olson, J. W., **Agar, J. N.**, Johnson, M. K., Maier, R. J. Characterization of the NifU and NifS Fe-S cluster formation proteins essential for viability in *Helicobacter pylori*. *Biochemistry*, 39(51), 16213–16219 (2000).
5. **Agar, J. N.**, Krebs, C., Frazzon, J., Huynh, B. H., Dean, D. R., Johnson, M. K. IscU as a scaffold for iron-sulfur cluster biosynthesis: sequential assembly of [2Fe-2S] and [4Fe-4S] clusters in IscU. *Biochemistry*, 39(27), 7856–7862 (2000). Accelerated Publication
4. **Agar, J. N.**, Yuvaniyama, P., Jack, R. F., Cash, V. L., Smith, A. D., Dean, D. R., Johnson, M. K. Modular organization and identification of a mononuclear iron-binding

site within the NifU protein. *Journal of Biological Inorganic Chemistry*, 5(2), 167–177 (2000).

3. **Agar, J. N.**; Zheng, LM; Cash, VL; et al. Role of the IscU protein in iron-sulfur cluster biosynthesis: IscS-mediated assembly of a [Fe₂S₂] cluster in IscU, *Journal of the American Chemical Society*, 122(9), 2136-2137 (2000).
2. Yuvaniyama, P., **Agar, J. N.**, Cash, V. L., Johnson, M. K., Dean, D. R. NifS-directed assembly of a transient [2Fe-2S] cluster within the NifU protein. *Proceedings of the National Academy of Science U.S.A.*, 97(2), 599–604 (2000).
1. Goodwin, P. J., **Agar, J. N.**, Roll, J. T., Roberts, G. P., Johnson, M. K., Dean, D. R. The *Azotobacter vinelandii* NifEN complex contains two identical [4Fe-4S] clusters. *Biochemistry*, 37(29), 10420–10428 (1998).

Non-refereed Book Chapters and Reviews

7. Recent advances in single-cell MALDI mass spectrometry imaging and potential clinical impact. Boggio, K. J., Obasuyi, E., Sugino, K., Nelson, S. B., Agar, N. Y., **Agar, J. N.** *Expert Reviews in Proteomics*, 8(5), 591–604 (2011).
6. “Motor Neuron Disease” H. D. Durham, E. Kabashi, D. M. Taylor, **Agar, J. N.**, in The Proteasome in Neurodegeneration, L. Stefanis and J. N. Keller ed. Springer US, 247-264 (2007).
5. “Relevance of oxidative injury in the pathogenesis of motor neuron diseases” **Agar, J. N.**, H. D. Durham, *Amyotrophic Lateral Sclerosis and Other Motor Neuron Disorders*. 4, 232-42 (2003).
4. “Biological Iron-Sulfur Cluster Assembly” **Agar, J. N.**, D. R., Dean, M. K. Johnson, in Biochemistry and Physiology of Anaerobic Bacteria, L. G. Ljungdahl, ed., Springer-Verlag, 46-66 (2003).
3. “Biological Iron-Sulfur Cluster Assembly,” P. Yuvaniyama, **Agar, J. N.**, M. K. Johnson, and D. R. Dean, *Archives of Microbiology* (2001).
2. “Studies on the Mechanism for the Activation of Iron and Sulfur for Formation of the Nitrogenase Metal Centers,” D. R. Dean, P. Yuvaniyama, **Agar, J. N.**, and M. K. Johnson, Nitrogen Fixation: From Molecules to Crop Productivity. *Current Plant Science and Biotechnology in Agriculture* 38, 37-39 (2000).
1. “Activation of Iron and Sulfur for Nitrogenase Metallocluster Formation,” D. R. Dean, J. Christianson, P. Yuvaniyama, L. Zheng, V. Cash, **Agar, J. N.**, M. K. Johnson, and D. H. Flint, *Current Plant Science and Biotechnology in Agriculture* 31, 27-31 (1998).

Other Creative Activity: Patents

5. U.S. US Patent Application 16/630,330, Provisional Application 62/530,934 Cyclic Thiosulfinate-Dithiol Click Chemistry (2021).
4. US 9,428,589 Tethering Cysteine Residues Using Cyclic Disulfides, Granted Aug 2016 (Licensed).
3. US 8,945,941 Tissue sample preparation and MALDI MS imaging thereof, Granted Feb 2015.
2. ES2535222 Cross-Linking of Superoxide Dismutase Monomers (US Pending, Europe Granted July 2015). (Licensed)
1. US 8,609,649 Compositions and methods for the diagnosis, treatment, and prevention of amyotrophic lateral sclerosis and related neurological diseases, Granted Dec 2013. (Licensed).

Presentations:

- 84 ASMS Conference "Sample Preparation for Top-Down Proteomics" June 2022.
- 83 Emory University "Small Molecule Treatment Strategy for ALS Inspired by Toxic and Protective Proteoforms." March 2022
- 82 Asilomar Conference ASMS Pacific Grove CA "Proteoform-Inspired Pharmacological Chaperones" Nov 2021
- 82 Asilomar Conference ASMS Pacific Grove CA Session Chair, Lightning Talks 2021
- 81 Select Science "Top-down- and ion mobility MS-enabled drug discovery for ALS" May 2021
80. New Jersey Mass Spectrometry Discussion Group "Top-down- and ion mobility MS-enabled drug discovery for ALS" April 2021
79. US HUPO "Top-Down Proteomics and Native MS" Session Chair. US HUPO March 11 2021.
78. US HUPO "Practical Implementation of top-down proteomics" March 9 2021.
77. University of Wisconsin Madison Chemistry Department "Target Discovery, Validation, and Therapy Development for ALS" Oct 2019.
76. American Society for Mass Spectrometry "Advanced MALDI Imaging for Neurosurgery and Neurooncology" Keynote lecture Bruker User Meeting. June 2019.
75. American Society for Mass Spectrometry "Metalloprotein Analysis with ExD/UVPD" Invited lecture. June 2019.
74. American Society for Mass Spectrometry "Pick Picking Methods and Perilous Pitfalls" Tutorial Co-organizer and principal lecturer. June 2019.
73. University of Georgia Chemistry "Target Discovery, Validation, and Therapy Development for ALS" Nov 2018.
72. Mass Spectrometry in Biotechnology and Mass Spectrometry (MSBM) 14 July, 2018, Center for Advanced Academic Studies (CAAS) Dubrovnik, Croatia. "Isotopic Fine Structure."
71. Mass Spectrometry in Biotechnology and Mass Spectrometry (MSBM) 11 July, 2018, Center for Advanced Academic Studies (CAAS) Dubrovnik, Croatia. "Top-down MS in Disease."
70. Penn State University Department of Chemistry. "A novel cross-linker that doesn't form dead-end modifications." June 2018
69. U Mass Lowell Dept. of Chemistry, March 2018 "Protein PTMs Inspired Pharmacological Chaperones and Crosslinkers That Minimize Dead-End Modifications."
68. US HUPO, March 2018, Minneapolis MN. Session Chair for Lightning Talks.
67. US HUPO, March 2018, Minneapolis MN. "How Protein PTMs Inspired Pharmacological Chaperones and Crosslinkers That Minimize Dead-End Modifications"
66. Baylor University Department of Chemistry, Jan 2018. "ALS-related Toxic Protein Modifications."
65. ASMS Fall Workshop. Top-Down Proteomics, Nov 2017, Boston MA. Co-session chair. "Sample Preparation for Top-Down Mass Spectrometry."
64. ASMS Fall Workshop. Top-Down Proteomics, Nov 2017, Boston MA. "Top-Down Proteomics Applications in Human Disease."
63. SUNY Medical School Department of Pathology, Oct 2017. "Protein Mass Spectrometry for Evaluating Neurotoxicology and *Vice Versa*."

