

## CURRICULUM VITAE

### ALEXANDROS MAKRIYANNIS, Ph.D.

*George D. Behrakis Chair in Pharmaceutical Biotechnology,  
Professor of Pharmaceutical Science, Chemistry and Chemical Biology  
Director of the Center for Drug Discovery*

#### EDUCATION:

- 1960 B.Ph. Chem., University of Cairo  
1967 Ph.D. (Medicinal Chemistry), University of Kansas (Supervisor E.E. Smissman)  
1967-69 Post-doctoral Fellow (Synthetic Organic Chemistry), University of California, Berkeley, CA (Supervisor H. Rapoport)

#### PROFESSIONAL SUMMARY:

- 1969-70 Senior Chemist, *Smith, Kline and French Laboratories*, Philadelphia, PA (Supervisor J. Wilson)  
1971-72 Research Associate, Department of Biochemistry and Pharmacology, *Tufts Medical School*, Boston, MA (Supervisor H. Mautner)  
1972-74 Assistant Professor, Department of Biochemistry and Pharmacology, *Tufts Medical School*, Boston, MA  
1974-80 Assistant Professor of Medicinal Chemistry, *University of Connecticut*, Storrs, CT  
1980-86 Associate Professor of Medicinal Chemistry, *University of Connecticut*, Storrs, CT  
1981-87 Head, Medicinal Chemistry and Pharmacognosy, School of Pharmacy, *University of Connecticut*, Storrs, CT  
1983-96 Visiting Scientist, F. Bitter National Magnet Laboratory, *Massachusetts Institute of Technology*, Cambridge, MA  
1985-91 Director and Founder, Institute of Organic and Pharmaceutical Chemistry, *National Hellenic Research Foundation* (Greece)  
1986-04 Professor of Medicinal Chemistry and Pharmacognosy, *University of Connecticut*, Storrs, CT  
Director of the Drug Design Program; Critical Technologies Initiative, *State of Connecticut*  
1994-04 Professor of Molecular and Cell Biology (joint), *University of Connecticut*, Storrs, CT  
1997-04 Director, Center for Drug Discovery, *University of Connecticut*, Storrs, CT  
1997-04 Professor of Pharmacology (joint), *University of Connecticut Health Center*, Farmington, CT  
1996-04 Board of Trustees' Distinguished Professor of Medicinal Chemistry and Molecular and Cell Biology, *University of Connecticut*, Storrs, CT  
2003 Founder, *MAKScientific* (Drug Discovery Start-up)  
2004- Adjunct Professor, Dept. Pharm. Sciences, *University of Connecticut*, Storrs, CT  
2004- George D. Behrakis Chair in Pharmaceutical Biotechnology, Professor of Chemistry & Chemical Biology and Pharmaceutical Sciences, and Director of the Center for Drug Discovery, *Northeastern University*, Boston, MA  
2006 Founder, *Pafos Pharmaceuticals* (Drug Discovery Start-up)

#### HONORS:

- McNeil Endowment Fellowship (1964-67)  
Research Scientist Award, NIDA (1990-95; 1995-2000)  
Fellow, American Association for the Advancement of Science (1993)  
President, International Cannabinoid Research Society (ICRS) (1993)  
Distinguished Scientist Award, University of Connecticut Alumni (1996)  
Fellow, American Association of Pharmaceutical Sciences (1997)  
National Institute of Health MERIT Awards (1997-2007, 2007-2017)  
Senior Scientist NIDA Award (2000-2011)  
Research Achievement Award in Drug Design and Discovery, American Association of

Pharmaceutical Scientists (AAPS) (2002)  
 Honorary Doctorate of Philosophy, University of Athens, Greece (2005)  
 Mechoulam Life Achievement Award in Cannabinoid Research (ICRS) (2006)  
 Kenneth E. Avis Award in Medicinal Chemistry (2007)  
 Marquis Who's Who in Science and Engineering (2007)  
 ACS Research Lifetime Achievement Award in Medicinal Chemistry (2012)  
 Annual NU Award for Excellence in Research and Creativity (2012)  
 ACS Medicinal Chemistry Hall of Fame (2013)

#### **FIELDS OF SPECIALIZATION:**

Target-based drug design and synthesis; chemical biology; membrane and protein biophysics (LC/MS/MS-NMR); proteomic and metabolomic LC/MS technologies

#### **RESEARCH INTERESTS:**

Cannabinergic agents; drugs of abuse; structure and function of G-protein coupled receptors and enzymes; enzyme inhibitors; drug-membrane interactions; neurosteroids; endocannabinoid biomarkers

#### **CONSULTING ACTIVITIES:**

Glaxo Wellcome, Bristol Myers, Genaissance Pharmaceuticals (Co-Chair, Scientific Advisory Board), Medochemie (Cyprus), Pfizer, Synaptic Corporation, MAKScientific (Chairman Scientific Advisory Board), Forest Laboratories, Inc., Arqule Pharmaceuticals, Biogen Idec, Aileron Therapeutics, Nestle, Wyeth, Ischemix, Inc.

#### **ADVISORY APPOINTMENTS:**

Consultant Intramural NIAAA Biophysics Research Program (1985-87)  
 Ad Hoc Member, NIDA Study Section (1985-89)  
 Senior Advisor National Research Council of Greece (1985-present)  
 NIDA Special Rev. Committee (1987-2000)  
 Member of Ad Hoc Committee NIAID (1990-1992)  
 Member, NIDA-L Medications Development Review Committee (1998-2004); Chair (2001-2004)  
 Member, NIH MCDN-5 Review Committee (1998-2008)  
 American Association of Pharmaceutical Scientists (AAPS)-Chair, Division of Medicinal Chemistry and Natural Products (1998-99); Chair, Division of Drug Design and Discovery (1999-00)  
 Member, Nat. Advisory Council for the Center for Medicinal Cannabis Research (2001-present)  
 Member, External Review Board, Institut de Recherches Cliniques de Montreal (2006-present)  
 Member, Scientific Review Board of the Institute for the Study of Aging, Alzheimer's Drug Discovery Foundation (2007-present)  
 Member, NIH Drug Discovery Scientific Study Section (2008-present)  
 Member of Industry Consulting Board, Tufts Clinical and Translational Science Institute, Tufts Medical Center, Boston, MA (2009)  
 Member, Drug Discovery for the Nervous System Review Group (2009-present)  
 Member, Awards Committee, American Association of Pharmaceutical Scientists (AAPS) (2010-present)  
 Consultanships with Pharm. Industries

#### **EDITORIAL ACTIVITIES:**

1999-04 PharmSci, Senior Associate Editor for Medicinal Chemistry  
 2001-06 Member, Editorial Board, Il Farmaco

2002-07	Member, Editorial Board, Journal of Medicinal Chemistry
2002-	Member, Editorial Advisory Board, Letters in Drug Design and Discovery
2010-	Member, Editorial Board, Global Journal of Organic Chemistry

#### ACADEMIC ACTIVITIES:

1976-04	Member, Institute of Materials Science, University of Connecticut, Storrs, CT
1980-87	Member, Polymer Science Program, University of Connecticut, Storrs, CT
1983-11	Chairman, Organizing Committee for 1st through 12th Cyprus Conference on "New Methods in Drug Research"
1987-98	Member, Biomolecular and Structural Analysis Center, University of Connecticut Health Center, Farmington, CT
2007-08	Member, Research Policy Oversight Committee, Northeastern University, Boston, MA
2011-12	Member, Research Policy Oversight Committee, Northeastern University, Boston, MA

#### PROFESSIONAL MEMBERSHIPS:

American Chemical Society (ACS), American College of Neuropsychopharmacology (ACNP), The Protein Society, American Association for the Advancement of Science (AAAS; Science), American Association of Colleges of Pharmacy (AAP), The Society of Neuroscience (SfN), American Society for Pharmacology and Experimental Therapeutics (ASPET), College on Problems of Drug Dependence (CPDD), The New York Academy of Science, Molecular Neuropharmacology and Signaling Study Section (MNPS)

#### PUBLICATIONS:

1. Smissman E.E., **A. Makriyannis**, (1970), Solvent effects in the NMR spectra of cyano compounds. *J. Pharm. Sci.*, **59**, 1186. PMID: 5457343
2. Smissman E.E., **A. Makriyannis**, E.J. Walaszek, (1970), Synthesis and pharmacology of N-Cyano-( $\beta$ -Arylethyl) amines. *J. Med. Chem.*, **13**, 640. PMID: 5466125
3. **Makriyannis A.**, R.F. Sullivan, H.G. Mautner, (1972), Conformational relationships between analogs of acetylcholine and those of local anesthetics in solution. *Proc. Natl. Acad. Sci.*, **69**, 3416. PMID: 4508331
4. **Makriyannis A.**, J.S. Frazee, J.W. Wilson, (1972), 3-Phenyl-5-quinolinemethanol antimalarials. *J. Med. Chem.*, **16**, 118-122. PMID: 4566626
5. **Makriyannis A.**, W.H.H. Gunther, H.G. Mautner, (1973), Selenol esters as specific reagents for the acylation of thiol groups. *J. Am. Chem. Soc.*, **95**, 8403-8406.
6. Smissman E.E., **A. Makriyannis**, (1973), Azodicarboxylic acid esters as dealkylating agents. *J. Org. Chem.*, **38**, 1652. PMID: 4709670
7. Feinstein M.B., M. Volpi, S. Perrie, **A. Makriyannis**, R.I. Sha'afi, (1977), Mechanisms of local anesthetic action on the permeability of erythrocytes, leukocytes and liposomes containing the erythrocyte anion channel protein. *Mol. Pharmacol.*, **13**, 840-851. PMID: 897520
8. **Makriyannis A.**, J. Knittel, (1978), Conformational studies on phenethylamine hallucinogens: The role of  $\alpha$ -alkyl substitution. *NIDA Research Monograph Series*, **22**, 464-481. PMID: 101888
9. **Makriyannis A.**, J. Knittel, (1979), The conformational analysis of aromatic methoxyl groups from carbon-13 chemical shifts and spin lattice relaxation times. *Tet. Lett.*, **20**, 2753-2756.
10. **Makriyannis A.**, J. Theard, H.G. Mautner, (1979), A direct approach to the determination of the rotational barriers of the acetylcholine and choline molecules. *Biochem. Pharmacol.*, **28**, 1911-1915. PMID: 454463
11. **Makriyannis A.**, G. Hite, (1979), Nortropacocaine hydrochloride conformation in aqueous and hydrophobic media. *J. Pharm. Sci.*, **68**, 788-790. PMID: 458585

12. **Makriyannis A.** J.B. Anderson, J. DiPiro, E. Kostiner, G. Hite, (1979), Steric requirements for adrenergic activity. I. The crystal structure of  $\beta$ - (2-hydroxy-phenyl) ethanolamine hydrochloride. *Acta. Crystal. B.*, **35**, 2247-2250.
13. Williams D.A., **A. Makriyannis**, (1979), Carbon-13 and proton magnetic resonance spectra of 2, 4-disubstituted 3, 3-diphenyltetrahydrofurans derived from isomethadone and isomethadol. *J. Hetero. Chem.*, **16**, 1223-1226.
14. **Makriyannis A.**, S.W. Fesik, (1980), Effects of anesthetics on sulfate transport in the red cell. *J. Neurosci. Res.*, **5**, 25-33. PMID: 7381978
15. Weintraub J.R., D.E. Nichols, **A. Makriyannis**, S. W. Fesik, (1980), Conformational energy differences between side chain-alkylated analogues of the hallucinogen DOM. *J. Med. Chem.*, **23**, 339- 341. PMID: 7365752
16. Henkel J.G., N. Sikand, **A. Makriyannis**, (1981), Synthesis and adrenoreceptor affinity of some highly polar  $\beta$ -substituted catecholamines. *J. Med. Chem.*, **24**, 1258-1260. PMID: 7328588
17. Knittel J., **A. Makriyannis**, (1981), Studies on phenethylamine hallucinogens. 2. Conformations of arylmethoxyl groups using  $^{13}\text{C}$  NMR. *J. Med. Chem.*, **24**, 906-909. PMID: 7277405
18. **Makriyannis A.**, J. Knittel, (1981), The conformational analysis of amphetamine in solution based on the unambiguous assignment of diastereotopic benzylic protons in the  $^1\text{H}$  NMR spectra. *Tet. Lett.*, **22**, 4631-4634.
19. de Jong A.P., S.W. Fesik, **A. Makriyannis**, (1982), Conformational requirements for norepinephrine uptake inhibition by phenethylamines in brain synaptosomes. Effects of  $\alpha$ -alkyl substitution. *J. Med. Chem.*, **25**, 1438-1441. PMID: 7154004
20. de Jong A.P., F. Huggins, D. Fournier, **A. Makriyannis**, (1982), Inhibition of [ $^3\text{H}$ ]5-HT binding to rat brain membranes by psychotomimetic amphetamines. *Eur. J. Pharmacol.*, **83**, 305-308. PMID: 7173311
21. **Makriyannis A.**, S.W. Fesik, (1982), Methoxy group conformations of phenyl methyl ethers in solution. *J. Am. Chem. Soc.*, **104**, 6462-6463.
22. **Makriyannis A.**, D. Bowerman, P.Y. Sze, D. Fournier, A.P. de Jong, (1982), Structure activity correlations in the inhibition of brain synaptosomal  $^3\text{H}$ -norepinephrine uptake by phenethylamine analogs: The role of  $\alpha$ -alkyl side chain and methoxyl ring substitutions. *Eur. J. Pharmacol.*, **81**, 337-340. PMID: 7117379
23. Naccache P., M. Volpi, E.L. Becker, **A. Makriyannis**, R.I. Sha'afi, (1982), Cannabinoid induced degranulation of rabbit neutrophils. *Biochem. Biophys. Res. Commun.*, **104**, 6462. PMID: 6288043
24. **Makriyannis A.**, J.L. Nilsson, (1983), Designing new drugs. *Pharmacy International*, **4**, 193.
25. **Makriyannis A.**, S.W. Fesik, (1983), Mechanism of steroid anesthetic action: interactions of alphaxalone and  $\Delta^{16}$ -alphaxalone with bilayer vesicles. *J. Med. Chem.*, **26**, 463-465. PMID: 6834378
26. Fesik S.W., **A. Makriyannis**, (1985), Geometric requirements for membrane perturbation and anesthetic activity. Conformational analysis of alphaxalone and  $\Delta^{16}$ -alphaxalone and  $^2\text{H}$  NMR studies on their interactions with model membranes. *Mol. Pharmacol.*, **27**, 624-629. PMID: 4000106
27. **Makriyannis A.**, S. Fesik, R. Kriwacki, (1985), Nuclear magnetic resonance in drug research. New methods in drug research. *J.R. Prous Science Publishers*, **1**, 19-43.
28. Ruocco M.T., **A. Makriyannis**, D.J. Siminovitch, S. Das Gupta, R.G. Griffin, (1985), Deuterium NMR study of ether and ester-linked phosphatidylcholines. *Biochemistry*, **24**, 4844-4851. PMID: 4074662
29. **Makriyannis A.** D.J. Siminovitch, S.K. Das Gupta, R.G. Griffin, (1986), Studies on the interactions of anesthetic steroids with phosphatidylcholine using  $^2\text{H}$  and  $^{13}\text{C}$  solid-state NMR. *Biochim. Biophys. Acta.*, **859**, 49-55. PMID: 3755060
30. Banijamali A., **A. Makriyannis** (1987), Separation of tetrahydrocannabinol isomers by reverse-phase high pressure liquid chromatography. *J. Liq. Chromatogr.*, **10**, 2931-2938.

