Michael E. Greenberg - Keynote speaker

Professor of Neurobiology

Head of the Department of Neurobiology, Harvard Medical School

Title of Presentation: **Signaling Networks that Regulate Synapse Development and Cognitive Function**

Over the last two decades Dr. Greenberg has served as a leader in the field of molecular neurobiology. His research has revealed a complex activity-regulated gene expression program relevant to synapse development and neural circuitry and has contributed greatly to our understanding of neurological diseases in which these processes have gone awry.

Honors

1976 Phi Beta Kappa, Sigma Xi, B.A. Magna Cum Laude, Honors in Chemistry

1983-1984 Damon Runyon-Walter Winchell Postdoctoral Fellowship

1987-1990 Searle Scholars Program Award--Chicago Community Trust

1990-1993 McKnight Scholars Award in Neuroscience

1991-1996 American Cancer Society Faculty Research Award

1999-2001 McKnight Innovation in Neuroscience Award 1999-2006 Jacob Javits Neuroscience Award

2001-2003 Ellison Medical Foundation Senior Scholar's Award

2003 Election to the American Academy of Arts and Sciences

2006 A. Clifford Barger Award for Excellence in Mentoring—Harvard Medical School

2006 3rd Annual Edward M. Scolnick Prize in Neuroscience (McGovern Institute)

2007 Harvey Lecture (Rockefeller University)

2008 J. Allyn Taylor International Prize in Medicine

2008 Elected to the National Academy of Sciences

2009 Perl-UNC Neuroscience Prize

2009 Julius Axelrod Prize

2010 Vernon B. Mountcastle Lecture (Johns Hopkins University)

2010 Walter Massey Family Lecture (Marine Biological Laboratory, Woods Hole, MA)

2010 Louis A. Bloomfield Lecture (Case Western Reserve University)

2011 William Shucart Lecture (Tufts University)

2011 Neil Moran Lecture (Emory University)

2012 Kavli Prize Symposium in Neuroscience Lecture (Bergen, Norway)

2012 The Agranoff Lecture (University of Michigan at Ann Arbor)

2012 The Koppanyi Lecture (Georgetown University)

2013 The Carter Wallace Lecture (Princeton University)

2013-2020 Jacob Javits Neuroscience Award

Selected peer-reviewed publications (selected from >150 total)

1. Tran H, Brunet A, Grenier JM, Data SR, Fornace AJ Jr, DeStefano PS, Chiang LW, Greenberg ME. DNA repair pathway stimulated by the forkhead transcription factor FOXO3a (FKHRL1) through the Gadd45 protein.Science 2002;296(5567):530-540.

2. Datta SR, Ranger AM, Lin MZ, Sturgill JF, Ma YC, Cowan CW, Dikkes P, Korsmeyer SJ, Greenberg ME. Survival factor-mediated BAD phosphorylation raises the mitochondrial threshold for apoptosis. Developmental Cell 2002;3(5):631-643.

3. Chen WG, Chang Q, Lin Y, Meissner A, West AE, Griffith EC, Jaenisch R, Greenberg ME. Derepression of BDNF transcription involves calcium-dependent phosphorylation of MeCP2. Science 2003;302(5646):885-889.

4. Brunet A, Sweeney LB, Sturgill JF, Chua KF, Greer PL, Lin Y, Tran H, Ross SE, Mostoslavsky R, Cohen HY, Hu LS, Cheng HL, Jedrychowski MP, Gygi SP, Sinclair DA, Alt FW, Greenberg ME. Stress-dependent regulation of FOXO transcription factors by the SIRT1 deacetylase. Science 2004;303(5666):2011-2015.

5. Tolias KF, Bikoff JB, Burette A, Paradis S, Harrar D, Tavazoie S, Weinberg RJ, Greenberg ME. The Rac1-GEF Tiam1 couples the NMDA receptor to the activity-dependent development of dendritic arbors and spines. Neuron 2005;45(4):525-538.

6. Cowan CW, Shao YR, Sahin M, Shamah SM, Lin MZ, Greer PL, Gao S, Griffith EC, Brugge JS, Greenberg ME. Vav family GEFs link activated Ephs to endocytosis and axon guidance. Neuron 2005;46(2):205-217.