62. Next Generation Sequencing & Single Cell Analysis Congress, October 2017, Boston. "Mass Spectrometry Methods for Single Neuron Analysis."
61. American Society for Mass Spectrometry, Indianapolis IN, June 2017
"Characterization of Single Fluorescent Motor Neurons in Amyotrophic Lateral Sclerosis (ALS) Mouse Brains via MALDI Mass Spectrometry Imaging (MSI)."
60. 9th International Symposium on Enabling Technologies (ETP 2017) May 4 – 5, 2017, University of Ottawa, Ontario, Canada. "A metabolic labeling approach for intact protein half-life determination in any organism."
59. Internal NEU Development Office Meeting With Potential Donors. Nov 2016
"Methods of Diagnosing and Treating Neurodegenerative Diseases"
58. Internal Parent's Day (NEU), Oct 2016. "Will Our Brains Survive the Aging Pandemic?" *This and the following presentation could also be considered University Service but are shown here. There were another seven more traditional (for colleagues and students) internal lectures that are not listed.*
57. NSF BRAIN workshop, Arlington VA, Oct 2016. "The Complexity of the Brain Versus The Current Technology"
56. International Mass Spectrometry Conference, Toronto Aug 2016 "Tracking the Dark Metabolome (also Proteome) with a Novel Isotopic Fine Structure Enabled Metabolic Labeling Strategy."
55. American Society for Mass Spectrometry, San Antonio TX, June 2016 "Just add Water or Sugar: Methods for Quantitative Lipidomics and Proteomics."
54. Inorganic Biochemistry Summer Workshop, Penn State University. June 2016
"Resolving Energy Differences Using Ultra High Resolving Power MS."
53. Asia Pacific Economic Counsel (APEC). Lima, Peru. Feb 2016 "Dynamic Online Course For Regulatory Harmonization"
52. HUPO, Boston March 2016. "Heavy Sugar or Water Create Arbitrary Changes in Isotope Distribution (ACID) For Quantitative MS of Any Biomolecule, in any Organism or Feed."
51. CASS, Brooklyn New York, Dec 2015. "Top-Down MS to Study Degradation Reactions of Protein Pharmaceuticals."
50. Consortium for Top-Down Proteomics Meeting, Boston MA, Nov 2015. "Arbitrary Changes in Isotopomer Distribution: Isotope Dilution MS of Proteins, Lipids, and Nucleic Acids, in Any Feed or Organism."
49. Concordia University, Montreal. Department of Chemistry, Sept 2015. "Development of Cyclic Disulfides as Pharmacological Chaperones."
48. Montreal Mass Spectrometry Discussion Group, Laval University Sep 2015. "ACID, a metabolic labeling technique for quantitative MS that works in all organisms and for all classes of Biomolecules."
47. NSF WORKSHOP MASS SPECTROMETRY DATA TO KNOWLEDGE, May 2015.
"Toxic Protein Modifications."
46. American Society for Mass Spectrometry National Conference (ASMS), June 2015
"Stochastic SILAC for intact protein quantification."
45. Sanibel Conference, Ft. Lauderdale 2015. "Top-down mass spectrometry of toxic protein modifications."
44. MIT Office of Industrial Liaison, July 2014. "Beyond proteomics: Intact protein analysis and deep MS/MS sequencing."

43. Association of Biomedical Research Facilities, St Louis 2014. "Top-down mass spectrometry."
42. University of Maryland, Regulatory Sciences. December 2 2014. "Educating the biopharmaceutical workforces."
41. Session Chair: American Society for Mass Spectrometry National Conference (ASMS), June 2014. "Top-down Protein Analysis"
40. Session Chair (*stand-in for Alexander Ivanov) ASMS, June 2014. "Pharmacoproteomics and toxicoproteomics for drug development"
39. H3 Biomedicine, Cambridge MA, Feb 2014. "Proteoforms Put in Perspective: Toxic, Therapeutic, and Protective."
38. Brown University Rhode Island Hospital "Toxic protein modifications in ALS", January 2014
37. Single Cell Analysis Summit, Select Bioscience, San Diego, Sept 2013 "Mass Spectrometry Imaging of Single Cells in Mouse Models of ALS."
36. Tufts University Sackler School of Biomedical Science, December 2013 PPET Seminar, "Mass spectrometry-based biomarker-, drug target-, small molecule binding-, and metabolite identification."
35. American Society for Mass Spectrometry. Use of isotopic fine structure in HDXMS. Qian Liu (Agar Graduate student) invited presentation, June 2013. *Records of all talks from 2012 and some of 2013 (during transition to NEU) were lost.*
34. Rhode Island College, Sept 2011. "The Many Roles of Mass Spectrometry In Drug Discovery" Inviter: Department Chair.
33. Saint Anselm College, Manchester NH. "Mass Spectrometry as a Tool for Drug Discovery." Inviter Lisa Bonner. Nov 2010.
32. Brandeis National Committee, Deerfield Beach Florida. Internal, "Why University Laboratories Adopted Orphaned Disease Research." Oct 2010.
31. Massachusetts General Hospital, MIND institute. "Structure-based drug development for ALS" Inviter Ippolita Castelvetti. 2010
30. University of Nebraska Lincoln. "ALS-associated Protein Structural Modifications, and Small Molecules That Stabilize Them" Dept of Chemistry Sept 2010 Title TBA.
29. National Institutes of Health. "ALS-associated structural perturbation of SOD1 and strategies for stabilization" Sept 2010, Inviter Sanford Markey, Sr.
28. American Society for Mass Spectrometry. Salt Lake City Utah. June 2010. "Structural Consequences of Loss of Metal from ALS-Associated SOD1 Variant Characterized Using Top-down Mass Spectrometric Hydrogen/Deuterium Exchange" (Former student Qi Wang to present thesis work). Inviter: Organization Committee.
27. American Society for Mass Spectrometry. Salt Lake City Utah. June 2010. "MALDI MS Imaging at Cellular Resolution Across Entire Tissue Sections of ALS Mice and Coregistration Using YFP-containing Fluorescent Neurons." (Student Kristin Boggio to present thesis work). Inviter: Organization Committee.
26. American Society for Mass Spectrometry. Salt Lake City Utah. June 2010. "Top-Down Proteomics of Isotopically Enriched Yeast Proteins on a LC Timescale using FT-ICR MS with Funnel-Skimmer Dissociation Fragmentation" (Student Jenifer Cobb to present thesis work). Inviter: Organization Committee.
25. March 2010, Harvard Medical School, Brigham and Women's Hospital "Mass Spectrometry's Many Roles in the Drug Discovery Process." Inviter Matt Lavoie.