31. Banijamali A., A. Charalambous, C.J. Van der Schyf, **A. Makriyannis**, (1987), Specific deuteration of phenols and aromatic ethers using borontrifluoride and deuterium oxide. *J. Label. Compounds*, **24**, 1479-1482.
32. **Makriyannis A.**, A. Banijamali, H. Jarrell, C.J. Van der Shyf, (1987), Interactions of cannabinoids with membranes: The role of the cannabinoid stereochemistry and absolute configuration and orientation of  $\Delta^9$ -THC in the cannabinoid bilayer. *NIDA Research Monograph Series*, **79**, 123-133. PMID: 2830533
33. Siminovitch D.J., M. Ruocco, **A. Makriyannis**, R.G. Griffin, (1987), The effect of cholesterol on lipid dynamics and packing in diether phosphatidylcholine bilayers. X-ray diffraction and 2H-NMR study. *Biochim. Biophys. Acta.*, **901**, 191-200. PMID: 3607045
34. Banijamali A., N. Abou Taleb, A. Charalambous, C.J. Van der Schyf, **A. Makriyannis**, (1988), Synthesis of deuterium labeled cannabinoids. *J. Label. Compounds*, **25**, 73-82.
35. **Makriyannis A.**, A. Banijamali, (1988), A novel synthesis of (-)-trans- $\Delta^{9,11}$ -tetrahydrocannabinol. *J. Heterocyclic Chem.*, **25**, 823-825.
36. Van der Schyf C.J., T. Mavromoustakos, **A. Makriyannis** (1988), The conformation of (-)  $8\alpha$  and (-)  $8\beta$ -hydroxy- $\Delta^9$ -tetrahydrocannabinols and their interactions with model membranes. *Life Sci.*, **42**, 2231-2239. PMID: 2836679
37. Abdelmageed O., D. Siminovitch, M. Ruocco, R.I. Duclos Jr., R.G. Griffin, **A. Makriyannis**, (1989), Syntheses of  $^2\text{H}$ - and  $^{13}\text{C}$ -labeled 1,2-di-O-hexadecyl-sn-glycero-3-phosphoethanolamines and 1,2-di-O-hexadecyl-sn-glycero-3-phosphocholines. *Chem. Phys. Lipids*, **50**, 163-169.
38. Kriwacki R.W., **A. Makriyannis**, (1989), The conformational analysis of  $\Delta^9$ - and  $\Delta^{9,11}$ -tetrahydrocannabinols in solution using high resolution nuclear magnetic resonance spectroscopy. *Mol. Pharmacol.*, **35**, 495-503. PMID: 2539557
39. Lee C.W., G.S. Das, J. Mattai, G.G. Shipley, M.O. Abdel, **A. Makriyannis**, R.G. Griffin, (1989), Characterization of the L- phase in trehalose-stabilized dry membranes by solid-state NMR and X-ray diffraction. *Biochemistry*, **28**, 5000-5009. PMID: 2765521
40. **Makriyannis A.**, A. Banijamali, H.C. Jarrell, D.P. Yang, (1989), The orientation of (-)-  $\Delta^9$ -tetrahydrocannabinol in DPPC bilayers as determined from solid-state 2H-NMR. *Biochim. Biophys. Acta.*, **986**, 141-145. PMID: 2554980
41. **Makriyannis A.**, T. Mavromoustakos, (1989), Studies on drug membrane interactions using solid state NMR, small angle X-ray diffraction and differential scanning calorimetry. *Rev. Clin. Pharmacol. Pharmacokinetics, Int. Ed.*, **3**, 95-114. PMID: 1753995
42. Abdelmageed O.H. R.I. Duclos Jr., E. Abushanab, **A. Makriyannis**, (1990), Chiroselective syntheses of  $^2\text{H}$ - and  $^{13}\text{C}$ -labeled 1-O-alkyl-2-O-alkyl'-sn-glycero-3-phosphoethanolamines and 1-O-alkyl-2-O-alkyl'-sn-glycero-3-phosphocholines. *Chem. Phys. Lipids*, **54**(1), 49-59. PMID: 2361232
43. **Makriyannis A.** R.S. Rapaka, (1990), The molecular basis of cannabinoid activity. *Life. Sci.*, **47**, 2173-2184. PMID: 2266785
44. **Makriyannis A.** D.P. Yang, R.G. Griffin, G.S. Das, (1990), The perturbation of model membranes by (-)- $\Delta^9$ -tetrahydrocannabinol. Studies using solid-state  $^2\text{H}$ - and  $^{13}\text{C}$ -NMR. *Biochim. Biophys. Acta.*, **1028**(1), 31-42. PMID: 2169880
45. Mavromoustakos T.M., D.P. Yang, A. Charalambous, L.G. Herbette, **A. Makriyannis**, (1990), Study of the topography of cannabinoids in model membranes using x-ray diffraction. *Biochim. Biophys. Acta.*, **1024**(2), 336-344. PMID: 2162206
46. Melchior D.L., A. Carruthers, **A. Makriyannis**, R.I. Duclos Jr., M.O. Abdel, (1990), Alterations in red blood cell sugar transport by nanomolar concentrations of alkyl lysophospholipid. *Biochim. Biophys. Acta.*, **1028**(1), 1-8. PMID: 2207116
47. Burstein S.H., C.A. Audette, A. Charalambous, S.A. Doyle, G. Yan, S.A. Hunter, **A. Makriyannis**, (1991), Detection of cannabinoid receptors by photoaffinity labeling. *Biochem. Biophys. Res. Commun.*, **176**(1), 492-497. PMID: 1850270

48. Charalambous A., G. Marciniak, C.Y. Shiue, S.L. Dewey, D.J. Schlyer, A.P. Wolf, **A. Makriyannis**, (1991), PET studies in the primate brain and biodistribution in mice using (-)-5'-<sup>18</sup>F- $\Delta^8$ -THC. *Pharmacol. Biochem. Behav.*, **40**(3), 503-507. PMID: 1666914
49. Charalambous A., S.Y. Lin, G. Marciniak, A. Banijamali, F.L. Friend, D.R. Compton, B.R. Martin, **A. Makriyannis**, (1991), Pharmacological evaluation of halogenated  $\Delta^8$ -THC analogs. *Pharmacol. Biochem. Behav.*, **40**(3), 509-512. PMID: 1666915
50. **Makriyannis A.**, C.M. DiMeglio, S.W. Fesik, (1991), Anesthetic steroid mobility in model membrane preparations as examined by high-resolution <sup>1</sup>H and <sup>2</sup>H NMR spectroscopy. *J. Med. Chem.*, **34**(5), 1700-1703. PMID: 2033593
51. Marciniak G., A. Charalambous, C.Y. Shiue, S.L. Dewey, D.J. Schlyer, **A. Makriyannis**, A.P. Wolf, (1991), <sup>18</sup>F-labeled tetrahydrocannabinol: Synthesis and PET studies in a baboon. *J. Lab. Comp. Radiophys.*, **30**, 413-415.
52. Mavromoustakos T., D.P. Yang, W. Broderick, D. Fournier, **A. Makriyannis**, (1991), Small angle x-ray diffraction studies on the topography of cannabinoids in synaptic plasma membranes. *Pharmacol. Biochem. Behav.*, **40**(3), 547-552. PMID: 1666918
53. Yang D.P., A. Banijamali, A. Charalambous, G. Marciniak, **A. Makriyannis**, (1991), Solid state <sup>2</sup>H-NMR as a method for determining the orientation of cannabinoid analogs in membranes. *Pharmacol. Biochem. Behav.*, **40**(3), 553-557. PMID: 1806945
54. Charalambous A., Y. Guo, D.B. Huston, A.C. Howlett, D.R. Compton, B.R. Martin, **A. Makriyannis**, (1992), (-)-5'-azido- $\Delta^8$ -THC: A novel photoaffinity label for the cannabinoid receptor. *J. Med. Chem.*, **35**(16), 3076-3079. PMID: 1323683
55. Duclos Jr. R.I., **A. Makriyannis**, (1992), Syntheses of all four stereoisomers which are conformationally constrained 1, 4-dioxanyl analogs of the antineoplastic ether lipid ET-18-OCH<sub>3</sub>. *J. Org. Chem.*, **57**(23), 6156-6163.
56. Froimowitz M., C.M. DiMeglio, **A. Makriyannis**, (1992), Conformational preferences of the kappa-selective opioid agonist U50488. A combined molecular mechanics and nuclear magnetic resonance study. *J. Med. Chem.*, **35**(17), 3085-3094. PMID: 1324314
57. Yang D.P., T. Mavromoustakos, K. Beshah, **A. Makriyannis**, (1992), Amphipathic interactions of cannabinoids with membranes. A comparison between  $\Delta^8$ -THC and its o-methyl analog using differential scanning calorimetry, x-ray diffraction and solid-state <sup>2</sup>H-NMR. *Biochim. Biophys. Acta.*, **1103**(1), 25-36. PMID: 1309660
58. DiMeglio C.M., M. Froimowitz, **A. Makriyannis**, (1993), Conformational analysis of the opioid phenylmorphane and its 9-methyl analogue in solution using high-resolution nuclear magnetic resonance spectroscopy. *Pharm. Res.*, **10**(8), 1200-1205. PMID: 8415408
59. **Makriyannis A.**, C.M. DiMeglio, A.P. de Jong, S. El-Khateeb, (1993), Hallucinogenic receptor models: Interaction of imidazolium chloride with amphetamine analogs. *Mol. Pharmacol.*, **43**(1), 78-83. PMID: 8423771
60. Martel P., **A. Makriyannis**, T. Mavromoustakos, K. Kelly, K.R. Jeffrey, (1993), Topography of tetrahydrocannabinols in model membranes using neutron diffraction. *Biochim. Biophys. Acta.*, **1151**(1), 51-58. PMID: 8395214
61. Martin B.R., D.R. Compton, S.F. Semus, S.Y. Lin, G. Marciniak, J. Grzybowska, A. Charalambous, **A. Makriyannis**, (1993), Pharmacological evaluation of iodo and nitro analogs of  $\Delta^8$ -THC and  $\Delta^9$ -THC. *Pharmacol. Biochem. Behav.*, **46**(2), 295-301. PMID: 8265683
62. Mavromoustakos T., E. Theodoropoulou, M. Koufaki, D.P. Yang, S.Y. Lin, M. Zerbou, T. Kalogeropoulou, **A. Makriyannis**, (1993), Conformational analysis of 1-thiohexadecyl-2-O-methyl-rac-glycero-3-phosphocholine. *Rev. Clin. Pharmacol.*, **11**, 178-187.
63. Mavromoustakos T., **A. Makriyannis**, (1993), Studies of drug induced changes on the thermotropic properties of model membranes using differential scanning calorimetry. *Rev. Clin. Pharmacol. Pharmacokin.*, **11**, 13-21.
64. Yang D.P., T. Mavromoustakos, **A. Makriyannis**, (1993), Small angle x-ray diffraction studies of (-)- $\Delta^8$ -tetrahydrocannabinol and its O-methyl analog in membranes. *Life Sci.*, **53**(7), 117-122. PMID: 8394487

65. Abadji V., S.Y. Lin, G. Taha, G. Griffin, L.A. Stevenson, R.G. Pertwee, **A. Makriyannis**, (1994), (R)-methanandamide: A chiral novel anandamide possessing higher potency and metabolic stability. *J. Med. Chem.*, **37**(12), 1889-1893. PMID: 8021930
66. Duclos Jr. R.I., H.H. Chia, O.H. Abdelmageed, H. Esber, D.J. Fournier, **A. Makriyannis**, (1994), Syntheses of racemic and nearly optically pure ether lipids and evaluation of in vitro antineoplastic activities. *J. Med. Chem.*, **37**(24), 4147-4154. PMID: 7990114
67. Guo Y., V. Abadji, K.L. Morse, D.J. Fournier, X. Li, **A. Makriyannis**, (1994), (-)-11-hydroxy-7'-isothiocyanato-1',1'-dimethylheptyl- $\Delta^8$ -THC: A novel, high-affinity irreversible probe for the cannabinoid receptor in the brain. *J. Med. Chem.*, **37**(23), 3867-3870. PMID: 7966145
68. Matsoukas J.M., J. Hondrelis, M. Keramida, T. Mavromoustakos, **A. Makriyannis**, R. Yamdazni, Q. Wu, G.J. Moore, (1994), Role of the NH<sub>2</sub>-terminal domain of angiotensin II (ANG II) and [Sar<sup>1</sup>]angiotensin II on conformation and activity. NMR evidence for aromatic ring clustering and peptide backbone folding comparing to [des-1,2,3] angiotensin II. *J. Biol. Chem.*, **269**(7), 5303-5312. PMID: 8106515
69. Mavromoustakos T., D.P. Yang, **A. Makriyannis**, (1994), Topography of alphaxalone and  $\Delta^{16}$ -alphaxalone in membrane bilayers containing cholesterol. *Biochim. Biophys. Acta.*, **1194**(1), 69-74. PMID: 8075143
70. Mavromoustakos T., E. Theodoropoulou, **A. Makriyannis**, (1994), Use of <sup>13</sup>C-CP/MASS techniques to study the dynamic properties of anesthetic steroids in membrane bilayers. *Pharmac. J.*, **7**, 129-139.
71. Smith R., F. Separovic, T.J. Milne, A. Whittaker, F.M. Bennett, B.A. Cornell, **A. Makriyannis**, (1994), Structure and orientation of the pore-forming peptide, melittin, in lipid Bilayers. *J. Mol. Biol.*, **241**(3), 456-466. PMID: 8064858
72. Tius M.A., **A. Makriyannis**, X. Long Zou, V. Abadji, (1994), Conformationally restricted hybrids of CP-55,940 and HHC: Stereoselective synthesis and activity. *Tetrahedron*, **50**(9), 2671-2680.
73. Xie X.Q., D.P. Yang, L.S. Melvin, **A. Makriyannis**, (1994), Conformational analysis of the prototype nonclassical cannabinoid CP-47,497, using 2D NMR and computer molecular modeling. *J. Med. Chem.*, **37**(10), 1418-1426. PMID: 8182700
74. Yan G., D. Yin, A.D. Khanolkar, D.R. Compton, B.R. Martin, **A. Makriyannis**, (1994), Synthesis and pharmacological properties of 11-hydroxy-3-(1',1'-dimethylheptyl) hexahydrocannabinol: A high-affinity cannabinoid agonist. *J. Med. Chem.*, **37**(16), 2619-2622. PMID: 8057304
75. Yin D., A.D. Khanolkar, **A. Makriyannis**, M. Froimowitz, (1994), Chiral resolution of 1, 3-dimethyl-4-phenylpiperidine derivatives using high-performance liquid chromatography with a chiral stationary phase. *J. Chrom. A.*, **678**(1), 176-179. PMID: 7921191
76. Calogeropoulou T., M. Koufaki, A. Tsotinis, J. Balzarini, E. DeClercq, **A. Makriyannis**, (1995), Synthesis and anti-HIV evaluation of alkyl and alkoxyethyl phosphodiester AZT derivatives. *Antiv. Chem. & Chemoth.*, **6**(1), 43-49. PMID: 2266785
77. Hampson A.J., W. A. Hill, M. Zan-Phillips, **A. Makriyannis**, E. Leung, R.M. Elgin, L.M. Bornheim, (1995), Anandamide hydroxylation by brain lipoxigenase: Metabolite structures and potencies at the cannabinoid receptor. *Biochim. Biophys. Acta.*, **1259**(2), 173-179. PMID: 7488638
78. Mavromoustakos T., D. Papahatzis, T. Kourouli, E. Theodoropoulou, **A. Makriyannis**, (1995), Classical and non-classical cannabinoids. Structure activity relationships and interactions with membranes. *Rev. Clin. Pharmacol.*, **13**, 105-128. PMID: 2266785
79. Mavromoustakos T., D.P. Yang, **A. Makriyannis**, (1995), Effects of the anesthetic steroid alphaxalone and its inactive  $\Delta^{16}$ -alphaxalone on the thermotropic properties of membrane bilayers. A model for membrane perturbation. *Biochim. Biophys. Acta*, **1239**(2), 257-264. PMID: 7488631
80. Mavromoustakos T., D. Paphatjis, T. Kourouli, E. Theodoropoulou, **A. Makriyannis**, (1995), Recent advances in the field of cannabinoids: Synthesis of novel analogs and their

- interactions with membranes. *A Review of Clinical Pharmacology and Pharmacokinetics*, **13**, 105-128.
81. Mavromoustakos T., D.P. Yang, **A. Makriyannis**, (1995), Small angle x-ray diffraction and differential scanning calorimetric studies of O-methyl(-)- $\Delta^8$ -tetrahydrocannabinol and its 5' iodinated derivative in membrane bilayers. *Biochim. Biophys. Acta.*, **1237**(2), 183-188. PMID: 7632712
  82. Mavromoustakos T., D.P. Yang, E. Theodoropoulou, **A. Makriyannis**, (1995), Studies of the conformational properties of the cannabimimetic aminoalkylindole pravadoline using NMR and molecular modeling. *Eur. J. Med. Chem.*, **30**(3), 227-234.
  83. Mavromoustakos T., D.P. Yang, E. Theodoropoulou, **A. Makriyannis**, (1995), Use of molecular graphics as an aid in the study of conformational properties of aminoalkylindole pravadoline and the analgesic cannabinoid CP-55, 940. *Rev. Clin. Pharm.*, **9**, 113-116.
  84. Moring J., R.I. Duclos Jr. J.H. Zhang, L.E. Herbette, X.Q. Xie, **A. Makriyannis**, (1995), Single crystal x-ray structure of the two 4-heptadecyl derivatives of (1R, 5S)-3,6,8-trioxabicyclo [3.2.1]-octane. *Chem. Phys. Lipids*, **77**(1), 99-112. PMID: 7586096
  85. Morse K.L., D.J. Fournier, X. Li, J. Grzybowska, **A. Makriyannis**, (1995), A novel electrophilic high affinity irreversible probe for the cannabinoid receptor. *Life Sci.*, **56**(23-24), 1957-1962. PMID: 7776819
  86. Pertwee R., G. Griffin, S. Fernando, X. Li, A. Hill, **A. Makriyannis**, (1995), AM630, a competitive cannabinoid receptor antagonist. *Life Sci.*, **56**(23-24), 1949-1955. PMID: 7776818
  87. Pertwee R., S.R. Fernando, G. Griffin, V. Abadji, **A. Makriyannis**, (1995), Effect of phenylmethylsulphonyl fluoride on the potency of anandamide as an inhibitor of electrically evoked contractions in two isolated tissue preparations. *Eur. J. Pharmacol.*, **272**(1), 73-78. PMID: 7713152
  88. Tius M.A., W.A. Hill, X.L. Zou, J. Busch-Petersen, J.K. Kawakami, M.C. Fernandez-Garcia, D.J. Drake, V. Abadji, **A. Makriyannis**, (1995), Classical/non-classical cannabinoid hybrids; stereochemical requirements for the southern hydroxyalkyl chain. *Life Sci.*, **56**(23-24), 2007-2012. PMID: 7776825
  89. Xie X.Q., M. Eissenstat, **A. Makriyannis**, (1995), Common cannabimimetic pharmacophoric requirements between aminoalkyl indoles and classical cannabinoids. *Life Sci.*, **56**(23-24), 1963-1970. PMID: 7776820
  90. Busch-Petersen J., W.A. Hill, P. Fan, A. Khanolkar, X.Q. Xie, M.A. Tius, **A. Makriyannis**, (1996), Unsaturated side chain  $\beta$ -11-hydroxyhexahydrocannabinol analogs. *J. Med. Chem.*, **39**(19), 3790-3796. PMID: 8809166
  91. Cody V., N. Li, A.D. Khanolkar, **A. Makriyannis**, M. Froimowitz, (1996), Crystal structure of the meta hydroxyl phenyl analog of  $\alpha$ (+)-prodine. *J. Chem. Cryst.*, **26**(9), 601-605.
  92. D'Ambra T.E., M.A. Eissenstat, J. Abt, J.H. Ackerman, E.R. Bacon, M.R. Bell, P.M. Carabateas, K.A. Josef, V. Kumar, J.D. Weaver III, R. Arnold, F.M. Casiano, S.M. Chippari, D.A. Haycock, J.E. Kuster, D.A. Luttinger, J.I. Stevenson, S.J. Ward, W.A. Hill, A.D. Khanolkar, **A. Makriyannis**, (1996), C-attached aminoalkylindoles: Potent cannabinoid mimetics. *Bioorg. Med. Chem.*, **6**(1), 17-22.
  93. Gatley J., A.N. Gifford, N.D. Volkow, R. Lan, **A. Makriyannis**, (1996), 123I labeled AM 251: A radioiodinated ligand which binds in vivo to mouse brain CB1 cannabinoid receptors. *Eur. J. Pharmacol.*, **307**(3), 331-338. PMID: 8836622
  94. Keramidias A.D., A.B. Papaioannou, B. Vlahos, T.A. Kabanos, G. Bonas, **A. Makriyannis**, C.P. Raptopoulou, A. Terzis, (1996), Model investigations for vanadium-protein interactions. Synthetic, structural, and physical studies of vanadium (III) and oxovanadium (IV). *Inorg. Chem.*, **35**(2), 357-367. PMID: 11666216
  95. Khanolkar A.D., V. Abadji, S.Y. Lin, W.A. Hill, G. Taha, K. Abouzid, Z. Meng, P. Fan, **A. Makriyannis**, (1996), Head group analogs of arachidonylethanolamide, the endogenous cannabinoid ligand. *J. Med. Chem.*, **39**(22), 4515-4519. PMID: 8893848