7. Schratt GM, Tuebing F, Nigh EA, Kane C, Sabatini ME, Kiebler M, Greenberg ME. A brain-specific microRNA regulates dendritic spine development. (Article) Nature 2006;439(7074):283-289.

8. Ma YC, Song MR, Park JP, Henry Ho HY, Hu L, Kurtev MV, Zieg J, Ma Q, Pfaff SL, Greenberg ME. Regulation of motor neuron specification by phosphorylation of neurogenin 2. Neuron 2008;58(1):65-77.

9. Lin Y, Bloodgood, BL, Hauser JL, Lapan, AD, Koon, AC, Kim T-K, Hu LS, Malik AN, Greenberg ME. Activity-dependent regulation of inhibitory synapse development by Npas4. (Article) Nature, 2008; 455(7217):1198-1204.

10. Flavell SW, Kim TK, Gray JM, Harmin DA, Hemberg M, Hong EJ, Markenscoff-Papadimitriou E, Bear DM, Greenberg ME. Genome-wide analysis of MEF2 transcriptional program reveals synaptic target genes and neuronal activity-dependent polyadenylation site selection. Neuron 2008;60(6):1022-1038.

11. Hong EJ, McCord AE, Greenberg ME. A biological function for the neuronal activity-dependent component of Bdnf transcription in the development of cortical inhibition. Neuron 2008;Nov 26;60(4):610-24.

12. Margolis SS, Salogiannis J, Lipton DM, Mandel-Brehm C, Wills ZP, Mardinly AR, Hu L, Greer PL, Bikoff JB, Ho HY, Soskis MJ, Sahin M, Greenberg ME. EphB-mediated degradation of the RhoA GEF Ephexin5 relieves a developmental brake on excitatory synapse formation. Cell. 2010 Oct 29;143(3):442-55.

13. Greer PL, Hanayama R, Bloodgood BL, Mardinly AR, Lipton DM, Flavell SW, Kim TK, Griffith EC, Waldon Z, Maehr R, Ploegh HL, Chowdhury S, Worley PF, Steen J, Greenberg ME. The Angelman Syndrome protein Ube3A regulates synapse development by ubiquitinating Arc. Cell 2010;140(5):704-716.

14. Kim TK, Hemberg M, Gray JM, Costa AM, Bear DM, Wu J, Harmin DA, Laptewicz M, Barbara-Haley K, Kuersten S, Markenscoff-Papadimitriou E, Kuhl D, Bito H, Worley PF, Kreiman G, Greenberg ME. Widespread transcription at neuronal activity-regulated enhancers. Nature 2010; 465(7295): 182-187.

15. Cohen S, Gabel HW, Hemberg M, Hutchinson AN, Sadacca LA, Ebert DH, Harmin DA, Greenberg RS, Verdine VK, Zhou Z, Wetsel WC, West AE, Greenberg ME. Genome-wide

activity-dependent MeCP2 phosphorylation regulates nervous system development and function. Neuron. 2011 Oct 6;72(1):72-85.

16. Goffin D, Allen M, Zhang L, Amorim M, Wang IT, Reyes AR, Mercado-Berton A, Ong C, Cohen S, Hu L, Blendy JA, Carlson GC, Siegel SJ, Greenberg ME, Zhou Z. Rett syndrome mutation MeCP2 T158A disrupts DNA binding, protein stability and ERP responses. Nat Neurosci 2011 Nov 27;15(2):274-83.

17. 141. Ross SE, McCord AE, Jung C, Atan D, Mok SI, Hemberg M, Kim TK, Salogiannis J, Hu L, Cohen S, Lin Y, Harrar D, McInnes RR, Greenberg ME. Bhlhb5 and Prdm8 form a repressor complex involved in neuronal circuit assembly. Neuron 2012 Jan 26;73(2):292-303.

18. Wills ZP, Mandel-Brehm C, Mardinly AR, McCord AE, Giger RJ, Greenberg ME. The nogo receptor family restricts synapse number in the developing hippocampus. Neuron 2012 Feb 9;73(3):466-81.

19. Ho HY, Susman MW, Bikoff JB, Ryu YK, Jonas AM, Hu L, Kuruvilla R, Greenberg ME. Wnt5a-Ror-Dishevelled signaling constitutes a core developmental pathway that controls tissue morphogenesis. Proc Natl Acad Sci U S A 2012 Mar 13;109(11):4044-51.