24. ICOSA 2010, University of Massachusetts Medical School. "Small Molecule Mediated Stabilization of SOD1" Inviter Lawrence Haywood.
23. University of Oregon, Dept. of Biochemistry Colloquium: Feb 2010. "How Post Translational Modifications Change SOD1 structure". Inviter Joseph Beckman
22. University of Illinois at Chicago, School of Pharmacognesy. Feb 2010. "A Mass Spectrometry-Based Pipeline for Amyotrophic Lateral Sclerosis Drug Discovery." Inviter: Richard Van Breemen.
21. The University of Michigan, Flint. Nov 2010. "Drug discovery for Lou Gehrig's disease using mass spectrometry." Inviter Robert Stach.
20. Merrimack College. October 2009. "The many roles of mass spectrometry in drug development." Inviter: Department Chair.
19. Clarke University. October 2009. "The many roles of mass spectrometry in drug development." Inviter: Department Chair.
18. American Society for Mass Spectrometry. Philadelphia PA. June 2009. "MALDI Mass Spectrometry Imaging of Drugs and Metabolites." (Kathy Kellersberger Presenter of Collaborative Work).
17. American Society for Mass Spectrometry. Philadelphia PA. June 2009. "Methods for MALDI Mass Spectrometry Imaging at Cellular Resolution." Inviter: Organization Committee.
16. University of Texas at San Antonio Health Center: March 2009. "Properties of SOD1 that effect patient lifespan." Inviter: P. John Hart.
15. American Society for Mass Spectrometry. Indianapolis IN. June 2008. "Funnel Skimmer Dissociation" (Graduate Student Jennifer Cobb Speaker). Inviter: Organization Committee.
14. Rhode Island College, April 2008. "Biological Mass Spectrometry of ALS" Inviter: Department Chair.
13. Wellesley University. 2008. "Biological Mass Spectrometry of ALS." Inviter: Department Chair.
12. Colorado State, Dept. of Biochemistry, April 2008. "The physicochemical basis of amyotrophic lateral sclerosis (ALS)" Inviter: Rick Finke.
11. TREAT ALS Forum, Tampa Bay, Florida, Jan 2008. "The potential of advanced glycation endproduct inhibitors as ALS therapeutics." Inviter: The ALS association of America.
10. Boston Area Mass Spectrometry Discussion Group, Dec 2007. "Top Down for the Masses." Inviter: Organization Committee.
9. 18th International Symposium on ALS/MND (the major conference in ALS), Toronto, Canada, Dec 2007. "Protein aggregation and thermodynamic stability are risk factors in ALS patient survival." Inviter: Organization committee.
8. ICOSA 2007, Brookhaven National Laboratory, New York, Sept 2007. "Mechanisms of SOD-1 toxicity in ALS." Inviter: Diane Cabelli.
7. Human Proteomics Symposium, University of Wisconsin Madison, August 2007. "Sensitive and selective protein identification using top-down mass spectrometry" Inviter: organization committee probably influenced by Bruker Daltonics.
6. Bruker Daltonics Morning Seminar, Keynote Lecture: Cambridge Massachusetts, April 2007, "Methods for the identification of intact proteins using mass spectrometry." Inviter: Bruker Daltonics.

5. Bruker Daltonics Symposium, Keynote Lecture: March 2007, King of Prussia, Pennsylvania. "Selective protein identification using top-down mass spectrometry." Inviter: Bruker Daltonics.
4. Mount Sinai Hospital, March 2007, New York: "Selective protein identification using top-down mass spectrometry." Inviter: department colloquia probably influenced by Bruker Daltonics.
3. New Jersey Mass Spectrometry Users Group, Somerset NJ, Feb 2007. "Top-down protein identification using Big Mascot." Inviter: organization committee influenced by Bruker Daltonics.
2. American Society for Mass Spectrometry, Bruker Daltonics User Meeting, San Antonio Texas, June 2006. "Characterization of ALS-associated Protein Post Translational Modifications." Inviter: Bruker Daltonics.
1. American Society for Mass Spectrometry (5000 attendees, the major conference in mass spectrometry), Seattle WA. June 2005. "Superoxide Dismutase Modifications of Potential Therapeutic Relevance for Familial Amyotrophic Lateral Sclerosis." Inviter: organization committee.

Grant Support

Current Funding

2. Northeastern University Tier I 06/1/2022-05/31/2023
 Strategy For Broad Spectrum Corona Virus Treatment
 Goal: Target a two cysteine motif conserved in corona virus proteases.
1. Johnston Educational Foundation (Philanthropic arm of JAIVC) 05/2016-11/2023
Cyclic Disulfides as Pharmacological Chaperones for ALS and Parkinson. Role: PI
 Goal: Bring ALS mouse colony online and assess pharmacodynamics of compound 56224. \$120 k direct in 2016, \$100 k 2018, \$70 k 2019, \$60 k direct 2021, \$100k direct in 2023.

Completed Funding

24. B-BIC RadX BWH Agar Subcontract 09/2020-08/2021
 Subcontract \$40 k direct
23. ALS Association (ALSA) 10/2017-10/2021
Cyclic Disulfides to Stabilize ALS-Associated SOD1 Variants. Role: PI Manetch: Co PI
 Goal: Preclinical optimization of a lead SOD1 stabilizing compound. \$270 k direct
22. Dana Farber Cancer Institute 02/2016-1/2019
Clinical and Preclinical MALDI Imaging of cancer drugs repurposed for brain cancer.
 Role: Subcontract with Nathalie Y.R. Agar Goal: To test the feasibility of drug repurposing for neurooncology via blood-brain-barrier penetration using our MALDI-FTICR MS. \$120 k direct.
21. invriCRO 09/2015-1/2019
 Brain imaging research subcontracts for Biogen, Alnylam, Bayesian, etc. Role: CoPI with Nathalie Y.R. Agar Goal: *MALDI Imaging of Drug Blood-Brain Barrier Penetration* (Diagnostics). \$ > 40k direct.
20. INTERNAL Northeastern University, Tier 1. 07/2018-07/2019
Project title and goal: Cyclic Thiosulfinate-mediated Polymers. Role: PI. \$50 K direct.
19. Ono Pharmaceuticals 08/2015-08.2018 *Development of Pharmaceutical Agents.*
 Role: PI Goal: Ono small molecule mass spectrometrists spend one year in lab in the

- role of Agar lab post-doctoral fellow with their supplies provided. In the course of their projects they receive protein MS training. \$40k direct
18. **INTERNAL** BioAPEC Center of Excellence. 06/2016-06/2017 *Tier III: Biopharmaceutical Regulatory Harmonization Pilot*. Role: Lead PI, Jared Auclair, Mike Polastri co PIs. Goal: Training FDA-equivalent regulators from APEC member states in pharmaceutical characterization. \$150 K direct.
 17. **INTERNAL** Northeastern University, Tier 1. 07/2014-07/2016 *Project title and goal: Building a Prototype Hyperspectral Imaging Platform*. Role: PI, Max Diem CoPI \$50 K direct.
 16. **INTERNAL** Northeastern University, Tier 1. 07/2014-07/2016 *Project title and goal: Systems Biology Approaches to Enable Proteomic Profiling of Single Neurons Isolated from the Brain of an Amyotrophic Lateral Sclerosis (ALS) Mouse Model*. Role: Co PI (50%) with Alexander Ivanov. \$ 50 K direct.
 15. NIH 1R01NS065263-01 04/2009-05/2015 *Structural consequences of ALS-related modifications of SOD1* Goal: This study characterizes structural changes to SOD1 that occur as a result of familial ALS-associated mutations. Role: PI \$1.4 M direct.
 14. *The role of systemic LPS in the pathogenesis of schistosomiasis morbidity*, Sponsored by Rhode Island Hospital, National Institutes of Health. (July 1, 2015 - June 30, 2018), Organized Research. Effort: 5%, Subcontract for \$20 K/year. PI is Lisa Gangley-Leal.
 13. **INTERNAL** "Nanotechnology for the nervous system: Developing injectable materials for nervous system tissue engineering applications" Sponsored by Northeastern University. (July 1, 2013 - June 30, 2014), TIER 1 Sponsored by Northeastern University. CoPI with Tom Webster \$50 K direct.
 12. **INTERNAL** "Using MALDI mass spectrometry imaging to map spinal cord regeneration in a regeneration-competent vertebrate model system" Sponsored by Northeastern University. (July 1, 2013 - June 30, 2014), TIER 1 Sponsored by Northeastern University. CoPI with Gunter Zupanc \$50 K direct
 11. *Greater Boston Mass Spec Discussion Group Student Travel Awards of \$2K to grad students Jeniffer Quijada, Kristin Boggio, and Jeniffer Cobb to present at ASMS 2010, 2012, 2015.*
 10. *Stabilizing fALS SOD1 Variants by Crosslinking Subunits* NIH 1R21NS071256-01 04/2010-04/2012 \$275 K direct. Role: PI
 9. *Mass Spectrometry Imaging of Motor Neurons and Their Environment*. Amyotrophic Lateral Sclerosis Society of America 60993 09/2010-09/2013 \$240 K direct. Role: PI
 8. *Mass Spectrometry Imaging Of Motor Neurons and Their Environment* Amyotrophic Lateral Sclerosis Society of America. G1392 08/01/07-08/01/08 Role: PI \$40 K direct.
 7. *Core Facilities for Neuroscience at Brandeis* P30 NIH NS45713 01/2008-01/2010 Role: coPI (one of many), Michael Rosbash PI. (Agar's portion \$224 K)
 6. *Sleep in flies and mammals*. This was a project involving seven co-investigators to study the circuitry that control sleep and waking. Funds were acquired through two supplemental funds applications coauthored by Agar. US Army Medical Research and Material Command Contract: W81XWH-04-1-0158 Role: coauthor and coPI of supplements, Michael Rosbash PI. Department of Defense 01/15/04-09/18/09 (\$935 K is Agar's portion of the funds).