96. Khanolkar A.D., D. Yin, **A. Makriyannis**, A.I. Brooks, G.W. Pasternak, M. Froimowitz, (1996), The morphine-like and nonmorphine-like conformers of prodine opioids. *Med. Chem. Res.*, **6**, 11-21.
97. Koufaki M., V. Polychroniou, T. Calogeropoulou, A. Tsotinis, M. Drees, H.H. Fiebig, S. LeClerc, H.R. Hendriks, **A. Makriyannis**, (1996), Alkyl and alkoxyethyl antineoplastic phospholipids. *J. Med. Chem.*, **39**(13), 2609-2614. PMID: 8691459
98. Koufaki M., T. Calogeropoulou, T. Mavromoustakos, E. Theodoropoulou, A. Tsotinis, **A. Makriyannis**, (1996), Synthesis of 2H-labeled alkoxyethyl phosphodiester (AZT) derivatives for solid-state 2H-NMR studies. *J. Heteroc. Chem.*, **33**(3), 619.
99. Lan R., S.J. Gatley, **A. Makriyannis**, (1996), Preparation of Iodine-123 labeled AM251: A potential SPECT radioligand for the brain cannabinoid CB1 receptor. *J. Lab. Comp. Radiopharm.*, **38**(10), 875-881.
100. Lang W., C. Qin, W.A. Hill, S.Y. Lin, A.D. Khanolkar, **A. Makriyannis**, (1996), High-performance liquid chromatographic determination of anandamide amidase activity in rat brain microsomes. *Anal. Biochem.*, **238**(1), 40-45. PMID: 8660583
101. Mavromoustakos T., E. Theodoropoulou, D.P. Yang, S.Y. Lin, M. Koufaki, **A. Makriyannis**, (1996), The conformational properties of the antineoplastic ether lipid 1-thiohexadecyl-2-O-methyl-S-glycero-3-phosphocholine. *Chem. Phys. Lipids*, **84**(1), 21-34. PMID: 8952050
102. Mavromoustakos T., E. Theodoropoulou, C. Dimitriou, J. Matsoukas, D. Panagiotopoulos, **A. Makriyannis**, (1996), Interactions of angiotensin II with membranes using a combination of differential scanning calorimetry and 31P-NMR spectroscopy. *Peptide Lett.*, **3**(4), 175-180.
103. Mavromoustakos T., E. Theodoropoulou, D. Papahatjis, T. Kourouli, D.P. Yang, M. Trumbore, **A. Makriyannis**, (1996), Studies on the thermotropic effects of cannabinoids on phosphatidylcholine bilayers using differential scanning calorimetry and small angle x-ray diffraction. *Biochim. Biophys. Acta.*, **1281**(2), 235-244. PMID: 8664323
104. Mavromoustakos T., D.P. Yang, **A. Makriyannis**, (1996), Topography and thermotropic properties of cannabinoids in brain sphingomyelin bilayer. *Life Sci.*, **59**(23), 1969-1979. PMID: 8950296
105. Romero J., E. García-Palomero, S.Y. Lin, J.A. Ramos, **A. Makriyannis**, J.J. Fernández-Ruiz, (1996), Extrapyramidal effects of methanandamide, an analog of anandamide, the endogenous CB1 receptor ligand. *Life Sci.*, **58**(15), 1249-1257. PMID: 8614278
106. Tius M.A., J.K. Kawakami, W.A.G. Hill, **A. Makriyannis**, (1996), Selectivity in aromatic fluorination. Introduction of fluorine probes into nabilone. *Chem. Commun.*, 2085-2086.
107. Tsotinis A., T. Calogeropoulou, M. Koufaki, C. Souli, J. Balzarini, E. De Clercq, **A. Makriyannis**, (1996), Synthesis and antiretroviral evaluation of new alkoxy and aryloxy phosphate derivatives of 3'-azido-3'-deoxythymidine. *J. Med. Chem.*, **39**(19), 3418-3422. PMID: 8765527
108. Xie X.Q., L. S. Melvin, **A. Makriyannis**, (1996), The conformational properties of the highly selective cannabinoid receptor ligand CP-55,940. *J. Biol. Chem.*, **271**(18), 10640-10647. PMID: 8631869
109. Xie X.Q., S.Y. Lin., J. Moring, **A. Makriyannis**, (1996), Interdigitation of bilayers from ether lipid analogs: (R)-PAF, (R)-Lyso-PAF and the antineoplastic (R)-ET-18-OMe. *Biochim. Biophys. Acta.*, **1283**(1), 111-118. PMID: 8765102
110. Beltramo M., N. Stella, A. Calignano, S.Y. Lin, **A. Makriyannis**, D. Piomelli, (1997), Functional role of high-affinity anandamide transport, as revealed by selective inhibition. *Science*, **277**(5329), 1094-1097. PMID: 9262477
111. Calignano A., G. La Rana, S.Y. Lin, M. Beltramo, **A. Makriyannis**, D. Piomelli (1997), Inhibition of intestinal motility by anandamide, an endogenous cannabinoid. *Eur. J. Pharmacol.*, **340**(2-3), R7-R8. PMID: 9537804
112. Calignano A., G. La Rana, M. Beltramo, **A. Makriyannis**, D. Piomelli, (1997), Potentiation of anandamide hypotension by the transport inhibitor, AM404. *Eur. J. Pharmacol.*, **337**(1), R1-R2. PMID: 9389389

113. Deutsch D., S.Y. Lin, W.A. Hill, K.L. Morse, D. Salehani, G. Arreaza, R.L. Omeir, **A. Makriyannis**, (1997), Fatty acid sulfonyl fluorides inhibit anandamide metabolism and bind to the cannabinoid receptor. *Biochem. Biophys. Res. Commun.*, **231**(1), 217-221. PMID: 9070252
114. Deutsch D., **A. Makriyannis**, (1997), Inhibitors of anandamide breakdown. *NIDA Research Monograph*, **173**, 65-84. PMID: 9260184
115. Fernández-Ruiz J.J., R.M. Muñoz, J. Romero, M.A. Villanua, **A. Makriyannis**, J.A. Ramos, (1997), Time course of the effects of different cannabimimetics on prolactin and gonadotrophin secretion: Evidence for the presence of CB1 receptors in hypothalamic structures and their involvement in the effects of cannabimimetics. *Biochem. Pharmacol.*, **53**(12), 1919-1927. PMID: 9256167
116. Gatley S.J., R. Lan, B. Pyatt, A.N. Gifford, N.D. Volkow, **A. Makriyannis**, (1997), Binding of the non-classical cannabinoid CP-55,940, and the diarylpyrazole AM251 to rodent brain cannabinoid receptors. *Life Sci.*, **61**(14), 191-197. PMID: 9335234
117. Gifford A.N., Y. Tang, S.J. Gatley, N.D. Volkow, R. Lan, **A. Makriyannis**, (1997), Effect of the cannabinoid receptor SPECT agent, AM 281, on hippocampal acetylcholine release from rat brain slices. *Neurosci. Lett.*, **238**(1-2), 84-86. PMID: 9464661
118. Hosohata Y., R.M. Quock, K. Hosohata, **A. Makriyannis**, P. Consroe, W.R. Roeske, H.I. Yamamura, (1997), AM630 antagonism of cannabinoid-stimulated [<sup>35</sup>S]GTPγS binding in the mouse brain. *Eur. J. Pharmacol.*, **321**(1), R1-R3. PMID: 9083796
119. Hosohata K., R.M. Quock, Y. Hosohata, T.H. Burkey, **A. Makriyannis**, P. Consroe, W.R. Roeske, H.I. Yamamura, (1997), AM630 is a competitive cannabinoid receptor antagonist in the guinea pig brain. *Life Sci.*, **61**(9), 115-118. PMID: 9284087
120. Lin S.Y., R. Duclos Jr., **A. Makriyannis**, (1997), Syntheses of 1, 2-di-O-palmitoyl-sn-glycero-3-phosphocholine (DPPC) and analogs with <sup>13</sup>C-and <sup>2</sup>H-labeled choline head groups. *Chem. and Phys. Lipids*, **86**(2), 171-181. PMID: 9179996
121. Xie X.Q., J. Moring, **A. Makriyannis**, (1997), Differential scanning calorimetry and small angle x-ray diffraction study of the interaction of (R)-PAF, (R)-ET-18-OME and (R)-Lyso-PAF with model membranes. *Life Sci.*, **61**(9), 909-923. PMID: 9284084
122. Banijamali A.R., C.J. Van der Schyf, **A. Makriyannis**, (1998), Addition and elimination of HCl to tetrahydrocannabinol isomers. A method for the preparation of stereospecifically <sup>2</sup>H-labeled cannabinoids. *J. Lab. Comp. and Radiopharm.*, **41**(2), 121-130.
123. Berglund B.A., D.L. Boring, G.H. Wilken, **A. Makriyannis**, A.C. Howlett, S. Lin, (1998), Structural requirements for arachidonylethanolamide interactions with CB1 and CB2 cannabinoid receptors: Pharmacology of the carbonyl and ethanolamide groups. *Prostaglandins, Leukotrienes Essent. Fatty Acids*, **59**(2), 111-118. PMID: 9774174
124. Carriero D., J. Aberman, S.Y. Lin, A. Hill, **A. Makriyannis**, J.D. Salamone, (1998), A detailed characterization of the effects of four cannabinoid agonists on operant lever pressing. *Psychopharmacol. (Berl.)*, **137**(2), 147-156. PMID: 9630001
125. Miguel R., J. Romero, R.M. Muñoz, L. Garcia-Gil, S. González, M.A. Villanua, **A. Makriyannis**, J.A. Ramos, J.J. Fernández-Ruiz, (1998), Effects of cannabinoids on prolactin and gonadotrophin secretion: Involvement of changes in hypothalamic gamma-aminobutyric acid (GABA) inputs. *Biochem. Pharmacol.*, **56**(10), 1331-1338. PMID: 9825732
126. Drake D.J., R.S. Jensen, J. Busch-Petersen, J.K. Kawakami, M.C. Fernandez-Garcia, P. Fan, **A. Makriyannis**, M.A. Tius, (1998), Classical/non-classical hybrid cannabinoids: Southern aliphatic chain-functionalized C-6β methyl, ethyl, and propyl analogs. *J. Med. Chem.*, **41**(19), 3596-3608. PMID: 9733485
127. Gatley S.J., R. Lan, N.D. Volkow, N. Pappas, P. King, C.T. Wong, A.N. Gifford, B. Pyatt, S.L. Dewey, **A. Makriyannis**, (1998), Imaging the brain marijuana receptor: Development of a radioligand that binds to cannabinoid CB1 receptors in vivo. *J. Neurochem.*, **70**(1), 417-423. PMID: 9422389

128. Järbe T.U.C., R.J. Lamb, **A. Makriyannis**, S.Y. Lin, A. Goutopoulos, (1998),  $\Delta$ 9-THC training dose as a determinant for (R)-methanandamide generalization in rats. *Psychopharmacol. (Berl)*, **140**(4), 519-522. PMID: 9888629
129. Järbe T.U.C., R.J. Lamb, **A. Makriyannis**, S.Y. Lin, A. Goutopoulos, (1998), (R)-methanandamide as a discriminative stimulus in rats: Tests with anandamide and  $\Delta$ 9-THC. *Behav. Pharmacol.*, **9**, 167-174.
130. Järbe T.U.C., R.J. Lamb, **A. Makriyannis**, S.Y. Lin, A. Goutopoulos, (1998), (R)-Methanandamide as a discriminative stimulus in rats: Tests with anandamide and  $\Delta$ 9-THC. *NIDA Research Monograph*, **179**, 75, National Institute on Drug Abuse, Rockville, MD.
131. Järbe T.U.C., R. Sheppard, R.J. Lamb, **A. Makriyannis**, S. Lin, A. Goutopoulos, (1998), Effects of delta-9-tetrahydrocannabinol and (R)-methanandamide on open-field behavior in rats. *Behav. Pharmacol.*, **9**(2), 169-174. PMID: 10065936
132. Landsman R.S., **A. Makriyannis**, H. Deng, P. Consroe, W.R. Roeske, H.I. Yamamura, (1998), AM630 is an inverse agonist at the human cannabinoid CB1 receptor. *Life Sci.*, **62**(9), PL109-PL113. PMID: 9496703
133. Lin S.Y., A.D. Khanolkar, P. Fan, A. Goutopoulos, C. Qin, D. Papahatjis, **A. Makriyannis**, (1998), Novel analogs of arachidonylethanolamide (anandamide): Affinities for the CB1 and CB2 cannabinoid receptors and metabolic stability. *J. Med. Chem.*, **41**(27), 5353-5361. PMID: 9876105
134. Papahatjis D.P., T. Kourouli, V. Abadji, A. Goutopoulos, **A. Makriyannis**, (1998), Pharmacophoric requirements for cannabinoid side chains: Multiple bond and C1'-substituted delta-tetrahydrocannabinols. *J. Med. Chem.*, **41**(7), 1195-1200. PMID: 9544219
135. Paria B.C., W. Ma, D.M. Andrenyak, P.C. Schmid, H.H. Schmid, D.E. Moody, H. Deng, **A. Makriyannis**, S.K. Dey, (1998), Effects of cannabinoids on preimplantation mouse embryo development and implantation are mediated by brain-type cannabinoid receptors. *Biol. Reprod.*, **58**(6), 1490-1495. PMID: 9623610
136. Qin C., S.Y. Lin, W. Lang, A. Goutopoulos, S. Pavlopoulos, F. Mauri, **A. Makriyannis**, (1998), Determination of anandamide amidase activity using ultraviolet-active amine derivatives and reverse-phase high-performance liquid chromatography. *Anal. Biochem.*, **260**(1), 8-15. PMID: 9683506
137. Xie X.Q., S. Pavlopoulos, C.M. DiMeglio, **A. Makriyannis**, (1998), Conformational studies on a diastereoisomeric pair of tricyclic nonclassical cannabinoids by NMR spectroscopy and molecular modeling. *J. Med. Chem.*, **41**(2), 167-174. PMID: 9457240
138. Gifford A.N., M. Bruneus, S.J. Gatley, **A. Makriyannis**, N.D. Volkow, (1999), Large receptor reserve for cannabinoid actions in the central nervous system. *J. Pharm. Exp. Ther.*, **288**(2), 478-483. PMID: 9918548
139. Gifford A.N., M. Bruneus, S.Y. Lin, **A. Makriyannis**, N.D. Volkow, S.J. Gatley, (1999), Potentiation of the action of anandamide on hippocampal slices by the anandamide amidase inhibitor, palmitylsulphonyl fluoride (AM 374). *Eur. J. Pharmacol.*, **383**(1), 9-14. PMID: 10556675
140. González S., J. Romero, R. de Miguel, I. Lastres-Becker, M.A. Villanua, **A. Makriyannis**, J.A. Ramos, J.J. Fernández-Ruiz, (1999), Extrapyramidal and neuroendocrine effects of AM404, an inhibitor of the carrier-mediated transport of anandamide. *Life Sci.*, **65**(3), 327-336. PMID: 10447218
141. Khanolkar A.D., D. Lu, P. Fan, X. Tian, **A. Makriyannis**, (1999), Novel conformationally restricted tetracyclic analogs of  $\Delta$ 8-tetrahydrocannabinol. *Bioorg. & Med. Chem. Lett.*, **9**(15), 2119-2124. PMID: 10465529
142. Lan R., J. Gatley, Q. Liu, P. Fan, S.R. Fernando, N.D. Volkow, R. Pertwee, **A. Makriyannis**, (1999), Design and synthesis of the CB1 selective cannabinoid antagonist AM281: A potential human SPECT ligand. *AAPS PharmSci.*, **1**(2), E4. PMID: 11741201
143. Lan R., S. Fernando, P. Fan, D. McCallion, Q. Liu, R. Pertwee, **A. Makriyannis**, (1999), Structure-activity relationships of pyrazole derivatives as cannabinoid receptor antagonists. *J. Med. Chem.*, **42**(4), 769-776. PMID: 10052983