20. Chahrour MH, Yu TW, Lim ET, Ataman B, Coulter ME, Hill RS, Stevens CR, Schubert CR; ARRA Autism Sequencing Collaboration, Greenberg ME, Gabriel SB, Walsh CA. Whole-exome sequencing and homozygosity analysis implicate depolarization-regulated neuronal genes in autism. PLoS Genet 2012 8(4):e1002635.

21. Schafer DP, Lehrman EK, Kautzman AG, Koyama R, Mardinly AR, Yamasaki R, Ransohoff RM, Greenberg ME, Barres BA, Stevens B. Microglia sculpt postnatal neural circuits in an activity and complement-dependent manner. Neuron 2012 May 24;74(4):691-705.

22. Hemberg M, Gray JM, Cloonan N, Kuersten S, Grimmond S, Greenberg ME, Kreiman G. Integrated genome analysis suggests that most conserved non-docing sequences are regulatory factor binding sites. Nucleic Acids Res 2012 Sep 40(16):7858-69.

23. Soskis MJ, Ho HY, Bloodgood BL, Robichaux MA, Malik AN, Ataman B, Rubin AA, Zieg J, Zhang C, Shokat KM, Sharma N, Cowan CW, Greenberg ME. A chemical genetic approach reveals distinct EphB signaling mechanisms during brain development. Nat Neurosci 2012 Nov 15(12):1645-54.

24. Ebert DH, Greenberg ME. Activity-dependent neuronal signaling and autism spectrum disorder. Nature 2013 Jan 17;493(7432):327-37.

25. Yu TW, Chahrour MH, Coulter ME, Jiralerspong S, Okamura-Ikeda K, Ataman B, Schmitz-Abe K, Harmin DA, Adli M, Malik AN, D'Gama AM, Lim ET, Sanders SJ, Mochida GH, Partlow JN, Sunu CM, Felie JM, Rodriguez J, Nasir RH, Ware J, Joseph RM, Hill RS, Kwan BY, Al-Saffar M, Mukaddes NM, Hashmi A, Balkhy S, Gascon GG, Hisama FM, LeClair E, Poduri A, Oner O, Al-Saad S, Al-Awadi SA, Bastaki L, Ben-Omran T, Teebi AS, Al-Gazali L, Eapen V, Stevens CR, Rappaport L, Gabriel SB, Markianos K, State MW, Greenberg ME, Taniguchi H,

Braverman NE, Morrow EM, Walsh CA. Using whole-exome sequencing to identify inherited causes of autism. Neuron 2013 Jan 23;77(2):259-73.

26. Yun J, Nagai T, Furukawa-Hibi Y, Kuroda K, Kaibuchi K, Greenberg ME, Yamada K. Neuronal Per Arnt Sim (PAS) domain protein 4 (NPAS4) regulates neurite outgrowth and phosphorylation of synapsin I. J Biol. Chem 2013 Jan 25;288(4):2655-64.

27. Veeramah RV, Johnstone L, Karafet TM, Wolf D, Sprissler R, Salogiannis J, Barth-Maron A, Greenberg ME, Stuhlmann T, Weinert S, Jentsch TJ, Pazzi M, Restifo LL, Talwar D, Erickson R, Hammer MF. Exome sequencing reveals new causal mutations in children with epileptic encephalopathies. Epilepsia May 3.

28. Lyst MJ, Ekiert R, Ebert DH, Merusi C, Nowak J, Selfridge J, Guy J, Kastan NR, Robinson ND, de Lima Alves F, Rappsilber J, Greenberg ME, Bird A. Rett syndrome mutations abolish the interaction of MeCP2 with the NCoR/SMRT co-repressor. Nat Neurosci 2013 Jun 16;16(7):898-902.

29. Ebert DG, Gabel HW, Robinson ND, Kastan NR, Hu LS, Cohen S, Navarro, AJ, Lyst MJ, Ekiert R, Bird AP, Greenberg ME. Activity-dependent phosphorylation of MECP2 threonine 308 regulates interaction with NcoR. Nature 2013 Jul 18;499(7458):341-5.

30. Gabel HW, Greenberg ME. Genetics. The maturing brain methylome. Science 2013 Aug 9;341(6146):626-7.