5. *Advanced Glycation Endproduct Inhibitors, Preclinical Development*. Robert Johnson Foundation 1/2012-1/2013 \$52 K direct Role: PI
4. *Physiological and Pathological Implications of the Unique Subcellular distribution of LRRK2* Role: Subcontract to Agar with Matt Lavoie PI. Michael J Fox Foundation 10/2010-10/2012 \$40 K direct.
3. *Identification of Molecules for Stabilizing DJ-1, A Protein Involved In Parkinson and Alzheimer Diseases* Role: Mentor/PI, Salisbury (graduate student) PI. Brandeis Sprout Grant 06/2011-06/2012 \$5 K direct.
2. **INTERNAL** Identifying Pharmacological Chaperones that Promote Survival in Mouse Models of ALS Role: Mentor/PI, Auclair (post-doc) PI Brandeis Sprout Grant 06/2011-06/2012 \$10 K direct.
1. *Mechanisms and Consequences of Altered Protein Solubility in Amyotrophic Lateral Sclerosis (ALS)*. Muscular Dystrophy Assoc (US). G203655 06/01/02-6/01/05 Role: PI \$150 K direct.

Other research Support: Agreements Leading to Equipment

2. "Donation of Two Holographic Imaging, Holomonitor, Systems" From Phase Holographic Imaging (a second instrument). Ed Luther PI. Agar provided lab space, animal models, consumables, presentation to Phase Holographic Imaging, and biological preparations. 09/2014-ongoing
1. *Development of Ultrahigh resolution MS methods*. This collaboration agreement results in the continuous upgrade of our FT-ICR MS; \$30 k of Bruker electronics shop resources; a two year loan (2013-2015) of a Q-TOF mass spectrometer; travel to ASMS 2016 (San Antonio) and IMSC 2016 (Toronto); as-needed (currently three weeks total) visits from applications chemists; "Donation of Dynamically Harmonized Ion Cyclotron Resonance Cell" in 2015 (retail ~ \$100k); and is scheduled to result in the "Donation of Dynamically Harmonized Ion Cyclotron Resonance Cell Redesigned for Two-Omega Acquisition" in Dec 2018. Role PI Bruker Daltons (>\$250k, 2005-current collaboration agreement).

Pending Funded

1. Tier 1. Northeastern University Internal. "A strategy for Pan Coronavirus Inhibition"

Honors, Awards, and Recognition (post-baccalaureate)

- | | |
|------------|---|
| 1996-1998 | National Science Foundation Fellowship at the Center for Metalloenzyme Studies, UGA |
| 2001, 2002 | Conrad F. Harrington postdoctoral fellowship |
| 2002, 2003 | Jeanne Timmins Costello postdoctoral fellowship |
| 2002-2005 | Muscular Dystrophy Association of America Career Development Grant |
| 2010 | Alberta Gotthardt Strage and Henry Strage Award for Aspiring Young Science Faculty |

Service and Professional Development

Service to the Institution:

Northeastern University Global Initiatives

- **2019 Asia Pacific Economic Council Center of Excellence in Regulatory Harmonization.** Taught "Advanced Therapeutics Course" in Seoul Korea.
- **2017 Asia Pacific Economic Council Center of Excellence in Regulatory Harmonization.** APEC ratified permanent online-onground program.

<http://news.northeastern.edu/2017/10/northeastern-selected-to-lead-global-biotherapeutics-education-training-center/>

- **2016 Asia Pacific Economic Council Pilot Center of Excellence in Regulatory Harmonization.** Co-designer and Co-PI of dynamic release on-line curriculum (~25 hours). Online portions taught in Aug. and Oct. 2017. See appendix “institutional service” for details.
- **2016 Asia Pacific Economic Council Pilot Center of Excellence in Regulatory Harmonization** Was the academic driving force for the recently awarded “Asia Pacific Economic Council Center of Excellence in Biopharmaceutical Harmonization.” Co-organizer, co-designer, and lecturer for both four-day on-ground courses. This was a hybrid lecture/lab for experiential learning. The first four-day course taught in Burlington MA, USA in Sept 2016 and the second was taught Dec 2016 in Seoul Korea. With the help of representatives from FDA, Health Canada, and Korean Drug evaluators, as well as every major pharma company, we trained two sets of drug evaluators from 12 APEC nations. I also developed online statistics primer based upon the feedback from the first course and gave Skype recorded lecture for Dec 2016 Pilot CoE in Korea.

Northeastern Service to Departments and Colleges 2022-2023

- **CCB Department:** Executive Committee. Biotech teaching professor search committee chair. Metabolism professor search committee. Undergraduate faculty advisor.
- **Pharm. Sci Department:** ACPE Self Study Group 6 (standards 23-25) Co-chair.

Northeastern Service to Departments and Colleges 2021-2022

- **CCB Department:** Executive Committee. Merit Committee. Barnett Chair search committee. Barnett Facility Director search committee.
- **Pharm. Sci Department:** Instrumentation Committee.

Northeastern Service to Departments and Colleges 2020-2021

- **CCB Department:** Barnett Chair search committee. Barnett Facility Director search committee.
- **Pharm. Sci Department:** Instrumentation Committee.

Northeastern Service to Departments and Colleges 2019-2020

- **CCB Department:** Service load reduced in recognition of extra work effort on the APEC CoE.
- **Pharm. Sci Department:** Instrumentation Committee.
- **College/University: Undergraduate Curriculum committee.**

Northeastern Service to Departments and Colleges 2018-2019

- **CCB Department:** UG curriculum committee.
- **Pharm. Sci Department:** Instrumentation Committee.
- **College/University:** BATL service load eliminated in recognition of extra work effort on the APEC CoE. Two internal seminars given at student recruitment events. Visited Glaxo in Philadelphia and gave research seminar as part of College of Science industrial Ph.D. recruiting group.

Northeastern Service to Departments and Colleges 2017-2018

- **CCB Department:** Service load reduced in recognition of extra work effort on the APEC CoE.
- **Pharm. Sci Department:** Instrumentation Committee.