144. Lang W., C. Qin, S. Lin, A.D. Khanolkar, A. Goutopoulos, P. Fan, K. Abouzid, Z. Meng, D. Biegel, **A. Makriyannis**, (1999), Substrate specificity and stereoselectivity of rat brain microsomal anandamide amidohydrolase. *J. Med. Chem.*, **42**(9), 896-902. PMID: 10231226
145. Lang W., C. Qin, S. Lin, A.D. Khanolkar, A. Goutopoulos, P. Fan, K. Abouzid, Z. Meng, D. Biegel, **A. Makriyannis**, (1999), Substrate specificity and stereoselectivity of rat brain microsomal anandamide amidohydrolase. *J. Med. Chem.*, **42**(5), 896-902. PMID: 10072686
146. Piomelli D., M. Beltramo, S. Glasnapp, S.Y. Lin, A. Goutopoulos, X.Q. Xie, **A. Makriyannis**, (1999), Structural determinants for recognition and translocation by the anandamide transporter. *Proc. Natl. Acad. Sci. USA*, **96**(10), 5802-5807. PMID: 10318965
147. Romero J., F. Berrendero, L. García-Gil, S.Y. Lin, **A. Makriyannis**, J.A. Ramos, J.J. Fernández-Ruiz, (1999), Cannabinoid receptor and WIN-55,212-2-stimulated [35S]GTPS binding and cannabinoid receptor mRNA levels in several brain structures of adult male rats chronically exposed to R-methanandamide. *Neurochemistry Int'l.*, **34**(6), 473-482. PMID: 10402222
148. Ross R.A., H.C. Brockie, L.A. Stevenson, V.L. Murphy, F. Templeton, **A. Makriyannis**, R.G. Pertwee, (1999), Agonist-inverse agonist characterization at CB1 and CB2 cannabinoid receptors of L759633, L759656 and AM630. *Br. J. Pharmacol.*, **126**(3), 665-672. PMID: 10188977
149. Xie X.Q., X.W. Han, J.Z. Chen, M.A. Eissenstat, **A. Makriyannis**, (1999), High resolution NMR and computer modeling studies of the cannabimimetic aminoalkylindole prototype WIN55212-2. *J. Med. Chem.*, **42**(24), 5060. PMID: 10585215
150. Cosenza M., A.N. Gifford, S.J. Gatley, B. Pyatt, Q. Liu, **A. Makriyannis**, N.D. Volkow, (2000), Locomotor activity and occupancy of brain cannabinoid CB1 receptors by the antagonist/inverse agonist AM281. *Synapse*, **38**(4), 477-482. PMID: 11044895
151. Harrington P.E., I.A. Stergiades, J. Erickson, **A. Makriyannis**, M.A. Tius, (2000), Synthesis of functionalized cannabinoids. *J. Org. Chem.*, **65**(20), 6576-6582. PMID: 11052105
152. Howlett A., G.H. Wilken, J.J. Pigg, D.B. Houston, R. Lan, Q. Liu, **A. Makriyannis**, (2000), Azido- and isothiocyanato-substituted aryl pyrazoles bind covalently to the CB1 cannabinoid receptor and impair signal transduction. *J. Neurochem.*, **74**(5), 2174-2181. PMID: 10800963
153. Järbe T.U.C., R.J. Lamb, S.Y. Lin, **A. Makriyannis**, (2000), Delta (9)-THC training dose as a determinant for (R)-methanandamide generalization in rats: A systematic replication. *Behav. Pharmacol.*, **11**(1), 81-86. PMID: 10821212
154. Khanolkar A.D., S.L. Palmer, **A. Makriyannis**, (2000), Molecular probes for the cannabinoid receptors. *Chem. Phys. Lipids*, **108**(1-2), 37-52. PMID: 11106781
155. Lamb R.J., T.U.C. Järbe, **A. Makriyannis**, S.Y. Lin, A. Goutopoulos, (2000), Effects of  $\Delta^9$ -tetrahydrocannabinol, (R)-methanandamide, SR 141716, and d-amphetamine before and during daily  $\Delta^9$ -tetrahydrocannabinol dosing. *Eur. J. Pharmacol.*, **398**(2), 251-258. PMID: 10854837
156. Liu J., B. Gao, F. Mirshahi, A.J. Sanyal, A.D. Khanolkar, **A. Makriyannis**, G. Kunos, (2000), Functional CB1 cannabinoid receptors in human vascular endothelial cells. *Biochem. J.*, **346**, 835-840. PMID: 10698714
157. Palmer S.L., A.D. Khanolkar, **A. Makriyannis**, (2000), Natural and synthetic endocannabinoids and their structural-activity relationships. *Curr. Pharm. Res.*, **6**(13), 1381-1397. PMID: 10903399
158. Baker D., G. Pryce, J.L. Croxford, P. Brown, R.G. Pertwee, **A. Makriyannis**, A. Khanolkar, L. Layward, F. Fezza, T. Bisogno, V. Di Marzo, (2001), Endocannabinoids control spasticity in a multiple sclerosis model. *FASEB J.*, **15**(2), 300-302. PMID: 11156943
159. Bátkai S., Z. Járαι, J.A. Wagner, S.K. Goparaju, K. Varga, J. Liu, L. Wang, F. Mirshahi, A.D. Khanolkar, **A. Makriyannis**, R. Urbaschek, N. Garcia Jr., A.J. Sanyal, G. Kunos, (2001), Endocannabinoids acting at vascular CB1 receptors mediate the vasodilated state in advanced liver cirrhosis. *Nature Med.*, **7**(7), 827-832. PMID: 11433348

160. Goutopoulos A., P. Fan, A.D. Khanolkar, X.Q. Xie, S.Y. Lin, **A. Makriyannis**, (2001), Stereochemical selectivity of methanandamides for the CB1 and CB2 cannabinoid receptors and their metabolic stability. *Bioorg. Med. Chem.*, **9**(7), 1673-1684. PMID: 11425567
161. Järbe T.U.C., R.J. Lamb, S. Lin, **A. Makriyannis**, (2001), (R)-methanandamide and  $\Delta^9$ -THC as discriminative stimuli in rats: Tests with the cannabinoid antagonist SR-141716 and the endogenous ligand anandamide. *Psychopharm. (Berl.)*, **156**, 369-380. PMID: 11498713
162. Lin S., R.I. Duclos Jr., **A. Makriyannis**, (2001), Preparation of optically pure 4-(hydroxymethyl)-2-pentadecyl-1,3-dioxolanes and their corresponding phosphocholine derivatives. *Chem. Phys. Lip.*, **113**(1-2), 111-122. PMID: 11687231
163. Malan Jr. T.P., M.M. Ibrahim, H. Deng, Q. Liu, H.P. Mata, T. Vanderah, F. Porreca, **A. Makriyannis**, (2001), CB2 cannabinoid receptor-mediated peripheral analgesia. *Pain*, **93**(3), 239-245. PMID: 11514083
164. Mavromoustakos T., T. Calogeropoulou, M. Koufaki, A. Kolocouris, I. Daliani, C. Demetzos, Z. Meng, **A. Makriyannis**, E. De Clercq, (2001), Ether phospholipid-AZT conjugates possessing anti-HIV and antitumor cell activity. Synthesis, conformational analysis and study of their thermal effects of membrane bilayers. *J. Med. Chem.*, **44**(11), 1702-1709. PMID: 11356105
165. Papahatjis D.P., S. Nikas, A. Tsotinis, M. Vlachou, **A. Makriyannis**, (2001), A new ring-forming methodology for the synthesis of conformationally constrained bioactive molecules. *Chem. Lett.*, **3**, 192-193.
166. Simoneau I.I., M.S. Hamza, H.P. Mata, E.M. Siegel, T.W. Vanderah, F. Porreca, **A. Makriyannis**, T.P. Malan Jr., (2001), The cannabinoid agonist WIN55212-2 suppresses morphine-induced emesis in ferrets. *Anesthesiology*, **94**(5), 882-887. PMID: 11388542
167. Barnett-Norris J., D.P. Hurst, D.L. Lynch, F. Guarnieri, **A. Makriyannis**, P.H. Reggio, (2002), Conformational memories and the endocannabinoid binding site at the cannabinoid CB1 receptor. *J. Med. Chem.*, **45**(17), 3649-3659. PMID: 12166938
168. Gardner B., L.X. Zu, S. Sharma, Q. Liu, **A. Makriyannis**, D.P. Tashkin, S.M. Dubinett, (2002), Autocrine and paracrine regulation of lymphocyte CB2 receptor expression by TGF- $\beta$ . *Biochem. Biophys. Res. Commun.*, **290**(1), 91-96. PMID: 11779138
169. Gifford A.N., **A. Makriyannis**, N.D. Volkow, S.J. Gatley, (2002), In vivo imaging of the brain cannabinoid receptor. *Chem. Phys. Lipids*, **121**(1-2), 65-72. PMID: 12505691
170. Goutopoulos A., **A. Makriyannis**, (2002), From cannabis to cannabinergics: New therapeutic opportunities. *Pharmacol. Ther.*, **95**(2), 103-117. PMID: 12182958
171. Krylatov A.V., R.V. Uzhachenko, L.N. Maslov, N.A. Bernazkaya, **A. Makriyannis**, R. Mechoulam, R.G. Pertwee, O.M. Sal'nikova, J.B. Stefano, Y.B. Lishmanov, (2002), Endogenous cannabinoids improve myocardial resistance to arrhythmogenic action of coronary occlusion and reperfusion: A possible mechanism. *Bull. Exp. Biol. Med.*, **133**(2), 122-124. PMID: 12428277
172. Krylatov A.V., R.V. Uzhachenko, L.N. Maslov, D.S. Ugdyzhekova, N.A. Bernatskaia, R. Pertwee, G.B. Stefano, **A. Makriyannis**, (2002), Anandamide and R-(+)-methanandamide prevent development of ischemic and reperfusion arrhythmia in rats by stimulation of CB2-receptors. *Eksp. Klin. Farmakol.*, **65**(3), 6-9. PMID: 12227101
173. Malan Jr. T.P., M.M. Ibrahim, T.W. Vanderah, **A. Makriyannis**, F. Porreca, (2002), Inhibition of pain responses by activation of CB(2) cannabinoid receptors. *Chem. Phys. Lipids*, **121**(1-2), 191-200. PMID: 12505700
174. Nikas S.P., G.A. Thakur, **A. Makriyannis**, (2002), A convenient and effective synthesis of 3-(3, 5-dimethoxyphenyl) propanal. *Synthetic Communications*, **32**(11), 1751-1756.
175. Nikas S.P., G.A. Thakur, **A. Makriyannis**, (2002), Regiospecifically deuterated (-)- $\Delta^9$ -tetrahydrocannabinol derivatives. *J. Chem. Soc., Perkin Trans.*, **1**(22), 2544-2548.
176. Nikas S.P., G.A. Thakur, **A. Makriyannis**, (2002), Synthesis of side chain specifically deuterated (-)- $\Delta^9$ -tetrahydrocannabinols. *J. Lab. Comp. Radiopharm.*, **45**(12), 1065-1076.

177. Papahatjis D.P., S.P. Nikas, T. Andreou, **A. Makriyannis**, (2002), Novel 1'1'-chain substituted  $\Delta$ 8-tetrahydrocannabinols. *Bioorg. Med. Chem. Lett.*, **12**(24), 3583-3586. PMID: 12443781
178. Picone R.P., D.J. Fournier, **A. Makriyannis**, (2002), Ligand based structural studies of the CB1 cannabinoid receptor. *J. Pept. Res.*, **60**(6), 348-356. PMID: 12464113
179. Schuel H., L.J. Burkman, J. Lippes, K. Crickard, M.C. Mahony, A. Giuffrida, R.P. Picone, **A. Makriyannis**, (2002), Evidence that anandamide-signaling regulates human sperm functions required for fertilization. *Mol. Reprod. Dev.*, **63**(3), 376-387. PMID: 12237954
180. Thakur G.A., S.L. Palmer, P.E. Harrington, I.A. Stergiades, M.A. Tius, **A. Makriyannis**, (2002), Enantiomeric resolution of a novel chiral cannabinoid receptor ligand. *J. Biochem. Biophys. Methods*, **54**(1-3), 415-422. PMID: 12543516
181. Uzhachenko R.V., A.V. Krylatov, L.N. Maslov, **A. Makriyannis**, N.A. Bernatskaja, R. Mechoulam, R.G. Pertwee, G.B. Stefano, (2002), The role of cannabinoid receptors and voltage-dependent K<sup>+</sup>-channels on the development of the antiarrhythmic effect of R-(+)-methanandamide. *Vestnik Aritmology*, **28**, 53-57.
182. Xie X.Q., H. Yang, G. Choi, S. Lin, **A. Makriyannis**, (2002), Synthesis of 15N and 13C selectively labeled anandamide. *J. Lab. Comp. Radiopharm.*, **45**(9), 775-784.
183. Avlonitis N., E. Lekka, A. Detsi, M. Koufaki, T. Calogeropoulou, E. Scoulica, E. Siapi, I. Kyrikou, T. Mavromoustakos, A. Tsotinis, S. Gradadolnik, **A. Makriyannis**, (2003), Antileishmanial ring-substituted ether phospholipids. *J. Med. Chem.*, **46**(5), 755-767. PMID: 12593656
184. Chu C., A. Ramamurthy, **A. Makriyannis**, M.A. Tius, (2003), Synthesis of covalent probes for the radiolabeling of the cannabinoid receptor. *J. Org. Chem.*, **68**(1), 55-61. PMID: 12515461
185. Guo J., S. Pavlopoulos, X. Tian, D. Lu, S.P. Nikas, D.P. Yang, **A. Makriyannis**, (2003), Conformational study of lipophilic ligands in phospholipid model membrane systems by solution NMR. *J. Med. Chem.*, **46**(23), 4838-4846. PMID: 14584935
186. Ibrahim M.M., H. Deng, A. Zvonok, D.A. Cockayne, J. Kwan, H.P. Mata, T.W. Vanderah, J. Lai, F. Porreca, **A. Makriyannis**, T.P. Malan Jr., (2003), Activation of CB2 cannabinoid receptors by AM1241 inhibits experimental neuropathic pain: Pain inhibition by receptors not present in CNS. *Proc. Natl. Acad. Sci.*, **100**(18), 10529-10533. PMID: 12917492
187. Järbe T.U., N. DiPatrizio, C. Li, **A. Makriyannis**, (2003), The cannabinoid receptor antagonist SR-141716 does not readily antagonize open-field effects induced by the cannabinoid receptor agonist R-methanandamide in rats. *Pharmacol. Biochem. Behav.*, **75**(4), 809-821. PMID: 12957223
188. Järbe T.U., R.J. Lamb, Q. Liu, **A. Makriyannis**, (2003), (R)-methanandamide and  $\Delta$ 9-tetrahydrocannabinol-induced operant rate decreases in rats are not readily antagonized by SR-141716A. *Eur. J. Pharmacol.*, **466**(1-2), 121-127. PMID: 12679148
189. Koufaki M., T. Calogeropoulou, E. Rekkas, M. Chryselis, P. Papazafiri, C. Gaitanaki, **A. Makriyannis**, (2003), Bifunctional agents for reperfusion arrhythmias: Novel hybrid vitamin E/class I antiarrhythmics. *Bioorg. & Med. Chem.*, **11**(23), 5209-5219. PMID: 14604685
190. Lastres-Becker I., R. de Miguel, L. De Petrocellis, **A. Makriyannis**, V. Di Marzo, J. Fernández-Ruiz, (2003), Compounds acting at the endocannabinoid and/or endovanilloid systems reduce hyperkinesia in a rat model of Huntington's disease. *J. Neurochem.*, **84**(5), 1097-1109. PMID: 12603833
191. McLaughlin P.J., K. Winston, L. Swezey, A. Wisniecki, J. Aberman, D.J. Tardif, A.J. Betz, K. Ishiwari, **A. Makriyannis**, J.D. Salamone, (2003), The cannabinoid CB1 antagonists SR141716A and AM251 suppress food intake and food-reinforced behavior in a variety of tasks in rats. *Behav. Pharmacol.*, **14**(8), 583-588. PMID: 14665975
192. Nackley A.G., **A. Makriyannis**, A.G. Hohmann, (2003), Selective activation of cannabinoid CB(2) receptors suppresses spinal fos protein expression and pain behavior in a rat model of inflammation. *J. Neurosci.*, **119**(3), 747-757. PMID: 12809695

193. Papahatjis D.P., S.P. Nikas, T. Kourouli, R. Chari, W. Xu, R.G. Pertwee, **A. Makriyannis**, (2003), Pharmacophoric requirements for the cannabinoid side chain. Probing the cannabinoid receptor subsite at CB1. *J. Med. Chem.*, **46**(15), 3221-3229. PMID: 12852753
194. Quartilho A., H.P. Mata, M.M. Ibrahim, T.W. Vanderah, F. Porreca, **A. Makriyannis**, T.P. Malan Jr., (2003), Inhibition of inflammatory hyperalgesia by activation of peripheral CB2 cannabinoid receptors. *Anesthesiology*, **99**(4), 955-960. PMID: 14508331
195. Yao F., S. Palmer, A. Khanolkar, X. Tian, J. Guo, **A. Makriyannis**, (2003), Synthesis of 15N-, 13C- and 2H-labeled methanandamide analogs. *J. Lab. Comp. Radiopharm.*, **46**(2), 115-129.
196. Arizzi M.N., K.M. Cervone, J.E. Aberman, A. Betz, Q. Liu, S. Lin, **A. Makriyannis**, J.D. Salamone, (2004), Behavioral effects of inhibition of cannabinoid metabolism: The amidase inhibitor AM374 enhances the suppression of lever pressing produced by exogenously administered anandamide. *Life Sci.*, **74**(8), 1001-1011. PMID: 14672756
197. Czoty P.W., **A. Makriyannis**, J. Bergman, (2004), Methamphetamine discrimination and in vivo microdialysis in squirrel monkeys. *Psychopharmacol.* **175**(2), 170-178. PMID: 15064912
198. Czoty P.W., C.R. Ramanathan, N.H. Mutschler, **A. Makriyannis**, J. Bergman, (2004), Drug discrimination in methamphetamine-trained monkeys: Effects of monoamine transporter inhibitors. *J. Pharmacol. Exp. Ther.*, **311**(2), 720-727. PMID: 15240827
199. Fegley D., S. Kathuria, R. Mercier, C. Li, A. Goutopoulos, **A. Makriyannis**, D. Piomelli, (2004), Anandamide transport is independent of fatty-acid amide hydrolase activity and is blocked by the hydrolysis-resistant inhibitor AM1172. *Proc. Natl. Acad. Sci. USA*, **101**(23), 8756-8761. PMID: 15138300
200. Filppula S., S. Yaddanapudi, R. Mercier, W. Xu, S. Pavlopoulos, **A. Makriyannis**, (2004), Purification and mass spectroscopic analysis of human CB2 cannabinoid receptor expressed in the baculovirus system. *J. Pept. Res.*, **64**(6), 225-236. PMID: 15613086
201. Hohmann A.G., J.N. Farthing, A.M. Zvonok, **A. Makriyannis**, (2004), Selective activation of cannabinoid CB2 receptors suppresses hyperalgesia evoked by intradermal capsaicin. *J. Pharmacol. Exp. Ther.*, **308**, 446-453. PMID: 14610224
202. Järbe T.U.C., N.V. DiPatrizio, D. Lu, **A. Makriyannis**, (2004), (-)-Adamantyl- $\Delta$ 8-tetrahydrocannabinol (AM-411), a selective cannabinoid CB1 receptor agonist: Effects on open-field behaviors and antagonism by SR-141716 in rats. *Behav. Pharmacol.*, **15**(7), 517-521. PMID: 15472574
203. Järbe T.U.C., M.Y. Harris, C. Li, Q. Liu, **A. Makriyannis**, (2004), Discriminative stimulus effects in rats of SR-141716, a cannabinoid CB1 receptor antagonist. *Psychopharmacol.* **177**(1-2), 35-45. PMID: 15167981
204. Luk T., W. Jin, A. Zvonok, D. Lu, X.Z. Lin, C. Chavkin, **A. Makriyannis**, K. Mackie, (2004), Identification of a potent and highly efficacious, yet slowly desensitizing CB1 cannabinoid receptor agonist. *Br. J. Pharmacol.*, **142**(3), 495-500. PMID: 15148260
205. Nackley A.G., A.M. Zvonok, **A. Makriyannis**, A.G. Hohmann, (2004), Activation of cannabinoid CB2 receptors suppresses C-Fiber responses and windup of spinal wide dynamic range neurons in the absence and presence inflammation. *J. Neurophysiol.*, **92**(6), 3562-3574. PMID: 15317842
206. Nikas S.P., J. Grzybovska, D.P. Papahatjis, A. Charalambous, A.R. Banijamali, R. Chari, P. Fan, T. Kourouli, S. Lin, A.J. Nitowski, G. Marciniak, Y. Guo, X. Li, C.L. Wang, **A. Makriyannis**, (2004), The role of halogen substitution in classical cannabinoids: A CB1 pharmacophore model. *AAPS PharSci.*, **6**(4) e30. PMID: 15760095
207. Choi G., J. Guo, **A. Makriyannis**, (2005), The conformation of the cytoplasmic helix 8 of the CB1 cannabinoid receptor using NMR and circular dichroism. *Biochim. Biophys. Acta.*, **1668**(1), 1-9. PMID: 15670725
208. Deng H., A.N. Gifford, A.M. Zvonok, G. Cui, X. Li, P. Fan, J.R. Deschamps, J.L. Flippen-Anderson, S.J. Gatley, **A. Makriyannis**, (2005), Potent cannabinergic indole analogs as

- radioiodinatable brain imaging agents for the CB1 cannabinoid receptor. *J Med. Chem.*, **48**(20), 6386-6392. PMID: 16190764
209. Ibrahim M.M., F. Porreca, J. Lai, P.J. Albrecht, F.L. Rice, A. Khodorova, G. Davar, **A. Makriyannis**, T.W. Vanderah, H.P. Mata, T.P. Malan Jr., (2005), CB2 cannabinoid receptor activation produces antinociception by stimulating peripheral release of endogenous opioids. *Proc. Natl. Acad. Sci.*, **102**(8), 3093-3098. PMID: 15705714
210. Karanian D.A., Q.B. Brown, **A. Makriyannis**, B.A. Bahr, (2005), Blocking cannabinoid activation of FAK and ERK1/2 compromises synaptic integrity in hippocampus. *Eur. J. Pharmacol.*, **508**(1-3), 47-56. PMID: 15680253
211. Karanian D.A., Q.B. Brown, **A. Makriyannis**, T.A. Kosten, B.A. Bahr, (2005), Dual modulation of endocannabinoid transport and fatty acid amide hydrolase protects against excitotoxicity. *J. Neurosci.*, **25**(34), 7813-7820. PMID: 16120783
212. Li C., W. Xu, S.K. Vadivel, P. Fan, **A. Makriyannis**, (2005), High affinity electrophilic and photoactivatable covalent endocannabinoid probes for the CB1 receptor. *J. Med. Chem.*, **48**(20), 6423-6429. PMID: 16190768
213. Li Z., A. Gifford, Q. Liu, R. Thotapally, Y.S. Ding, **A. Makriyannis**, S.J. Gatley, (2005), Candidate PET radioligands for cannabinoid CB1 receptors: [18F]AM5144 and related pyrazole compounds. *Nucl. Med. Biol.*, **32**(4), 361-366. PMID: 15878505
214. Lu D., Z. Meng, G.A. Thakur, P. Fan, J. Steed, C.L. Tartal, D.P. Hurst, P.H. Reggio, J.R. Deschamps, D.A. Parrish, C. George, T.U.C. Järbe, R.J. Lamb, **A. Makriyannis**, (2005), Adamantyl cannabinoids: A novel class of cannabinergic ligands. *J. Med. Chem.*, **48**(14), 4576-4585. PMID: 15999995
215. **Makriyannis A.**, J. Guo, X. Tian, (2005), Albumin enhances the diffusion of lipophilic drugs into the membrane bilayer. *Life Sci.*, **77**(14), 1605-1611. PMID: 15964025
216. **Makriyannis A.**, X. Tian, J. Guo, (2005), How lipophilic cannabinergic ligands reach their receptor sites. *Prostaglandins and Other Lipid Mediat.*, **77**(1-4), 210-218. PMID: 16099405
217. **Makriyannis A.**, R. Mechoulam, D. Piomelli, (2005), Therapeutic opportunities through modulation of the endocannabinoid system. *Neuropharmacology*, **48**(8), 1068-1071. PMID: 15885714
218. McLaughlin P.J., D. Lu, K.M. Winston, G.A. Thakur, L.A. Swezey, **A. Makriyannis**, J.D. Salamone, (2005), Behavioral effects of the novel cannabinoid full agonist AM 411. *Pharmacol. Biochem. Behav.*, **81**(1), 78-88. PMID: 15894067
219. McLaughlin P.J., K.M. Winston, C.L. Limebeer, L.A. Parker, **A. Makriyannis**, J.D. Salamone, (2005), The cannabinoid CB1 antagonist AM 251 produces food avoidance and behaviors associated with nausea but does not impair feeding efficiency in rats. *Psychopharmacol. (Berl.)*, **180**(2), 286-293. PMID: 15948012
220. McLaughlin P.J., C.M. Brown, K.M. Winston, G.A. Thakur, D. Lu, **A. Makriyannis**, J.D. Salamone, (2005), The novel cannabinoid agonist AM 411 produces a biphasic effect on accuracy in a visual target detection task in rats. *Behav. Pharmacology*, **16**(5-6), 477-486. PMID: 16148454
221. Picone R.P., A.D. Khanolkar, W. Xu, L.A. Ayotte, G.A. Thakur, D.P. Hurst, M.E. Abood, P.H. Reggio, D.J. Fournier, **A. Makriyannis**, (2005), (-) – 7'-Isothiocyanato-11-hydroxy-1',1'-dimethylheptyllhexahydrocannabinol (AM841), a high- affinity electrophilic ligand interacts covalently with a cysteine in helix six and activates the CB1 cannabinoid receptor. *Mol. Pharmacol.*, **68**(6), 1623-1635. PMID: 16157695
222. Solinas M., L.V. Panlilio, G. Tanda, **A. Makriyannis**, S.A. Matthews, R.R. Goldberg, (2005), Cannabinoid agonists but not inhibitors of endogenous cannabinoid transport or metabolism enhance the reinforcing efficacy of heroin in rats. *Neuropsychopharmacol.* **30**(11), 2046-2057. PMID: 15870833
223. Souli C., N. Avlonitis, T. Calogeropoulou, A. Tsotinis, G. Maksay, T. Bíró, A. Politi, T. Mavromoustakos, **A. Makriyannis**, H. Reis, M. Papadopoulos, (2005), Novel 17 $\beta$ -substituted conformationally constricted neurosteroids that modulate GABA A receptors. *J. Med. Chem.*, **48**(16), 5203-5214. PMID: 16078839



224. Thakur G.A., R.I. Duclos Jr., **A. Makriyannis**, (2005), Natural cannabinoids: Templates for drug discovery. *Life Sci.*, **78**(5), 454-466. PMID: 16242157
225. Tian X., J. Guo, F. Yao, D.P. Yang, **A. Makriyannis**, (2005), The conformation, location, and dynamic properties of the endocannabinoid ligand anandamide in a membrane bilayer. *J. Biol. Chem.*, **280**(33), 29788-29795. PMID: 15964843
226. Van Sickle M.D., M. Duncan, P.J. Kingsley, A. Mouihate, P. Urbani, K. Mackie, N. Stella, **A. Makriyannis**, D. Piomelli, J.S. Davison, L.J. Marnett, V. Di Marzo, Q.J. Pittman, K.D. Patel, K.A. Sharkey, (2005), Identification and functional characterization of brainstem cannabinoid CB2 receptors. *Science*, **310**(5746), 329-332. PMID: 16224028
227. Woelkart K., W. Xu, Y. Pei, **A. Makriyannis**, R.P. Picone, R. Bauer, (2005), The endocannabinoid system as target for alkaloids from *Echinacea angustifolia* roots. *Planta Med.*, **71**(8), 701-705. PMID: 16142631
228. Xu W., S.A. Filppula, R. Mercier, S. Yaddanapudi, S. Pavlopoulos, J. Cai, W.M. Pierce, **A. Makriyannis**, (2005), Purification and mass spectroscopic analysis of human CB1 cannabinoid receptor functionally expressed using the baculovirus system. *J. Pept. Res.*, **66**(3), 138-150. PMID: 16083441
229. Bahr B.A., D.A. Karanian, S.S. Makanji, **A. Makriyannis**, (2006), Targeting the endocannabinoid system in treating brain disorders. *Expert Opin. Investig. Drugs*, **15**(4), 351-365. PMID: 16548785
230. Chen J.Z., X.W. Han, Q. Liu, **A. Makriyannis**, J. Wang, X.Q. Xie, (2006), 3D-QSAR studies of arylpyrazole antagonists of cannabinoid receptor subtypes CB1 and CB2. A combined NMR and CoMFA approach. *J. Med. Chem.*, **49**(2), 625-636. PMID: 16420048
231. Dhawan J., H. Deng, S.J. Gatley, **A. Makriyannis**, T. Akinfeleye, M. Bruneus, A.A. Dimairo, A.N. Gifford, (2006), Evaluation of the in vivo receptor occupancy for the behavioral effects of cannabinoids using a radiolabeled cannabinoid receptor agonist, R- [125/131] AM2233. *Synapse*, **60**(2), 93-101. PMID: 16715483
232. Ibrahim M.M., M.L. Rude, N.J. Stagg, H.P. Mata, J. Lai, T.W. Vanderah, F. Porreca, N.E. Buckley, **A. Makriyannis**, T.P. Malan Jr., (2006), CB2 cannabinoid receptor mediation of antinociception. *Pain*, **122**(1-2), 36-42. PMID: 16563625
233. Järbe T.U.C., R.J. Lamb, Q. Liu, **A. Makriyannis**, (2006), Discriminative stimulus functions of AM-1346, a CB1R selective anandamide analog in rats trained with Delta9-THC or (R)-methanandamide (AM-356). *Psychopharmacol.* **188**(3), 315-323. PMID: 16953384
234. Järbe T.U.C., Q. Liu, **A. Makriyannis**, (2006), Antagonism of discriminative stimulus effects of delta (9)-THC and (R)-methanandamide in rats. *Psychopharmacol. (Berl.)*, **184**(1), 36-45. PMID: 16307294
235. Järbe T.U.C., T. Ross, N.V. Dipatrizio, L. Pandarinathan, **A. Makriyannis**, (2006), Effects of the CB1R agonist WIN-55,212-2 and the CB1R antagonists SR-141716 and AM-1387: Open-field examination in rats. *Pharmacol. Biochem. Behav.*, **85**(1), 243-252. PMID: 16996123
236. Kim K., D.H. Moore, **A. Makriyannis**, M.E. Abood, (2006), AM1241, a cannabinoid CB2 receptor selective compound, delays disease progression in a mouse model of amyotrophic lateral sclerosis. *Eur. J. Pharmacol.*, **542**(1-3), 100-105. PMID: 16781706
237. Koufaki M., C. Kiziridi, P. Papazafiri, A. Vassilopoulos, A. Varró, Z. Nagy, A. Farkas, **A. Makriyannis**, (2006), Synthesis and biological evaluation of benzopyran analogues bearing class III antiarrhythmic pharmacophores. *Bioorg. Med. Chem.*, **14**(19), 6666-6678. PMID: 16782345
238. McLaughlin P.J., L. Qian, J.T. Wood, A. Wisniecki, K.M. Winston, L.A. Swezey, K. Ishiwari, A.J. Betz, L. Pandarinathan, W. Xu, **A. Makriyannis**, J.D. Salamone, (2006), Suppression of food intake and food-reinforced behavior produced by the novel CB1 receptor antagonist/inverse agonist AM 1387. *Pharmacol. Biochem. Behav.*, **83**(3), 396-402. PMID: 16616951
239. Papahatjis D.P., V.R. Nahmias, T. Andreou, P. Fan, **A. Makriyannis**, (2006), Structural modifications of the cannabinoid side chain towards C3-aryl and 1',1'-cycloalkyl-1'-cyano cannabinoids. *Bioorg. Med. Chem. Lett.*, **16**(6), 1616-1620. PMID: 16387492

240. Williams J., L. Pandarinathan, J.T. Wood, P. Vouros, **A. Makriyannis**, (2006), Endocannabinoid metabolomics: A novel liquid chromatography-mass spectrometry reagent for fatty acid analysis. *AAPS J.*, **8**(4), E655-660. PMID: 17233529
241. Willmore C.B., G.D. Kohler, **A. Makriyannis**, (2006), Irt>t schedule controlled behavior in 'learned helpless' rats: Effects from a cannabinoid agonist. *Neuropharmacology*, **51**(1), 90-101. PMID: 16753187
242. Chambers A.P., V.K. Vemuri, Y. Peng, J.T. Wood, T. Olzewska, Q.J. Pittman, **A. Makriyannis**, K. Sharkey, (2007), A neutral CB1 receptor antagonist reduces weight gain in rat. *Am. J. Physiol. Regul. Integr. Comp. Physiol.*, **293**(6), R2185-2193. PMID: 17959701
243. Gutierrez T., J.N. Farthing, A.M. Zvonok, **A. Makriyannis**, A.G. Hohmann, (2007), Activation of peripheral cannabinoid CB1 and CB2 receptors suppresses the maintenance of inflammatory nociception: A comparative analysis. *Br. J. Pharmacol.*, **150**(2), 153-163. PMID: 17160008
244. Janero D.R., **A. Makriyannis**, (2007), Targeted modulators of the endogenous cannabinoid system: Future medications to treat addiction disorders and obesity. *Curr. Psych. Report*, **9**(5), 365-373. PMID: 17915075
245. Järbe T.U.C., N.V. Dipatrizio, C. Li, **A. Makriyannis**, (2007), Effects of AM1346, a high-affinity CB1 receptor selective anandamide analog, on open-field behavior in rats. *Behav. Pharmacol.*, **18**(7), 673-680. PMID: 17912052
246. Jiang S., Y. Fu, J. Williams, J.T. Wood, L. Pandarinathan, S. Avraham, **A. Makriyannis**, S. Avraham, H.K. Avraham, (2007), Expression and function of cannabinoid receptors CB1 and CB2 and their cognate cannabinoid ligands in murine embryonic stem cells. *PLoS ONE*, **2**(7), e641. PMID: 17653268
247. Kapur A., D.P. Hurst, D. Fleischer, R. Whitnell, G.A. Thakur, **A. Makriyannis**, P.H. Reggio, M.E. Abood, (2007), Mutation studies of Ser7.39 and Ser2.60 in the human CB1 cannabinoid receptor: Evidence for a serine induced bend in CB1 transmembrane helix 7. *Mol. Pharmacol.*, **71**(6), 1512-1524. PMID: 17384224
248. Karanian D.A., S.L. Karim, J.T. Wood, J.S. Williams, S. Lin, **A. Makriyannis**, B.A. Bahr, (2007), Endocannabinoid enhancement protects against kainic acid-induced seizures and associated brain damage. *J. Pharmacol. Exp. Ther.*, **322**(3), 1059-1066. PMID: 17545313
249. Khanolkar A.D., D. Lu, M. Ibrahim, R.I. Duclos Jr., G.A. Thakur, T.P. Malan Jr., F. Porreca, V. Veerappan, X. Tian, C. George, D.A. Parrish, D.P. Papahatjis, **A. Makriyannis**, (2007), Cannabilactones: A novel class of CB2 selective agonists with peripheral analgesic activity. *J. Med. Chem.*, **50**(26), 6493-6500. PMID: 18038967
250. **Makriyannis A.**, (2007), Cannabinoids as therapeutics. *J. Med. Chem.*, **50**(19), 4785.
251. Nikas S.P., G.A. Thakur, D. Parish, S.O. Alapafuja, M.A. Huestis, **A. Makriyannis**, (2007), A concise methodology for the synthesis of (-)- $\Delta^9$ -tetrahydrocannabinol and (-)- $\Delta^9$ -tetrahydrocannabivarin metabolites and their regiospecifically deuterated analogs. *Tetrahedron*, **63**, 8112-8123.
252. Papahatjis D.P., V.R. Nahmias, S.P. Nikas, T. Andreou, S.O. Alapafuja, A. Tsotinis, J. Guo, P. Fan, **A. Makriyannis**, (2007), C1'-cycloalkyl side chain pharmacophore in tetrahydrocannabinols. *J. Med. Chem.*, **50**(17), 4048-4060. PMID: 17672444
253. Rahn E.J., **A. Makriyannis**, A.G. Hohmann, (2007), Activation of cannabinoid CB1 and CB2 receptors suppresses neuropathic nociception evoked by the chemotherapeutic agent vincristine in rats. *Br. J. Pharmacol.*, **152**(5), 765-777. PMID: 17572696
254. Salamone J.D., P.J. McLaughlin, K.S. Sink, **A. Makriyannis**, L.A. Parker, (2007), Cannabinoid CB1 receptor inverse agonists and neutral antagonists: Effects on food intake, food-reinforced behavior and food aversions. *Physiol. Behav.*, **91**(4), 383-388. PMID: 17521686
255. Solinas M., G. Tandy, Z. Justinova, C.E. Wertheim, S. Yasar, D. Piomelli, S.K. Vadivel, **A. Makriyannis**, S.R. Goldberg, (2007), The endogenous cannabinoid anandamide produces  $\Delta^9$ -tetrahydrocannabinol-like discriminative and neurochemical effects that are enhanced by