Northeastern Service to Departments and Colleges 2016-2017

- **CCB Department:** Analytical Chemistry Position Search Committee. Hired L. Deravi.
- **Pharm. Sci Department:** Instrumentation Committee.
- **College/University:**
 1. Taught six, five hour continuing mass spec education lectures at NEU's Burlington Innovation Campus.
 2. Developed draft curriculum and pilot online course for presentation at APEC Peru.
 3. Attended APEC meeting in Peru. Spent one week lobbying for the Center of Excellence in Biotherapeutic Regulation Harmonization course in Peru with Auclair and Luzzi. Awarded a pilot course.
 4. Developed curriculum for Pilot CoE with Jared Auclair including a 15-25 hour, dynamic online learning module, and four days of on-ground classes.
 5. Led one-week course (and taught classes for pilot CoE) in Burlington. Seven major pharmaceutical companies as well as government regulators from four countries were recruited and taught at this Pilot CoE. Trainees were from regulatory agencies of Chile, China, Indonesia, Malaysia, Mexico, Papua New Guinea, Peru, the Philippines, Russia, Chinese Taipei, Thailand, and Vietnam. Observers from APEC and the World Health Organization also attended. Organized social events and chaperoned guest from 12 nations in trip to Boston. Note that in terms of the number of hours spent, this CoE is the equivalent of developing one course and teaching and additional two courses in 2016.
 6. Based upon excellent student reviews and enthusiasm from APEC constituents, this course has been ratified as a full Center of Excellence. The World Health Organization has been in contact and is interested in extending this curriculum worldwide.
 7. Performed Mass Spec Service: We have analyzed MS samples and provide letters of support to numerous labs, including Sunny Zhou, Roger Giese, Bill Hancock, Alex Makriyannis, Mansoor Amiji, Carolyn Lee Parsons, Alexander Ivanov, Barry Karger, Diomedes Logathetis.
 8. Spearheaded and Contact PI for Schrodinger Site License. Negotiated from \$60k down to \$30k, organized 12 faculty members, and garnered support for an unlimited Schrodinger software site license. Also organized training service
 9. Lectured for NEU student day and for the Office of Development.

Northeastern Service to Departments and Colleges 2015-2016

- **CCB Department:** Graduate Admissions Committee. Equipment Committee.
- **College/University:**
 - I. Evaluated and Beta Tested New Digital Measures Merit Review System.
 - II. **Taught six, five-hour continuing education Mass spectrometry lectures at BATL.**

Northeastern Service to Departments and Colleges 2014-2015

- **CCB Department:** Graduate Admissions Committee.
- **College/University:**
 1. **Led the establishment of Biotherapeutic Analysis Training Laboratory (BATL) labs.**
 - a. Helped establish a working laboratory (design and order equipment).
 - b. Met with Water's and NEU representatives to vet curriculum and procure the necessary materials and protocols.
 - c. Modernized and maintained the BATL website, helped develop promotional materials, *etc.*
 - d. Developed curriculum for two, three-day Biopharmaceutical Analysis Training Laboratory (BATL) courses- Protein Mass Spectrometry and Antibody Mass Spectrometry- that are taught at NEU's Burlington Campus (with Jared Auclair, who was at the time my post-doctoral fellow). This curriculum formed the backbone of the new Protein Mass Spectrometry lab (Chem 5617) for NEU students, and five sections of Analytical Lab and Bioengineering courses developed by and taught by Jared Auclair.
 2. **Taught three, five-hour MS lectures at BATL.**

Brandeis University Committees

2010-2011: Brandeis Intellectual Property Review Committee. Brandeis Institutional Animal Care and Use Committee. 2009-2010: Chem. Dept. Instrumentation Committee. Chem. Dept. Graduate Admissions Committee. Chem. Dept. Graduate Studies Committee. Brandeis Intellectual Property Review Committee. Brandeis Institutional Animal Care and Use Committee. 2008-2009: Chem. Dept. Instrumentation Committee. Chem. Dept. Graduate Admissions Committee. Brandeis Intellectual Property Review Committee. 2007-2008: Chem. Dept. Graduate Studies Committee. Chem. Dept. Instrumentation Committee. Chem. Dept. Organized chemistry colloquia. Brandeis Intellectual Property Review Committee. 2006-2007: Chem. Dept. Graduate Admissions Committee. Chem. Dept. Instrumentation Committee. 2005-2006: Chem. Dept. Graduate Studies Committee. Chem. Dept. Instrumentation Committee.

Director, Brandeis Mass Spectrometry Facility: 2005-2012

We helped over twenty-five Brandeis faculty with their mass spectrometry projects, mostly on a *pro bono* basis. We frequently contributed figures for grants and quality control of purified proteins and molecules. We offer walk-up instrument use to students having taken Chem147b (mass spec). We have been acknowledged by the Ozerov group in multiple publications; provided quality control (accurate mass) in publications of the Yu and Deng laboratories; structural characterization by MS⁴ for the Krauss laboratory, our data has been included as a thesis chapter in Nicole Persky's Ph.D. thesis (Lovett lab); and the Petsko-Ringe group has included us as coauthors in submitted manuscript (Biochemistry) where we provided a figure.

Service to the Discipline/Profession:

Education Outreach

1998, 2000, 2010, 2012, 2014, 2016, 2018. Instructor at the Bioinorganic Chemistry Summer Workshop. Courses taught: Metalloprotein mass spectrometry, electron paramagnetic resonance spectroscopy, magnetic circular dichroism, resonance

Raman. For example, in Summer 2014 and 2016 I taught eight, three hour labs over the course of one week (pro bono). I was a trainee at this conference in 1996, and have been an instructor since 1998. Every research university can send 1-2 students, and the leading bioinorganic spectroscopist PIs train the students extensively.

Review Service

- Grant Review Activity (Foundations): Burroughs Wellcome Fellowships Reviewer 2008; Motor Neuron Disease Association Reviewer 2009, 2015, 2017; Weston Brain Science Foundation (Toronto), 2013-2015; CIHR Reviewer (Canadian Institute of Health Research) proposals 2014; ALS society of America 2015, 2017; Reviewer ASMS Research Award Committee Dec 2015.
 - Grant Review Activity (Federal): DOD *CPRSM ALS TIA* ALS Therapy Development Awards (**2009-2012, 2021, 2022**); NIH/CSR *Ad Hoc* Astrocytes (**2012**); NIH/CSR *ZRG1 BCMB-D* Shared MS Instrumentation S10 (**2012**); NIH/CSR *ZRG1-BST High-End* Shared Instrumentation S10 (**2012, 2013**); NIH/CSR *Ad Hoc ZRG1 MCDN-B* Biophysics of Neuronal Systems Study Section (**2011, 2012, 2013a, 2013b**); NIH/CSR *ZRG1-BST-N-40* P41 Centers (**2013, 2014, 2020**); NIH/CSR *ZMH1-ERB-B-4* Fellowships Grants (**2014**); NIH/CSR *ZRG1-BDCN-W-2* Special Emphasis Brain Disorders: Trauma, Hydroceph. and Alzheimer (**2014**); NIH/CSR *Ad Hoc* DBD Developmental Brain Disorders Study Section (**2010, 2012, 2014, 2015**); NIH/CSR *ZNS1-SRB-N-08* NINDS P30 review (**2015, 2017, 2018**), *ZNS1 SRB-N (08)* Research Resource (R24) Review (**2015**). ASMS Research Award Committee (**2015**). DOE/SBIR grant review (**2018, 2019, 2020, 2021**); NIH (NINDS *ZNS1 SRB-A(23)*) POI review (**2019**), NIH BCDN anonymization panel (2019), NIH Biomedical Technology Development and Dissemination Center (BTDD, formerly P41) review (**2021**).
- **Granted continuous submission privileges at NIH 2012-2016 due to high service load.**
- Journal reviewer for ACS Bio & Med Chem Au, ACS Neuroscience, Annals of Medicine, Analyst, Analytical Chemistry, JACS, JBC, JASMS, Nature Chemical Biology, Nature Methods, Nature Communications, PLoS Biology, PNAS, RSC Chemical Biology, ¹etc. Ad Hoc Academic Editor PLoS Biology (>5 reviews/year).