- inhibition of fatty acid amide hydrolase but not by inhibition of anandamide transport. *J. Pharmacol. Exp. Ther.*, **321**(1), 370-380. PMID: 17210800
256. Vadivel S.K., S. Vardarajan, R.I. Duclos Jr., J.T. Wood, J. Guo, **A. Makriyannis**, (2007), Conformationally constrained analogues of 2-arachidonoylglycerol. *Bioorg. Med.Chem Lett.*, **17**(21), 5959-5963. PMID: 17826996
257. Williams J., J.T. Wood, L. Pandarinathan, D.A. Karanian, B.A. Bahr, P. Vouros, **A. Makriyannis**, (2007), Quantitative method for profiling of the endocannabinoid metabolome by LC-atmospheric pressure chemical ionization-MS. *Anal. Chem.*, **79**(15), 5582-5593. PMID: 17600384
258. Zvonok N.S., J. Yaddanapudi, S. Williams, S. Dai, K. Dong, T. Rejtar, B.L. Karger, **A. Makriyannis**, (2007), Comprehensive proteomic mass spectrometric characterization of human cannabinoid CB2 receptor. *J. Proteome Res.*, **6**(6), 2068-2079. PMID: 17472360
259. Bergman J., M.S. Delatte, C.A. Paronis, V.K. Vemuri, G.A. Thakur, **A. Makriyannis**, (2008), Some effects of CB1 antagonists with inverse agonist and neutral biochemical properties. *Physiol. Behav.*, **93**(4-5), 666-670. PMID: 18076956
260. Duclos Jr., R.I., D. Lu, J. Guo, **A. Makriyannis**, (2008), Synthesis and characterization of 2-substituted bornane pharmacophores for novel cannabinergic ligands. *Tetrahedron*, **49**(39), 5587-5589.
261. Guo J., D.P. Yang, R. Chari, X. Tian, S. Pavlopoulos, D. Lu, **A. Makriyannis**, (2008), Magnetically aligned bicelles to study the orientation of lipophilic ligands in membrane bilayers. *J. Med. Chem.*, **51**(21), 6793-6799. PMID: 18834109
262. Hodge J., J.P. Bow, K.S. Plyler, V.K. Vemuri, A. Wisniecki, J.D. Salamone, **A. Makriyannis**, P.J. McLaughlin, (2008), The cannabinoid CB1 receptor inverse agonist AM 251 and antagonist AM 4113 produce similar effects on the behavioral satiety sequence in rats. *Behav. Brain Res.*, **193**(2), 298-305. PMID: 18602425
263. Järbe T.U.C., B.J. Lemay, T. Oleszewska, V.K. Vemuri, J.T. Wood, **A. Makriyannis**, (2008), Intrinsic effects of AM4113, a putative neutral CB1 receptor selective antagonist, on open-field behaviors in rats. *Pharmacol. Biochem. Behav.*, **91**(1), 84-90. PMID: 18640150
264. Järbe T.U.C., C. Li, S.K. Vadivel, **A. Makriyannis**, (2008), Discriminative stimulus effects of the cannabinoid CB1 receptor antagonist rimonabant in rats. *Psychopharmacol. (Berl.)*, **198**(4), 467-478. PMID: 18264696
265. Kapur A., P. Samaniego, G.A. Thakur, **A. Makriyannis**, M.E. Abood, (2008), Mapping the structural requirements in the CB1 cannabinoid receptor transmembrane helix II for signal transduction. *J. Pharmacol. Exp. Ther.*, **325**(1), 341-348. PMID: 18174385
266. Lu D., J. Guo, R.I. Duclos Jr., A.L. Bowman, **A. Makriyannis**, (2008), Bornyl- and isobornyl- $\Delta^8$ -tetrahydrocannabinols: A novel class of cannabinergic ligands. *J. Med. Chem.*, **51**(20), 6393-6399. PMID: 18826296
267. Lu T.S., H.K. Avraham, S. Seng, S.D. Tachado, H. Koziel, **A. Makriyannis**, S. Avraham, (2008), Cannabinoids inhibit HIV-1 Gp120-mediated insults in brain microvascular endothelial cells. *J. Immunol.*, **181**(9), 6406-6416. PMID: 18941231
268. Magrioti V., G. Naxakis, D. Hadjipavlou-Litina, **A. Makriyannis**, G. Kokotos, (2008), A novel monoacylglycerol lipase inhibitor with analgesic and anti-inflammatory activity. *Bioorg. Med. Chem. Lett.*, **18**(20), 5424-5427. PMID: 18819796
269. Pei Y., R.W. Mercier, J.K. Anday, G.A. Thakur, A.M. Zvonok, D. Hurst, P.H. Reggio, D.R. Janero, **A. Makriyannis**, (2008), Ligand-binding architecture of human CB2 cannabinoid receptor: Evidence for receptor subtype-specific binding motif and modeling GPCR activation. *Chem. Biol.*, **15**(11), 1207-1219. PMID: 19022181
270. Rahn E.J., A.M. Zvonok, G.A. Thakur, A.D. Khanolkar, **A. Makriyannis**, A.G. Hohmann, (2008), Selective activation of cannabinoid CB2 receptors suppresses neuropathic nociception induced by treatment with the chemotherapeutic agent paclitaxel in rats. *J. Pharmacol. Exp. Ther.*, **327**(2), 584-591. PMID: 18664590
271. Scherma M., J. Medalie, W. Fratta, S.K. Vadivel, **A. Makriyannis**, D. Piomelli, E. Mikies, J. Haller, S. Yasar, G. Tanda, S.R. Goldberg, (2008), The endogenous cannabinoid

- anandamide has effects on motivation and anxiety that are revealed by fatty acid amide hydrolase (FAAH) inhibition. *Neuropharmacology*, **54**(1), 129-140. PMID: 17904589
272. Sink K.S., P.J. McLaughlin, J.A. Wood, C. Brown, P. Fan, V.K. Vemuri, Y. Peng, T. Olszewska, G.A. Thakur, **A. Makriyannis**, L.A. Parker, J.D. Salamone, (2008), The novel cannabinoid CB1 receptor neutral antagonist AM4113 suppresses food intake and food-reinforced behavior but does not induce signs of nausea in rats. *Neuropsychopharmacol.* **33**(4), 946-955. PMID: 17581535
273. Sink K.S., V.K. Vemuri, T. Olszewska, **A. Makriyannis**, J.D. Salamone, (2008), Cannabinoid CB1 antagonists and dopamine antagonists produce different effects on a task involving response allocation and effort-related choice in food-seeking behavior. *Psychopharmacol. (Berl.)*, **196**(4), 565-574. PMID: 18004546
274. Vemuri V.K., D.R. Janero, **A. Makriyannis**, (2008), Pharmacotherapeutic targeting of the endocannabinoid signaling system: Drugs for obesity and the metabolic syndrome. *Physiol. Behav.*, **93**(4-5), 671-686. PMID: 18155257
275. Wood J.T., J.S. Williams, L. Pandarinathan, A. Courville, M.R. Keplinger, D.R. Janero, P. Vouros, **A. Makriyannis**, C.J. Lammi-Keefe, (2008), Comprehensive profiling of the human circulating endocannabinoid metabolome: Clinical sampling and sample storage parameters. *Clin. Chem. Lab. Med.*, **46**(9), 1289-1295. PMID: 18611105
276. Yao F., C. Li, S.K. Vadivel, A.L. Bowman, **A. Makriyannis**, (2008), Development of novel tail-modified anandamide analogs. *Bioorg. Med. Chem. Lett.*, **18**(22), 5912-5915. PMID: 18723350
277. Zvonok N., J. Williams, M. Johnston, L. Pandarinathan, D.R. Janero, J. Li, S.C. Krishnan, **A. Makriyannis**, (2008), Full mass spectrometric characterization of human monoacylglycerol lipase generated by large-scale expression and single-step purification. *J. Proteome Res.*, **7**(5), 2158-2164. PMID: 18452279
278. Zvonok N., L. Pandarinathan, J. Williams, M. Johnston, I. Karageorgos, D.R. Janero, S.C. Krishnan, **A. Makriyannis**, (2008), Covalent inhibitors of human monoacylglycerol lipase: Ligand-assisted characterization of the catalytic site by mass spectrometry and mutational analysis. *Chem. Biol.*, **15**(8), 854-862. PMID: 18721756
279. Alapafuja S.O., S.P. Nikas, V.G. Shukla, I. Papanastasiou, **A. Makriyannis**, (2009), Microwave assisted synthesis of sodium sulfonates precursors of sulfonyl chlorides and fluorides. *Tetrahedron Lett.*, **50**(50), 7028-7031. PMID: 21132195
280. Bowman A.L., **A. Makriyannis**, (2009), Refined homology model of monoacylglycerol lipase: Toward a selective inhibitor. *J. Comput. Aided Mol. Des.*, **23**(11), 799-806. PMID: 19543978
281. Järbe T.U., C. Li, Q. Liu, **A. Makriyannis**, (2009), Discriminative stimulus functions in rats of AM1346, a high-affinity CB1R selective anandamide analog. *Psychopharmacol. (Berl.)*, **203**(2), 229-239. PMID: 18521574
282. Sharma, R., K.V. Subramanian, R.I. Duclos Jr., **A. Makriyannis**, (2009), Open vessel mode microwave-assisted synthesis of 2-oxazolines from carboxylic acids. *Tetrahedron*, **50**(2009), 5780-5782. PMID: 3083025
283. Sink K.S., K.N. Segovia, E.J. Nunes, L.E. Collins, V.K. Vemuri, G.A. Thakur, **A. Makriyannis**, J.D. Salamone, (2009), Intracerebroventricular administration of cannabinoid CB1 receptor antagonists AM251 and AM4113 fails to alter food-reinforced behavior in rats. *Psychopharmacol. (Berl.)*, **206**(2), 223-232. PMID: 19588124
284. Sink K.S., V.K. Vemuri, J.T. Wood, **A. Makriyannis**, J.D. Salamone, (2009), Oral bioavailability of the novel cannabinoid CB1 antagonist AM6527: Effects on food-reinforced behavior and comparisons with AM4113. *Pharmacol. Biochem. Behav.*, **91**(3), 303-306. PMID: 18703081
285. Storr M.A., C.M. Keenan, H. Zhang, K.D. Patel, **A. Makriyannis**, K.A. Sharkey, (2009), Activation of the cannabinoid 2 receptor (CB2) protects against experimental colitis. *Inflamm. Bowel Dis.*, **15**(11), 1678-1685. PMID: 19408320
286. Thakur G.A., R. Tichkule, S. Bajaj, **A. Makriyannis**, (2009), Latest advances in cannabinoid receptor agonists. *Expert Opin. Ther. Pat.*, **19**(12), 1647-1673. PMID: 19939187

287. Tiburu E.K., A.L. Bowman, J.O. Struppe, D.R. Janero, H.K. Avraham, **A. Makriyannis**, (2009), Solid-state NMR and molecular dynamics characterization of cannabinoid receptor-1 (CB1) helix 7 conformational plasticity in model membranes. *Biochim. Biophys. Acta.*, **1788**(5), 1159-1167. PMID: 19366584
288. Tiburu E.K., S.V. Gulla, M. Tiburu, D.R. Janero, D.E. Budil, **A. Makriyannis**, (2009), Dynamic conformational responses of a human cannabinoid receptor-1 helix domain to its membrane environment. *Biochemistry*, **48**(22), 4895-4904. PMID: 19485422
289. Tiburu E.K., S. Tyukhtenko, L. Deshmukh, O. Vinogradova, D.R. Janero, **A. Makriyannis**, (2009), Structural biology of human cannabinoid receptor-2 helix 6 in membrane-mimetic environments. *Biochem. Biophys. Res. Commun.*, **384**(2), 243-248. PMID: 19397896
290. Tyukhtenko S., E.K. Tiburu, L. Deshmukh, O. Vinogradova, D.R. Janero, **A. Makriyannis**, (2009), NMR solution structure of human cannabinoid receptor-1 helix 7/8 peptide: Candidates electrostatic interactions and microdomain formation. *Biochem. Biophys. Res. Commun.*, **390**(3), 441-446. PMID: 19766594
291. Willmore C.B., D.M. Krall, F.M. Spears, **A. Makriyannis**, G.I. Elmer, (2009), Cognitive effects of psychotomimetic drugs in rats discriminating number cues. *Psychopharmacol. (Berl.)*, **206**(4), 653-664. PMID: 18843483
292. Anagnostopoulos D., C. Rakiec, J.T. Wood, L. Pandarinathan, N. Zvonok, **A. Makriyannis**, A. Siafaka-Kapadai, (2010), Identification of endocannabinoids and related N-acylethanolamines in tetrahymena: A new class of compounds for tetrahymena. *Protist.*, **161**(3), 452-465. PMID: 20096629
293. Cluny N.L., V.K. Vemuri, A.P. Chambers, C.L. Limebeer, H. Bedard, J.T. Wood, B. Lutz, A. Zimmer, L.A. Parker, **A. Makriyannis**, K.A. Sharkey, (2010), A novel peripherally restricted cannabinoid receptor antagonist, AM6545, reduces food intake and body weight, but does not cause malaise, in rodents. *Br. J. Pharmacol.*, **161**(3), 629-642. PMID: 20880401
294. Dixon D.D., D. Sethumadhavan, T. Benneche, A.R. Banaag, M.A. Tius, G.A. Thakur, A. Bowman, J.T. Wood, **A. Makriyannis**, (2010), Heteroadamantyl cannabinoids. *J. Med. Chem.*, **53**(15), 5656-5666. PMID: 20593789
295. Godlewski G., S.O. Alapafuja, S. Batkai, S.P. Nikas, R. Cinar, L. Offertaler, D. Osei-Hyiaman, J. Liu, B. Mukhopadhyay, J. Harvey-White, J. Tam, K. Pacak, J.L. Blankman, B.F. Cravatt, **A. Makriyannis**, G. Kunos, (2010), Inhibitor of fatty acid amide hydrolase normalizes cardiovascular function in hypertension without adverse metabolic effects. *Chem. Biol.*, **17**(11), 1256-1266. PMID: 21095576
296. Guo J., R.I. Duclos Jr., V.K. Vemuri, **A. Makriyannis**, (2010), The conformations of 17 $\beta$ -estradiol (E2) and 17 $\alpha$ -estradiol as determined by solution NMR. *Tetrahedron*, **51**(2010), 3465-3469. PMID: 21442021
297. Hwang J., C. Adamson, D. Butler, D.R. Janero, **A. Makriyannis**, B.A. Bahr, (2010), Enhancement of endocannabinoid signaling by fatty acid amide hydrolase inhibition: A neuroprotective therapeutic modality. *Life Sci.*, **86**(15-16), 615-623. PMID: 19527737
298. Järbe T.U., R.S. Gifford, **A. Makriyannis**, (2010), Antagonism of  $\Delta^9$ -THC induced behavioral effects by rimonabant: Time course studies in rats. *Eur. J. Pharmacol.*, **648**(1-3), 133-138. PMID: 20854804
299. Järbe T.U., C. Li, S.K. Vadivel, **A. Makriyannis**, (2010), Discriminative stimulus functions of methanandamide and delta(9)-THC in rats: Tests with aminoalkylindoles (WIN55, 212-2 and AM678) and ethanol. *Psychopharmacol. (Berl.)*, **208**(1), 87-98. PMID: 19902182
300. Jiang S., R. Zagozdzon, M.A. Jorda, K. Parmar, Y. Fu, J.S. Williams, J.T. Wood, **A. Makriyannis**, N. Banu, S. Avraham, J.E. Groopman, H.K. Avraham, (2010), Endocannabinoids are expressed in bone marrow stromal niches and play a role in interactions of hematopoietic stem and progenitor cells with the bone marrow microenvironment. *J. Biol. Chem.*, **285**(46), 35471-35478. PMID: 20826813
301. Karageorgos I., S. Tyukhtenko, N. Zvonok, D.R. Janero, **A. Makriyannis**, (2010), Identification by nuclear magnetic resonance spectroscopy of an active-site hydrogen-bond network in human monoacylglycerol lipase (hMGL): Implications for hMGL dynamics,

- pharmacological inhibition, and catalytic mechanism. *Mol. Biosyst.*, **6**(8), 1381-1388. PMID: 20464001
302. Limebeer C.L., V.K. Vemuri, H. Bedhard, S.T. Lang, K.P. Ossenkopp, **A. Makriyannis**, L.A. Parker, (2010), Inverse agonism of cannabinoid CB receptors potentiates LiCl-induced nausea in the conditioned gaping model in rats. *Br. J. Pharmacol.*, **161**(2), 336-349. PMID: 20735419
303. McLaughlin P.J., K.M. Winston, L.A. Swezey, **A. Makriyannis**, J.D. Salamone, (2010), Detailed analysis of food-reinforced operant lever pressing distinguishes effects of a cannabinoid CB1 inverse agonists and dopamine D1 and D2 antagonists. *Pharmacol. Biochem. Behav.*, **96**(1), 75-81. PMID: 20403373
304. Mercier R.W., Y. Pei, L. Pandarinathan, D.R. Janero, J. Zhang, **A. Makriyannis**, (2010), Human cannabinoid 2 ligand-interaction landscape: Cysteine residues critical to biarylpyrazole antagonist binding motif and receptor modulation. *Chem. Biol.*, **17**(10), 1132-1142. PMID: 21035736
305. Nikas, S., S.O. Alapafuja, I. Papanastasiou, C.A. Paronis, V.G. Shukla, D.P. Papahatjis, A.L. Bowman, A. Halikhedkar, X. Han, **A. Makriyannis**, (2010), Novel 1',1'-chain substituted hexahydrocannabinols: 9 $\beta$ -Hydroxy-3-(1-hexyl-cyclobut-1-yl)-hexahydrocannabinol (AM2389) a highly potent cannabinoid receptor 1 (CB1) agonist. *J. Med. Chem.*, **53**(19), 6996-7010. PMID: 2092534
306. Papahatjis D.P., V.R. Nahmias, S.P. Nikas, M. Schimpfen, **A. Makriyannis**, (2010), Design and synthesis of (13S)-methyl-substituted arachidonic acid analogues: Templates for novel endocannabinoids. *Chemistry*, **16**(13), 4091-4099. PMID: 20187040
307. Rahn E.J., A.M. Zvonok, **A. Makriyannis**, A.G. Hohmann, (2010), Antinociceptive effects of racemic AM1241 and its chirally synthesized enantiomers: Lack of dependence upon opioid receptor activation. *AAPS J.*, **12**(2), 147-157. PMID: 20127295
308. Randall P.A., V.K. Vemuri, K.N. Segovia, E.F. Torres, S. Hosmer, E.J. Nunes, J.L. Santerre, **A. Makriyannis**, J.D. Salamone, (2010), The novel cannabinoid CB1 antagonist AM6545 suppresses food intake and food-reinforced behavior. *Pharmacol. Biochem. Behav.*, **97**(1), 179-184. PMID: 20713079
309. Schindler C.W., L.V. Panlilio, J.P. Gilman, Z. Justinova, V.K. Vemuri, **A. Makriyannis**, S.R. Goldberg, (2010), Effects of cannabinoid receptor antagonists on maintenance and reinstatement of methamphetamine self-administration in rhesus monkeys. *Eur. J. Pharmacol.*, **633**(1-3), 44-49. PMID: 20153314
310. Selvakumar J., **A. Makriyannis**, C.R. Ramanathan, (2010), An unusual reactivity of BBR (3): Accessing tetrahydroisoquinoline units from N-phenethylimides. *J. Org. Biomol. Chem.*, **8**(18), 4056-4058. PMID: 20664860
311. Sink K.S., K.N. Segovia, P.A. Randall, L.E. Collins, M. Correa, E.J. Markus, V.K. Vemuri, **A. Makriyannis**, J.D. Salamone, (2010), Potential anxiogenic effects of cannabinoid CB1 receptor antagonists/inverse agonists in rats: Comparisons between AM4113, AM251, and the benzodiazepine inverse agonist FG-7142. *Eur. Neuropsychopharmacol.*, **20**(2), 112-122. PMID: 20015619
312. Sink K.S., K.N. Segovia, L.E. Collins, E.J. Markus, V.K. Vemuri, **A. Makriyannis**, J.D. Salamone, (2010), The CB1 inverse agonist AM251, but not the CB1 antagonist AM4113, enhances retention of contextual fear conditioning in rats. *Pharmacol. Biochem. Behav.*, **95**(4), 479-484. PMID: 20347865
313. Storr M.A., M. Bashashati, C. Hirota, V.K. Vemuri, C.M. Keenan, M. Duncan, B. Lutz, K. Mackie, **A. Makriyannis**, W.K. Macnaughton, K.A. Sharkey, (2010), Differential effects of CB(1) neutral antagonists and inverse agonists on gastrointestinal motility in mice. *Neurogastroenterol. Motil.*, **22**(7), 787-796. PMID: 20180825
314. Tam J., V.K. Vemuri, J. Liu, S. B atkai, B. Mukhopadhyay, G. Godlewski, D. Osei-Hyiaman, S. Ohnuma, S.V. Ambudkar, J. Pickel, **A. Makriyannis**, G. Kunos, (2010), Peripheral CB1 cannabinoid receptor blockade improves cardiometabolic risk in mouse models of obesity. *J. Clin. Invest.*, **120**(8), 2953-2966. PMID: 20664173 PMCID: 2912197

315. Tian X., S. Pavlopoulos, D.P. Yang, **A. Makriyannis**, (2010), The interaction of cannabinoid receptor agonists, CP55940 and WIN55212-2 with membranes using solid state (2)H NMR. *Biochim. Biophys. Acta.*, **1108**(9), 2095-2101. PMID: 21129361
316. Vishnumurthy K., **A. Makriyannis**, (2010), Novel and efficient one-step parallel synthesis of dibenzopyranones via Suzuki-Miyaura cross coupling. *J. Comb. Chem.*, **12**(5), 664-669. PMID: 20831265
317. Wood J.T., J.S. Williams, L. Pandarinathan, D.R. Janero, C.J. Lammi-Keefe, **A. Makriyannis**, (2010), Dietary docosahexaenoic acid supplementation alters select physiological endocannabinoid-system metabolites in brain and plasma. *J. Lipid Res.*, **51**(6), 1416-1423. PMID: 20071693 PMCID: PMC3035504
318. Zvonok N., W. Xu, J. Williams, D.R. Janero, S.C. Krishnan, **A. Makriyannis**, (2010), Mass spectrometry-based GPCR proteomics: Comprehensive characterization of the human cannabinoid 1 receptor. *J. Proteome Res.*, **9**(4), 1746-1753. PMID: 20131867
319. Bowman A.L., **A Makriyannis**, (2011), Approximating protein flexibility through dynamic pharmacophore models: Application to fatty acid amide hydrolase (FAAH). *J. Chem. Inf. Model.*, **51**(12):3247-3253. PMID: 22098169
320. Cluny N.L., A.P. Chambers, V.K. Vemuri, J.T. Wood, L.K. Eller, C. Freni, R.A. Reimer, **A. Makriyannis**, K.A. Sharkey, (2011), The neutral cannabinoid CB(1) receptor antagonist AM4113 regulates body weight through changes in energy intake in the rat. *Pharmacol. Biochem. Behav.*, **97**(3), 537-543. PMID: 21056053
321. Duclos R.I., M. Johnston, S.K. Vadivel, **A. Makriyannis**, S.T. Glaser, S.J. Gately, (2011), A methodology for radiolabeling of the endocannabinoid 2-arachidonoylglycerol (2-AG). *J. Org. Chem.*, **76**(7), 2049-2055. PMID: 21370840
322. Janero D.R., L. Lindsley, V.K. Vemuri, **A. Makriyannis**, (2011), Cannabinoid 1 protein-coupled receptor (periphero-)neutral antagonists: Emerging therapeutics for treating obesity-driven metabolic disease and reducing cardiovascular risk. *Expert Opin. Drug Discov.*, **6**(10), 995-1025. PMID: 22646881
323. Gutierrez T., J.D. Crustal, A.M. Zvonok, **A. Makriyannis**, A.G. Hohmann, (2011), Self-medication of a cannabinoid CB(2) agonist in an animal model of neuropathic pain. *Pain*, **152**(9), 1976-1987. PMID: 21550725
324. Jarbe T.U., B.J. Lemay, V.K. Vemuri, S.K. Vadivel, A. Zvonok, **A. Makriyannis**, (2011), Central mediation and differential blockade by cannabinergics of the discriminative stimulus effects of the cannabinoid CB(1) receptor antagonist rimonabant in rats. *Psychopharmacol.* **216**(3), 355-365. PMID: 21369753
325. Jarbe T.U., H. Deng, S.K. Vadivel, **A. Makriyannis**, (2011), Cannabinergic aminoalkylindoles including AM678=JWH018 found in 'Spice' examined using drug ( $\Delta^9$ -tetrahydrocannabinol) discrimination for rats. *Behav. Pharmacol.*, **22**(5-6), 498-507. PMID: 21836461
326. **Makriyannis A.**, S.P. Nikas, (2011), Aspirin-triggered metabolites of ERAs. *Chem. Biol.*, **18**(10), 1208-1209. PMID: 22035788
327. Naidoo V., S.P. Nikas, D.A. Karanian, J. Hwang, J. Zhao, J.T. Wood, S.O. Alapafuja, S.K. Vadivel, D. Butler, **A. Makriyannis**, B.A. Bahr, (2011), A new generation fatty acid amide hydrolase inhibitor protects against kainate-induced excitotoxicity. *J. Mol. Neurosci.*, **43**(3), 493-502. PMID: 21069475
328. Rahn E.J., G.A. Thakur, J.A. Wood, A.M. Zvonok, **A. Makriyannis**, A.G. Hohmann, (2011), Pharmacological characterization of AM1710, a putative CB(2) agonist from the cannabillactone class: Antinociception without central nervous system side-effects. *Pharmacol. Biochem. Behav.*, **98**(4), 493-502. PMID: 21382397
329. Seif T., **A. Makriyannis**, G. Kunos, A. Bonci, F.W. Hopf, (2011), The endocannabinoid 2-arachidonoylglycerol mediates D1 and D2 receptor cooperative enhancement of rat nucleus accumbens core neuron firing. *Neuroscience*, **193**, 21-23. PMID: 21821098
330. Singh S.N., K. Bakshi, R.W. Mercier, **A. Makriyannis**, S. Pavlopoulos, (2011), Binding between a distal C-terminus fragment of cannabinoid receptor 1 and arrestin-2. *Biochemistry*, **50**(12), 2223-2234. PMID: 21306178

331. Szymanski D.W., M. Papanastasiou, K. Melchior, N. Zvonok, R.W. Mercier, D.R. Janero, G.A. Thakur, S. Cha, B. Wu, B. Karger, **A. Makriyannis**, (2011), Mass spectrometry-based proteomics of human cannabinoid receptor 2: Covalent cysteine 6.47 (257)-ligand interaction affording megagonist receptor activation. *J. Proteome Res.*, **10**(10), 4789-4798. PMID: 21861534
332. Teng H., G.A. Thakur, **A. Makriyannis**, (2011), Conformationally constrained analogs of BAY 59-3074 as novel cannabinoid receptor ligands. *Bioorg. Med. Chem. Lett.*, **21**(19), 5999-6002. PMID: 21880487
333. Tian X., S. Pavlopoulos, D.P. Yang, **A. Makriyannis**, (2011), The interaction of cannabinoid receptor agonists CP55940 and WIN55212-2 membranes using solid state 2H NMR. *Biochem. Biophys. Acta.*, **1808**(9), 2095-2101. PMID: 21129361
334. Tiburu E.K., S. Tyukhtenko, H. Zhou, D.R. Janero, J. Struppe, **A. Makriyannis**, (2011), Human cannabinoid 1 GPCR C-terminal domain interacts with bilayer phospholipids to modulate the structure of its membrane environment. *AAPS J.*, **13**(1), 92-98. PMID: 21234731
335. Vadivel S.K., K.M. Whitten, **A. Makriyannis**, (2011), Chemoenzymatic synthesis of 2-arachidonoylglycerol, an endogenous ligand for cannabinoid receptors. *Tetrahedron Lett.*, **52**(11), 1149-1150. PMID: 21318079
336. Alapafuja S.O., S.P. Nikas, I. Bharatan, V.G. Shukla, M.L. Nasr, A.L. Bowman, N. Zvonok, J. Li, X. Shi, J.R. Engen, **A. Makriyannis**, (2012), Sulfonyl Fluoride Inhibitors of Fatty Acid Amide Hydrolase. *J. Med. Chem.*, **55**(22), 10074-10089. PMID: 23083016
337. Bashashati M., M.A. Storr, S.P. Nikas, J.T. Wood, G. Godlewski, J. Liu, W. Ho, C.M. Keenan, H. Zhang, S.O. Alapafuja, B.F. Cravatt, B. Lutz, K. Mackie, G. Kunos, K.D. Patel, **A. Makriyannis**, J.S. Davison, K.A. Sharkey, (2012), Inhibiting fatty acid amide hydrolase normalizes endotoxin-induced enhanced gastrointestinal motility in mice. *Br. J. Pharmacol.*, **165**(5), 1556-1571. PMID: 21883147
338. Deng L., J. Guindon, V.K. Vemuri, G.A. Thakur, F.A. White, **A. Makriyannis**, A.G. Hohmann, (2012), The maintenance of cisplatin- and paclitaxel-induced mechanical and cold allodynia is suppressed by cannabinoid CB2 receptor activation and independent of CXCR4 signaling in models of chemotherapy-induced peripheral neuropathy. *Mol Pain.*, **8**(1), 71. PMID: 22998838
339. Dixon D.D., M.A. Tius, G.A. Thakur, H. Zhou, A.L. Bowman, V.G. Shukla, Y. Peng, **A. Makriyannis**, (2012), C3-heteroaryl cannabinoids as photolabeling ligands for the CB2 cannabinoid receptor. *Bioorg. Med. Chem.*, **22**(16), 5322-5325. PMID: 22796181
340. Gamaledin I., A. Zvonok, **A. Makriyannis**, S.R. Goldberg, B. LeFoll, (2012), Effects of a selective cannabinoid CB2 agonist and antagonist on intravenous nicotine self-administration and reinstatement of nicotine seeking. *PLoS One*, **7**(1), e29900. PMID: 22291896
341. Jarbe T.U., S. Tai, B.J. LeMay, S.P. Nikas, V. Shukla, A. Zvonok, **A. Makriyannis**, (2012), AM2389, a high-affinity, *in vivo* potent CB(1)-receptor-selective cannabinergic ligand as evidenced by drug discrimination in rats and hypothermia testing in mice. *Psychopharmacology (Berl.)*, **220**(2), 417-426. PMID: 21989802
342. Jonhston M., S.R. Bhatt, S. Sikka, R.W. Mercier, J.M. West, **A. Makriyannis**, S.J. Gatley, R.I. Duclos Jr., (2012), Assay inhibition of diacylglycerol lipase activity. *Bioorg. Med. Chem. Lett.*, **22**(14), 4585-4592. PMID: 22738638
343. Karageorgos I., N. Zvonok, D.R. Janero, V.K. Vemuri, V. Shukla, T.E. Wales, J.R. Engen, **A. Makriyannis**, (2012), Endocannabinoid enzyme engineering: Soluble human thio-monoacylglycerol lipase (sol-S-hMGL). *ACS Chem Neuroscience.*, **3**(5), 393-399. PMID: 22860208
344. Naidoo V., D.A. Karanian, S.K. Vadivel, J.R. Locklear, J.T. Wood, M. Nasr, P.M. Quizon, E.E. Graves, V. Shukla, **A. Makriyannis**, B.A. Bahr, (2012), Equipotent Inhibition of Fatty Acid Amide Hydrolase and Monoacylglycerol Lipase - Dual Targets of the Endocannabinoid System to Protect against Seizure Pathology. *Neurotherapeutics*, **9**(4), 801-813. PMID: 22270809.



345. Paronis C.A., S.P. Nikas, V.G. Shukla, **A. Makriyannis**, (2012),  $\Delta$ 9-Tetrahydrocannabinol acts as a partial agonist/antagonist in mice. *Behav. Pharmacol.*, **23**(8), 802-805. PMID: 23075707
346. Reichenbach V., J. Ros, G. Fernandez-Varo, G. Casals, P. Melgar-Lesmes, T. Campos, **A. Makriyannis**, M. Morales-Ruiz, W. Jimenez, (2012), Prevention of fibrosis progression in CC14-treated rats: Role of the hepatic endocannabinoid and apelin systems. *J. Pharmacol. Exp. Ther.*, **340**(3), 629-637. PMID: 22160265
347. Scherma M., Z. Justinova, C. Zanettini, L.V. Panlilio, P. Mascia, P. Fadda, W. Fratta, **A. Makriyannis**, S.K. Vadivel, I. Gamaledin, B. LeFoll, S.R. Goldberg, (2012), The anandamide transport inhibitor AM404 reduces the rewarding effects of nicotine-induced dopamine elevations in the nucleus accumbens shell in rats. *Br. J. Pharmacol.*, **165**(8), 2539-2548. PMID: 21557729
348. West J.M., N. Zvonok, K.M. Whitten, S.K. Vadivel, A.L. Bowman, **A. Makriyannis**, (2012), Biochemical and mass spectrometric characterization of human N-acylethanolamine-hydrolyzing Acid amidase inhibition. *PLoS One*, **7**(8), e43877. PMID: 22952796
349. West J.M., N. Zvonok, K.M. Whitten, J.T. Wood, A. Makriyannis, (2012), Mass spectrometric characterization of human N-acylethanolamine-hydrolyzing acid amidase. *J. Proteome Res.*, **11**(2), 972-981. PMID: 22040171
350. Whitten K.M., **A. Makriyannis**, S.K. Vadivel, (2012), Application of chemoenzymatic hydrolysis in the synthesis of 2-monoacylglycerols. *Tetrahedron.*, **68**(27-28), 5422-5428. PMID: 22822273
351. Whitten K., **A. Makriyannis**, S.K. Vadivel, (2012), Enzymatic synthesis of N-Acylethanolamines: Direct method for the aminolysis of esters. *Tetrahedron.*, **53**(43), 5753-5755. PMID: 23175586, PMCID: PMC3500964
352. Wilkerson J.L., K.R. Gentry, E.C. Dengler, J.A. Wallace, A.A. Kerwin, L.M. Armijo, M.N. Kuhn, G.A. Thakur, **A. Makriyannis**, E.D. Milligan, (2012), Immunofluorescent spectral analysis reveals the intrathecal cannabinoid agonist, AM1241, produces spinal anti-inflammatory cytokine responses in neuropathic rats exhibiting relief from allodynia. *Brain Beh.*, **2**(2), 155-177. PMID: 22574283
353. Wilkerson J.L., K.R. Gentry, E.C. Dengler, J.A. Wallace, A.A. Kerwin, L.M. Armijo, M.N. Kuhn, G.A. Thakur, **A. Makriyannis**, E.D. Milligan, (2012), Intrathecal cannabillactone CB(2)R agonist, AM1710, controls pathological pain and restores basal cytokine levels. *Pain*, **153**(5), 1091-1106. PMID: 22425445
354. Bowman A.L., **A. Makriyannis**, (2012), Highly predictive ligand-based pharmacophore and homology models of ABHD6, *Chem. Biol. Drug Des.*, **In Press**. PMID: 23110439
355. Desai R.I., G.A. Thakur, K. Vemuri, S. Bajaj, **A. Makriyannis**, J. Bergman, (2012), Analysis of tolerance and behavioral/physical dependence during chronic CB1 agonist treatment: Effects of CB1 agonists, antagonists, and non-cannabinoid drugs. *J. Pharmacol. Exp. Ther.*, **In Press**. PMID: 23197773
356. Gunduz-Cinar O., K.P. Macpherson, R. Cinar, J. Gamble-George, K. Sudgen, B. Williams, G. Godlewski, T.S. Ramilkie, A.X. Gorka, S.O. Alapafuja, S.P. Nikas, **A. Makriyannis**, R. Poulton, S. Patel, A.R. Hariri, A. Caspi, T.E. Moffitt, G. Kunos, A. Holmes, (2012), Convergent translational evidence of a role for anandamide in amygdala-mediated fear extinction, threat processing and stress-reactivity. *Mol. Psychiatry*, **In Press**. PMID: 22688188
357. Johnston M., S.R. Bhatt, S. Sikka, R.W. Mercier, J.M. West, **A. Makriyannis**, S.J. Gatley, R.I. Duclos Jr., (2012), Assay and inhibition of diacylglycerol lipase activity. *Bioorg Med Chem Lett*. **In Press**. PMID: 22738638
358. Paronis C., G.A. Thakur, S. Bajaj, S.P. Nikas, V.K. Vemuri, **A. Makriyannis**, J. Bergman, (2012), Diuretic effects of cannabinoids. *J. Pharmacol. Exp. Ther.*, **In Press**. PMID: 23019138
359. Randall P.A., M. Pardo, E.J. Nunes, L. López Cruz, V.K. Vemuri, **A. Makriyannis**, Y. Baqi, C.E. Müller, M. Correa, J.D. Salamone, (2012), Dopaminergic modulation of effort-related

choice behavior as assessed by a progressive ratio chow feeding choice task: pharmacological studies and the role of individual differences. *PloS One*, **In Press**. PMID: 23110135