Leadership

- Board of Directors. Consortium for Top-Down Proteomics 2014 – current.
- Committee member NSF WORKSHOP MASS SPECTROMETRY DATA TO KNOWLEDGE, May 2015. This was a think tank organized by John Yates to make recommendations for NSF funding directions.
- Committee member NSF “BRAIN” WORKSHOP, Oct 2016. This was a think tank organized by John Sweedler to make recommendations for NSF funding directions.

Software Provided to Research Community

- QUDeX-MS
- Isotope Calculator

Service to the Community/Public:

- Board member and then **Chairman of the Board**, Centre de la petite enfance (CPE) for Regulated Daycare Oversight Board, Montreal, PQ (August 2003 - May 2005). All

child daycare is regulated in Quebec by this government agency <https://www.mfa.gouv.qc.ca/fr/services-de-garde/cpe-garderies/pages/index.aspx> The board had operational authority over CPE activities for ~40 daycare facilities on the island of Montreal. This required understanding and application of Quebec's (Napoleonic, French Language) Civil code. We approved new facilities, were responsible for re-approval of existing facilities, liaised with CPE regulators, hired and dismissed workers, and dealt with corrective and punitive action.

- Society for the Advancement of Chicano and Native American Students (SACNAS). Served as mentor, poster competition judge, and attend National Conference.
- Head Coach of 6th grade football at Newton's Brown Middle School (2013).

Professional Development

- 2003- American Society for Mass Spectrometry.

Teaching

Student evaluations consistently place my courses in the upper quartile, and generally above the 90th percentile, in instructor effectiveness.

Northeastern Courses Taught

Fall 2021

- CHEM 5612, Principles of Mass Spectrometry, Credit Hours: 3.000. Enrollment: 12 students.

Spring 2021

- CHEM 5616, Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: 17 students.
- PHSC 2650, Intro to Health Sci Research, taught one class and supervised one project, Enrollment 11.

Spring 2020

- CHEM 5616, Online Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: 11 students.
- CHEM 5616, Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: 30 students.

Fall 2020 -Sabbatical

Spring 2019

- CHEM 5616, Online Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: 7 students.
- CHEM 5616, Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: 31 students.
- PHSC 6218 Biomedical Chemical Analysis, Enrollment 13

Fall 2019

- CHEM 5612, Principles of Mass Spectrometry, Credit Hours: 3.000. Enrollment: 27 students.

Spring 2018

- CHEM 5615, Online Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: four students.
- CHEM 5616, Protein Mass Spectrometry, Credit Hours: 3.000. Enrollment: 21 students.

Spring 2017

- Chemistry teaching load reduced in return for teaching APEC CoE in 2016.
- CHEM 5616 02, Online Protein Mass Spectrometry, Credit Hours: 3.000 Enrollment: four students
- PHSC 6218 01, Biomedical Chemical Analysis, Traditional, Credit Hours: 2.000, Enrollment: 14 students, mean teaching effectiveness 4.8/5.0.

Fall 2016

- Co-developed (with Auclair) and lectured a 15 hour, adaptive release online course for the Asia Pacific Economic Cooperative (APEC) Pilot center of excellence. See NEU service section for details. **(New Course)**.
- Co-developed (with Auclair), organized, lectured, and MC'd a four day on-ground course for the Asia Pacific Economic Cooperative (APEC) Pilot center of excellence. See NEU service section for details. Both courses had excellent reviews. **(New Course)**.
- Developed statistics online prime and gave lecture for Korean Pilot **(New Course)**.

Spring 2016

- CHEM 5616 01, Protein Mass Spectrometry, Traditional, Credit Hours: 3.000, Enrollment: 32.
- CHEM 5616 02, Online Protein Mass Spectrometry, Credit Hours: 3.000.

Spring, Summer, Fall 2016.

- Taught six lectures (5 hours each) for BATL courses. *Note: this was uncompensated and in addition to my normal teaching load.*

Spring 2015

- CHEM 5616 01, Protein Mass Spectrometry, Traditional, Credit Hours: 3.000, Enrollment: 30.
- PHSC 6218 01, Biomedical Chemical Analysis, Traditional, Credit Hours: 2.000.

Spring, Summer, Fall 2015.

- Developed online protein MS course.
- Taught six lectures (5 hours each) for BATL courses.

Fall 2014

- Taught three lectures (5 hours each) for Biopharmaceutical Analysis Training Laboratory (BATL) courses at Burlington Innovation Campus. **(New Course)**

Spring 2014

- CHEM 5616 01, Protein Mass Spectrometry, Traditional, Credit Hours: 3.000, Enrollment: 25. **New Course)**
- PHSC 6218 01, Biomedical Chemical Analysis, Traditional, Credit Hours: 2.000. **(New Course)**

Brandeis Courses Taught

- Chem 142a Quantum Chemistry (Spring 2011, **New Course**).
- Chem 123b Bioorganic chemistry (Spring 2008, **New Course**).

- Chem 147b Mass Spectrometry (spring 2006, fall 2008 and 2010, **New Course**).

Brandeis Courses Co-Taught

- One lecture. Cont 300B Ethical Practice in Health Sciences. Ethics of collaboration (2008).
- Lecturer Biochemistry 103b Advanced Biochemistry-Information Transfer Mechanisms (multiple lectures, **New Course**).
- Business 261 Technology Strategy, supervised one group of students on their project relating to our Patented Matrix Solution Fixation technology (Spring 2008).
- Lecturer (one lecture) COSI 230A Topics in Computational Biology (2007, **New Course**).
- Lecturer (two lectures) NBIO 146a The Neurobiology of Human Disease (2006, **New Course**).

Mentoring

PhDs Awarded	Term	U.G.	Project	Awards and Support
Jennifer Stroka-Cobb, Ph.D. <i>Employed by Novartis.</i>	2006-2010	BS, 2003, Lafayette University	Top-Down mass spectrometry methods development	2009- International Mass Spectrometry Foundation Travel Award 2009- Greater Boston Mass Spectrometry Discussion Group Student Travel Award 2009, 2008- Provost's Dissertation Expense Award 2008- Graduate Student Association Travel & Research Grant 2007- Graduate School of Arts & Sciences Outstanding Teaching Fellows Award
Kristin Boggio, Ph.D. <i>Employed by Pfizer</i>	2006-2011	BS, 2005 Univ. Massachusetts Boston	Design of ALS therapeutics, MALDI mass spectrometry imaging	2010- Provost's Dissertation Expense Award 2009- International Mass Spectrometry Foundation Travel Award 2009- Provost's Dissertation Expense Award 2008- Graduate Student Association Travel & Research Grant 2008-Graduate School of Arts & Sciences Outstanding Teaching Fellows Award
Murat Karabacak, Ph.D. <i>Research fellow at Mass.</i>	2006-2010	BS, 2004 Ankra University	FTICRMS methods development	2009- Provost's Dissertation Expense Award

<i>General Hospital</i>				
Qi Wang, Ph.D. <i>Employed by Waters Inc.</i>	2005-2010	BS, 2003 Nankai University	Mechanisms of ALS pathogenesis	Graduate school of Arts and Sciences Outstanding Teaching Fellow 2006 <i>Post-doctoral fellow at the BU School of Medicine.</i>
Joshua Johnson, Ph.D. <i>Employed by Novartis</i>	2006-2011	BS, 2005 Univ. Wisconsin	Mechanisms of familial ALS pathogenesis	IGERT Fellow
Qian Liu Ph.D. <i>Employed by STC Biologics</i>	2008-2012	BS Nankai University	Mechanism of ALS pathogenesis.	2010- Provost's Dissertation Expense Award
Joseph Salisbury, Ph.D. <i>Employed by Brain Power, LLC</i>	2008-2012	BS /M.S. Rhode Island College	Development of small molecule inhibitors of SOD1 aggregation.	2012- ASMS Student Travel Award (Greater Boston Mass Spectrometry Discussion Group) 2011 – Brandeis University Virtual Incubator Sprout Grant 2017- CDMRP Autism Research Program, grant PI.
Jeniffer Quijada, Ph.D. <i>Stanford Post-doc.</i>	2013-2017	BS UC Irvine	Top-Down Protein Quantification	2015- ASMS Student Travel Award (Greater Boston Mass Spectrometry Discussion Group). 2016- Provost's Dissertation Expense Award
Catherin Rawlins Ph.D. 908 Devices	2014-2018	BS Wisconsin-Stout	MALDI Imaging Studies of ALS Mouse Models	2015- ACS Leadership Development Award, US HUPO Travel Award 2016- Forbes Under 30 summit, NU Scholar, NESACS German Exchange Delegate Award 2017- Wolfgang Goetzinger-Memorial Scholar Award; ACS Leadership Award 2018- Provost's Dissertation Completion Award; College of Science Graduate Student Excellence Award in Leadership, Dissertation Completion Fellowship, Young Chemists crossing borders delate award

Daniel Donnelly Alnylam	2015-2019	BS Salem State University	The Development of Novel Cysteine Cross-linkers and Their Application Towards Neurodegenerative Disorders	2016- Esmond Scholar 2018- Wolfgang Goetzinger-Memorial Scholar Award; Graduate Student Excellence Award in Diversity 2019- COS Dissertation Completion Fellowship, Excellence in Graduate Research Award
Nicholas Schmitt Ph.D.	2016-2020	BS The University of Connecticut	FT-ICRMS Method Development for Top-Down Protein Fragmentation and Complex Organic Mixture Analysis	
Krishna Aluri Alnylam	2016-2021	MS Northeastern University BS Rajiv Gandhi University	Therapeutic strategies for the treatment of Amyotrophic Lateral Sclerosis (ALS) with mutations in Angiogenin and Superoxide Dismutase 1	
Richa Sarin	2017-2021	BS Fairleigh Dickinson University	Structural and functional consequences of cross-linker-mediated stabilization of fALS-associated SOD1	

Current Ph.D. Students

- The following NEU graduate students are members of the Agar laboratory: Amin Hossian, Novera Alam, Wensheng Yang, Durga Sivasankar, and Industrial Ph.D. Rutali Brahme (Novartis), Christopher Singleton (Callen Analytical Services), Michael Regan (Brigham and Women's Hospital).

Other Mentored

- Agar co-supervised Ph.D. students (graduated) Di Wu and Yanjun Liu with Bill Hancock, and Zhidan Chen with Paul Vouros.
- Two post-doctoral fellows, Joseph Salisbury and Jared Auclair (promoted to Senior Research Scientist, then Associate Dean at NEU, and now running the BATL laboratory and PSM Biotech. program.
- David DeFillippo and Haly Raharimampionona received M.S. from the Agar Lab in 2014 and 2015, respectively.

- Visiting Scientists: Takuya Nagama, Ono Pharmaceuticals- one year industry sabbatical (Aug 2015-Sept 2016) to learn protein MS

Undergraduate and MS Student's Supervised by Agar Lab

Northeastern Undergraduates Supervised: 2014-2020: Mary Duffy; Molly Blevins; Carrie Brown; Curtis Gong; Danielle DeLooze; Jessica Xu; Elliott Mueller; Caroline Lucas; Joy Horng, Justin Crisafulli, Nathaniel Shepard, Benjamin Moran, Jeremy Conway, Nathalie Leung, Isabella Miele, Millie Ness, William Peterson, Sydney Geyer, Nicole Vieira, Joshua Berger, Nolan Kelly (BS Neurobiology). **Current:** Steven Sheldon (Engineering), Eric Schaar (BS Biochemistry), Aziza Sattarova (BS Pharm Sci), William Peterson (BS Biochemistry), Adriana Cespedes (BS Bioengineering), Ji Hae Choi (BS Behavioral Neuroscience); Vivian Weigel (BS Chemistry), Thomas Paulus (BS Cell & Mol Bio).

M.S. Student Researchers Supervised: 2005-2013: Tracy Frish (Chemistry), Nabila Newaz, Krishna Aluri (Biotech). **NEU students: 2014-2019:** Meenal Chaudhari (Pharm Sci); Tri Devi Dahal Busfield [PSM Biotech (PSM)]; Janice Ferreira (PSM); Chirag Jain (PSM); Sandeep Kini (Pharm Sci); Fnu Ruchika (PSM); Madhumita Ramesh (PSM); Shreya Sarraf (Pharm Sci); Sneha Shenoy (Pharm Sci); Anirudh Singh (PSM); Vineet Joshi (Pharm Sci), Radhika Barve (PSM), Omkar Bhate (PSM), Senchan Khamboung; Chinmayee Shah (PSM), Shreosi Ghosh (PSM), Merlit Mathew (PSM), Meet Shaw (Bio-Tech); Aditya Ansodaria (Bio-Tech). **2020:** Shama Pilankar (Bio-Tech); Hetvi Desai (Bio-Tech); Gregory Colpitts (Pharm Sci), Nupar Gupte (Biotech); Urmi Ashish Patankar (Biotech), Sneha Gampa (Pharm Sci); Tanvi Gawde (Biotech); Aparna Ponmudiyani (Biotech); Durga Sivasankar (Bio-Tech); Aphurvika Manivannan (Biotech). **Current:** Nikhil Churmure (Biotech); Shrey Nelson Sing (Biotech); Swathi Padmakumar (Biotech); Sunanda Kannapadi (Biotech); Eesha Shevade (Biotech); Shraddha Kamath (Biotech); Purnima Upadhyaya (Biotech); Dhinesh Kannan Srinivasan (Pharm Sci); Darren D'Souza (Biotech); Meghana Bantwal (Biotech); NagaRaju Diddi (Biotech);

Brandeis Undergraduates Supervised. 2006 Jennifer Chabra

(jenni_chabra@yahoo.com): REU Bottom-up Proteomics. **2007** Josh Agranat (jagranat@brandeis.edu): Ion Trap liquid chromatography mass spec. **2008** Jung Gun "Justin" Song (jsong781@gmail.com) Top-Down Monoisotopic Mass Determination, Sagar Patel: Yeast metalloproteins. Medical Student at A.T. Still University-Kirksville College of Osteopathic Medicine. **2009** Rebecca Lazarus (rlazarus@brandeis.edu) Honors **Thesis:** Purifying and Labeling single neurons. Fjodor Melnikov (shlaffen@brandeis.edu): Single neuron purification, Worked with Harvard School of Public Health and then company Gradient Environmental Health. John Wong (jhwhy@brandeis.edu): Publication in *Methods in Molecular Biology*, see Agar's publication list for details. Labeling single neurons. HehSun Kim (hehsun@brandeis.edu): Slicing flies Applying for Dental School. Jung Gun "Justin" Song (jsong781@gmail.com): from Bowdoin University. Top-Down Monoisotopic. Yeon Hwa "Jennifer" Jung (jyung@smith.edu): REUY from Cornell University. Drug development. Daniel Weisz **Thesis.** Top-Down Monoisotopic Mass Spectrometry. Became a graduate student at University of Washington St Louis, now finished with Ph.D. **2010** Stacey Frisch (sfrisch@brandeis.edu): mouse husbandry, Gabriel Bronk

(gbronk@brandeis.edu): Out-Gel Digest mass spectrometry. **2011** Emmanuel Obasuyi (emmaobas@brandeis.edu): High Honors Thesis, Labeling single neurons. Peer reviewed publication in *Expert Review of Proteomics*, see Agar's publication list for details. Nana Sarp (nosarp@brandeis.edu): Top-Down Proteomics. Brian Williams (briwilli@brandeis.edu): High Honors Thesis, Computational docking studies of small molecule SOD1 stabilizers. Nikhil Malik (nikhil.nmalik@gmail.com): Animal husbandry of ALS model mice. Brandon Meiseles (br.meiseles@gmail.com): (Duke University): Proteomics of Parkinson's Brains. Yuewei Tao (yuewei@brandeis.edu): MALDI MS training. **2012** Bhavin Patel: Highest Honors thesis on the role of the proteasome in ALS etiology. Josue Alfaro M.S. 2010-2013 B.S. UC Irvine "MALDI Imaging MS" IGERT Fellow. M.S. Student Tracy Frish.

Student Advising

Northeastern Advising Committees.

2022 Thesis committees: Ketke Bagwe, Ivanov (Chair) Ph.D. committee; Michael Bergman, Deravi, (Committee Chair) Ph.D. committee; Kunal Daud, Zhou (Committee Chair) Ph.D. committee; Jaziel Chase, Auclair (Committee Chair) Ph.D. committee; Christina DiMarko, Manetsch, (Committee Chair) Ph.D. committee; Tyler Dost, Zhou (Committee Chair) Ph.D. committee; Amanda Marie Figueroa-Navedo, Ph.D. (Committee Chair) Ph.D. committee; Yunfan Gau, Ivanov, (Committee Chair) Ph.D. committee; Noah Gould, Ivanov, (Committee Chair) Ph.D. committee; Kendal Johnson, Ivanov, Ph.D. defense committee; Noah Gold, Ivanov, Ph.D. committee; Brandon Miller, Manetsch, (Committee Chair) Ph.D. committee; Yuliya Marusyk Manetsch, (Committee Chair) Ph.D. committee; Kasun Pathirage Don, Ph.D. committee, Mattos; Clifford Phaneuf, Ivanov, (Committee Chair) Ph.D. committee; Arnik Shaw, Ivanov, (Committee) Chair Ph.D. committee; Xianyi Su, Ivanov, (Committee Chair) Ph.D. committee; Estee Tool, Ph.D. committee; Alicia Wagner, Manetsch, (Committee Chair) Ph.D. committee. Alan Zimmerman, Ivanov, (Committee Chair) Ph.D. committee

2021 Thesis committees: Kunal Daud, Ph.D. committee, Zhou (Chair); Yunfan Gau, Ph.D. committee, Ivanov (Chair); Kasun Pathirage Don, Ph.D. committee, Mattos; Jiachen Lin, Ph.D. committee, Zhang; Arnik Shaw, Ivanov, Ph.D. committee. Kendal Johnson, Ivanov, Ph.D. committee. Clifford Phaneuf, Ivanov, Ph.D. committee. Sarah Geller, Ivanov, Thesis defense committee. Xianyi Su, Ivanov, Ph.D. committee. Amanda Marie Figueroa-Navedo, Ph.D. committee, Ivanov. Michael Bergman, Deravie, Ph.D. committee. Emily Micheloni, Zhu, Ph.D. committee. Christina DiMarko, Manetsch, Ph.D. committee. Brandon Miller, Manetsch, Ph.D. committee. **2020 Thesis committees:** Jacqueline Wood, MS thesis committee. Arnik Shaw, Ivanov, Ph.D. committee. Kendal Johnson, Ivanov, Ph.D. committee. Clifford Phaneuf, Ivanov, Ph.D. committee. Sarah Geller, Ivanov, Ph.D. committee. Xianyi Su, Ivanov, Ph.D. committee. Amanda Marie Figueroa-Navedo, Ph.D. committee, Ivanov. Michael Bergman, Beuning, Ph.D. committee. Emily Micheloni, Zhu, Ph.D. committee. Christina DiMarko, Manetsch, Ph.D. committee. Brandon Miller, Manetsch, Ph.D. committee. Diana Lee Capstone project, Agar lab. Jacob Deal, Deravi, MS committee. Christina Codden, Stubbins, Ph.D. Thesis defense committee. **2019 Thesis committees:** Christina Codden, Stubbins. Christina Di Marco, Manetsch. Michael Bergman, Beuning. Xianyi Su, Ivanov. Brandon Miller, Manetsch. Arnik Shah, Ivanov,

Emily Micheloni, Zhu. **Thesis defense committee:** Chao Liang, O'Doherty. **2018 Thesis committee:** Christina Codden, Stubins group, Ahmed Said, Ivanov Group, **Thesis defense committee:** Di Wu, Hancock group, Yuanyuan Yao, Giese group, Lihau Yang, Zhou group. **2017 Thesis defense committee:** Shanshan Liu, Zhou Group. **(chairperson)** Arseniy Belov, Karger Group. **2016 Thesis committees:** Megha Kamath, Carrier/Amiji Groups. Arseniy Belov, Karger Group. Di, Yanjun, Hancock Group. Di Wu, Hancock Group. Yanjun Liu, Hancock Group. Yu Wang, Hancock Group. Shanshan Liu, Zhou Group. Yuanyuan Yao, Giese Group. Wenjun Di, Heather Clark Group. **2016 Ph.D. Thesis Defense Committees:** Siyuan Liu, Karger Group March 2016. Gregory Pirrone, Engen Lab April 2016. Xianzhe Wang, Karger Group April 2016. Kalli Catcott, Zhou Group Dec 2016. Simion Kramer, Karger Group Dec 2016. **2015 Thesis committees.** Xianzhe Wang, Karger Group. Yuanwei Gao, Karger Group. Siyuan Liu, Karger Group. Arseniy Belov, Karger Group. Di Wu, Hancock Group. Yanjun Liu, Hancock Group. Yu Wang, Hancock Group. Gregory Pirrone, Engen Group. Shanshan Liu, Zhou Group. Yuanyuan Yao, Giese Group. **2015 Ph.D. Thesis Defense Committees:** Christopher Chumsae, Zhou Group April 2015. Fan Zhang, Karger Group May 2015. Ph.D. **External Ph.D. thesis defense committee member:** Meena Kathiresan, Ann English Group, Concordia University Montreal Quebec, Sept 2015. **2014 Thesis committees.** Xianzhe (Jason) Wang, Karger Group. Yuanwei (Abby) Gao, Karger Group. Fan (Anna) Zhang, Karger Group. Gregory Pirrone, Engen Group. Yu (Annie) Wang, Zhou-Hancock Groups. Shanshan Liu, Zhou Group. Yuanyuan Yao, Giese Group. Ph.D. **External Ph.D. thesis defense committee member:** Reddy Sama, Daryl Bosco Group, U Mass Medical School, March 2014.

Brandeis MS or Ph.D. Thesis, Progress, or Proposal Committees (2005-2012). Jon Kay, undergraduate in neuroscience, Honors. Ben Cuifo: graduate student in MCB. Yearly Progress. Wladimir Labeikovskiy: graduate student in biochemistry. Proposal. Bo Hong: graduate student in chemistry. Proposal. Marina Dang: graduate student in Chemistry. Proposal. Nicki Persky: graduate student in MCB. Thesis. Chris Hoefler: graduate student in Biochemistry. Yearly Progress. Iva Petrovic: graduate student in Chemistry. Proposal. Chris Knoell: graduate student in MCB: Yearly Progress. Sean O'Toole: graduate student in MCB: Proposal. Duane Winkler (University of Texas San Antonio) Outside Thesis Reviewer. Sai Venkatesh Seetharaman (University of Texas San Antonio) Outside Thesis Reviewer. Aram John Raissi: Proposal. Maria Genco graduate in Neuroscience: Proposal. Sivanne Pearl graduate student in MCB: Proposal.