360. Shen L., H. Huang, **A. Makriyannis**, L.S. Fisher, (2012), Integrated ligand based pharmacophore model derived from diverse FAAH covalent ligand classes. *Curr. Comput. Aided Drug Des.*, **In Press**. PMID: 22734710
361. Wood J.T., D.M. Smith, D.R. Janero, A.M. Zvonok, **A. Makriyannis**, (2012), Therapeutic modulation of cannabinoid lipid signaling: Metabolic profiling of a novel antinociceptive cannabinoid-2 receptor agonist. *Life Sci.*, **In Press**. PMID: 22749867

#### BOOKS:

1. **Makriyannis A.**, Ed., (1985), *New Methods in Drug Research*, **1**, J. R. Prous Science Publishers, Barcelona, Spain.
2. Rapaka A., **A. Makriyannis**, Eds., (1987), A RAUS Review Report 1987: Structure-Activity Relationships of the Cannabinoids (October 30 – 31, Bethesda, MD), *NIDA Research Monograph Series*, **79**.
3. **Makriyannis A.**, Ed., (1988), *New Methods in Drug Research*, **2**, J. R. Prous Science Publishers, Barcelona, Spain.
4. Musty R., P. Consroe, **A. Makriyannis**, Eds., (1988), *Marihuana, 1990*, Australian Publishing Service, Canberra.
5. **Makriyannis A.**, Ed., (1989), *New Methods in Drug Research*, **3**, J. R. Prous Science Publishers, Barcelona, Spain.
6. **Makriyannis A.**, Ed., (1992), *New Methods in Drug Research*, **4**, J. R. Prous Science Publishers, Barcelona, Spain.
7. **Makriyannis A.**, N. Castagnoli, Eds., (1995), *New Methods in Drug Research*, **5**, J. R. Prous Science Publishers, Barcelona, Spain.
8. Musty R., P. Reggio, P. Consroe, **A. Makriyannis**, Eds., (1995), *Life Sci., International Symposium on Cannabis and the Cannabinoids*, **56**, Pergamon Press, Tarrytown, N.Y.
9. Rapaka R., **A. Makriyannis**, H.H.O. Schmid, Eds., (2002), Cannabinoids: Chemistry and Biology, *Chem. Phys. Lipids*, **121**(1).
10. **Makriyannis A.**, D. Biegel, Eds., (2004), *Drug Discovery Strategies and Methods*, **1**, Marcel Dekker, New York, N.Y.

#### CHAPTERS IN BOOKS:

1. **Makriyannis A.**, R.S. Rapaka, (1987), The Medicinal Chemistry of Cannabinoids: An Overview in *NIDA Research Monograph Series*, **79**, 1-16.
2. **Makriyannis A.**, (1987), Nuclear Magnetic Resonance in Drug Research. Some New Developments in *New Methods in Drug Research*, J. R. Prous Science Publishers, Barcelona, Spain, **2**.
3. **Makriyannis A.**, (1988), Amphipathic Interactions of Drugs with Model Membranes as Studied by Solid-State NMR in *Antiarrhythmic Agents*, L. Hondeghem, Ed., Futura Publishing Co., Mount Kisco, NY, **19**,1-5.
4. **Makriyannis A.**, (1988), Molecular features of drug-induced membrane perturbation as studied by solid-state NMR, in *NMR Spectroscopy and Drug Development: The Alfred Benzon Symposium*, J.W. Jaroszewski, K. Schaumburg, H. Kofod, Eds., Munksgaard, Copenhagen, **26**, 437-451.
5. **Makriyannis A.**, (1988), Use of solid-state NMR techniques in drug research, in *Molecular Basis of the Action of Drugs and Toxic Substances*, N. Castagnoli, W. deGruyter, Eds., New York, NY, 225-236.
6. **Makriyannis A.**, D.P. Yang, (1989), Solid-State NMR Spectroscopy in the Study of Drug Membrane Interactions; Potential Applications with Antiarrhythmic Agents in *Molecular and*

- Cellular Mechanisms of Antiarrhythmic Agents*, L. Hondeghem, Ed., Futura Publishing Co., Mount Kisco, NY, **20**, 293-305.
7. **Makriyannis A.**, T. Mavromoustakos, H. Jarrell, A. Banijamali, (1988), The role of phenolic hydroxyl group during the tetrahydrocannabinol: Membrane interactions in *Marijuana: An International Research Report*, G. Chesher, P. Consroe, R. Musty, Eds., Australian Publishing Service, Canberra, 321-326.
  8. **Makriyannis A.**, D.P. Yang, T. Mavromoustakos, (1990), The molecular features of membrane perturbation by anesthetic steroids: A study using differential scanning calorimetry, small angle x-ray diffraction and solid state <sup>2</sup>H NMR in *Ciba. Found. Symp.*, **153**, 172-184.
  9. **Makriyannis A.**, D.P. Yang, T. Mavromoustakos, (1991), Combined use of solid-state nuclear magnetic resonance spectroscopy, small-angle x-ray diffraction and differential scanning calorimetry in studies of cannabinoid: Membrane interactions in *NIDA Research Monograph Series*, **112**, 106-128.
  10. Rapaka R.S., **A. Makriyannis**, M. Kuhar, (1991), Emerging Technologies in Drug Abuse Research: An Overview in *NIDA Res. Monogr.*, **112**, 106-128.
  11. **Makriyannis A.**, (1993), Probes for the cannabinoid sites of action in *NIDA Research Monograph Series*, **134**, 253-267.
  12. **Makriyannis A.**, D.P. Yang, (1994), How to Study Drug: Membrane Interactions Using Differential Scanning Calorimetry, Solid State NMR and Small Angle X-Ray Diffraction. **17**, 329-348. in *Recent Advances in the Study of Neurotransmitter Receptors*, B.N. Dhawan, R.C. Srimal, R. Raghubir, R.S. Rapaka, Eds., CDRI, Lucknow, India.
  13. Mavromoustakos T., E. Theodoropoulou, J. Matsoukas, G. Moore, **A. Makriyannis**, (1994), Interactions of ANG II with Membranes Using a Combination of Differential Scanning Calorimetry and <sup>31</sup>P-NMR in *Aminoacids, Peptides, Proteins, Drug Discovery and Design*, J. Matsoukas, Ed., Royal Society of Chemistry, Cambridge, 88-94.
  14. Mavromoustakos T., E. Theodoropoulou, D.P. Yang, **A. Makriyannis**, (1994), The use of molecular graphics to study the conformational properties of biologically active molecules in *Aminoacids, Peptides, Proteins, Drug Discovery and Design*, J. Matsoukas, Ed., Royal Society of Chemistry, Cambridge, 78-83.
  15. **Makriyannis A.**, (1995), The Role of Cell Membranes in Cannabinoid Activity in *Cannabinoid Receptors*, R. Pertwee, Ed., Academic Press, New York, 87-116.
  16. Khanolkar A.D., **A. Makriyannis**, (1999), Structure-activity relationships of anandamide, an endogenous cannabinoid ligands, in *Life Sci., Special Symposium Issue on Cannabinoids*, **65**(6-7), 607-616.
  17. Gatley S.J., N.D. Volkow, **A. Makriyannis**, (1999), Studies of the Brain Cannabinoid System Using Positron and Single-Photon Emission Tomography, in *Marihuana and Medicine*, G.G. Nahas, K.M. Sutin, S. Agurell, Eds., Humana Press, Totowa, 163-176.
  18. **Makriyannis A.**, S. Pavlopoulos, (1999), Structural Chemistry Using NMR Spectroscopy, Pharmaceuticals in: *Encyclopedia of Spectroscopy & Spectrometry*, J. Lindon, G. Tranter, J. Holmes, Eds., Academic Press, London, **3**, 2261-2271.
  19. Schuel H., M.C. Chang, L.J. Burkman, R.P. Picone, **A. Makriyannis**, A.M. Zimmerman, S. Zimmerman, (1999), Cannabinoid Receptors in Sperm in *Marihuana and Medicine*, G.G. Nahas, K.M. Sutin, S. Agurell, Eds., Humana Press, Totowa, 335-345.
  20. Palmer S.L., G.A. Thakur, **A. Makriyannis**, (2002), Cannabinergic ligands in *Chem. Phys. Lipids*, **121**(1-2), 3-19.
  21. Palmer S.L., A.D. Khanolkar, **A. Makriyannis**, (2002), Endocannabinoid Proteins and Ligands in *Biology of Marijuana: From Gene to Behavior*, E.S. Onaivi, Ed., Taylor and Francis, Inc., New York, NY, **18**, 491-522.
  22. Gatley S.J., A.N. Gifford, Y.S. Ding, R. Lan, Q. Liu, N.D. Volkow, **A. Makriyannis**, (2003), Development of PET and SPECT radioligands for cannabinoid receptors in *Drug Discovery Strategies and Methods*, **A. Makriyannis**, D. Biegel, Eds., CRC Press, New York, NY, **1**, 129-146.

23. **Makriyannis A.**, A. Goutopoulos, (2004), Cannabinergics: Old and new therapeutic possibilities in *Drug Discovery Strategies and Methods*, **A. Makriyannis**, D. Biegel, Eds., CRC Press, New York, NY, **1**, 89-128.
24. Rapaka R., **A. Makriyannis**, V. DiMarzo, D. Piomelli, (2005), Targeted lipidomics: endocannabinoids and other endolipid modulators in *Life Sci.*, **77**(14), 1517-1518.
25. Guo J., X. Tian, S. Pavlopoulos, **A. Makriyannis**, (2006), Phospholipid bicelle membrane systems for studying drug molecules in *Handbook of Modern Magnetic Resonance*, G.A. Webb, D. Craik, Eds., Kluwer Academic Publishers, London, UK.

## REVIEWS:

1. Mavromoustakos T., **A. Makriyannis**, (1993), The use of molecular graphics as an aid in the study of the conformational properties of biologically active molecules. *Rev. Clin. Pharmacol.*, **11**, 88-89.
2. Malan Jr. T.P., M.M. Ibrahim Jr., J. Lai, T.W. Vanderah, **A. Makriyannis**, F. Porreca, (2003), CB2 cannabinoid receptor agonists: Pain relief without psychoactive effects? *Curr. Opin. Pharmacol.*, **3**(1), 62-67. PMID: 12550743
3. Thakur G.A., S.P. Nikas, **A. Makriyannis**, (2005), CB1 cannabinoid receptor ligands. *Mini Rev. Med. Chem.*, **5**(7), 631-640. PMID: 16026309
4. Thakur G.A., S.P. Nikas, C. Li, **A. Makriyannis**, (2005), Structural requirements for cannabinoid receptor probes. *Handbook of Experimental Pharmacology*, (168), 209-246. PMID: 16596776
5. Lu D., V.K. Vemuri, R.I. Duclos Jr., **A. Makriyannis**, (2006), The cannabinergic system as a target for anti-inflammatory therapies. *Current Topics in Medicinal Chemistry*, **6**(13), 1401-1426. PMID: 16918457
6. Pavlopoulos S., G.A. Thakur, S.P. Nikas, **A. Makriyannis**, (2006), Cannabinoid receptors as therapeutic targets. *Curr. Pharm. Des.*, **12**(14), 1751-1769.
7. Thakur G.A., S.P. Nikas, R.I. Duclos Jr., **A. Makriyannis**, (2006), Methods for the synthesis of cannabinergic ligands. *Methods Mol. Med.*, **123**, 113-148.
8. Janero D.R., **A. Makriyannis**, (2009), Cannabinoid receptor antagonists: Pharmacological opportunities, clinical experience, and translational prognosis. *Expert Opin. Emerg. Drugs*, **14**(1), 43-65. PMID: 19249987
9. Janero D.R., S.K. Vadivel, **A. Makriyannis**, (2009), Pharmacotherapeutic modulation of the endocannabinoid signaling system in psychiatric disorders: Drug-discovery strategies. *Int. J. Psychiatry*, **21**(2), 122-133. PMID: 19367506
10. Kunos G., D. Osei-Hyiaman, S. Batkai, K.A. Sharkey, **A. Makriyannis**, (2009), Should peripheral CB(1) cannabinoid receptors be selectively targeted for therapeutic gain? *Trends Pharmacol. Sci.*, **30**(1), 1-7. PMID: 19042036

## ACTIVE RESEARCH FUNDING:

### FEDERAL GRANTS (Active)

(PI) *Supplementation of Omega-3 Fatty Acids during Pregnancy* (12/1/11-11/30/14)

R21 DA030209 (PI) *Structural Basis for Cannabinoid Receptor 2 Signaling* (7/15/10-6/30/13)

R01 DA031020 (PI) *Candidate Medications for Cannabis Addiction: FAAH Inhibitors* (9/30/10-8/31/15)

R37 DA023142 (PI) *Cannabinergic Medications for Methamphetamine Addiction* (5/1/07-4/30/17)

P01 DA09158 (PI) *Endocannabinoid Active Sites as Therapeutic Targets* (9/30/94-4/30/13)

R01 DA07215 (PI) *Cannabimimetic Ligands and Drugs* (9/1/96-4/30/13)

T32 DA07312 **(PI)** *Training Program in Medications Development for Drugs of Abuse (7/1/99-6/30/13)*

R01 DA026795-01 **(PI)** *Novel Medications for Cannabis Dependence (5/1/09-4/30/13)*

INDUSTRIAL GRANTS

Endo Pharmaceuticals *CB2 Selective Agonists*

Glaxo Wellcome *Design and Synthesis of Antineoplastic Alkyl Lysophospholipids*

Glaxo Wellcome *Antineoplastic Ether Lipids Molecular Mechanisms of Action*

WHO *World Health Organization Research Award*

Pfizer Central Research *Development of Porcine Somatotropin Receptor Binding Assays*

**UNITED STATES ISSUED PATENTS (First Author):**

1. *Cannabinergic lipid ligands.* US 8202893 (June 19, 2012)
2. *Antiprotozoal ring-substituted phospholipids.* US 8097752 (January 17, 2012).
3. *Novel Heteropyrrole Analogs Acting on Cannabinoid Receptors.* US 8084451 (December 27, 2011)
4. *Pyrazole Derivatives as Cannabinoid Receptor Antagonists.* US 8084467 (December 27, 2011)
5. *Inhibitors of the anandamide transporter.* US 7897598 (2011)
6. *Receptor selective cannabimimetic aminoalkylindoles.* US 7820144 (2010)
7. *Pyrazole analogs acting on cannabinoid receptors.* US 7745440 (June 29, 2010)
8. *Peripheral cannabinoid receptor (CB2) selective ligands.* US 7741365 (June 22, 2010)
9. *Heteroindanes: a new class of potent cannabimimetic ligands.* US 7666867 (February 23, 2010).
10. *Inhibitors of the anandamide transporter.* US 7589220 (September 15, 2009)
11. *Bicyclic cannabinoids.* US 7446229 (November 4, 2008)
12. *Pyrazole analogs acting on cannabinoid receptors.* US 7393842 (July 1, 2008)
13. *Bicyclic cannabinoid agonists for the cannabinoid receptor.* US 7335688 (February 26, 2008)
14. *Cannabimimetic ligands.* US 7329651 (February 12, 2008)
15. *Bicyclic and tricyclic cannabinoids.* US 7285683 (October 23, 2007)
16. *Retro-anandamides, high affinity and stability cannabinoid receptor ligands.* US 7276613 (October 2, 2007)
17. *Cannabimimetic indole derivatives.* US 7241799 (July 10, 2007)
18. *Keto cannabinoids with therapeutic indications.* US 7183313 (February 27, 2007)
19. *Receptor selective cannabimimetic aminoalkylindoles.* US 7173027 (February 6, 2007)
20. *Cannabimimetic lipid amides as useful medications.* US 7161016 (January 9, 2007)
21. *Pyrazole derivatives as cannabinoid receptor antagonists.* US 7119108 (October 10, 2006)
22. *Bifunctional agents possessing antioxidant and antiarrhythmic activity.* US 7115657 (October 3, 2006)
23. *GABA A modulating neurosteroids.* US 7064116 (June 20, 2006)
24. *Bicyclic and tricyclic cannabinoids.* US 7057076 (June 6, 2006)
25. *Peripheral cannabinoid receptor (CB2) selective ligands.* US 6995187 (February 7, 2006)
26. *Analgesic and immunomodulatory cannabinoids.* US 6939977 (September 6, 2005)
27. *Cannabimimetic indole derivatives.* US 6900236 (May 31, 2005)
28. *Anandamide inhibitors as analgesic agents.* US 6391909 (May 21, 2002)
29. *Bicyclic cannabinoid agonists for the cannabinoid receptor.* US 6943266 (September 13, 2005)
30. *Anandamide amidase inhibitors as analgesic agents.* US 6579900 (June 17, 2003)
31. *Cannabinoids selective for the CB2 receptor.* US 6166066 (December 26, 2000)

32. *Anandamide amidase inhibitors as analgesic agents*. US 5874459 (February 23, 1999)
33. *Compositions useful as a cannabinoid receptor probe*. US 5872148 (February 16, 1999)
34. *Phospholipid compounds and use thereof*. US 5744459 (April 28, 1998)
35. *Anandamide amidase inhibitors as analgesic agents*. US 5688825 (November 18, 1997)
36. *Phospholipid compounds and use thereof*. US 5489580 (February 6, 1996)
37. *Compositions useful as a cannabinoid receptor probe*. US 5440052 (August 8, 1995)

#### **INVITED LECTURES SINCE 1998:**

- 1998 American Assoc. of Pharma. Scientists' Eastern Regional Meeting, Parsippany, NJ (**Keynote**)  
 Regional American Chemical Society Meeting, Middlebury, CT (**Keynote**)  
 Boston University, School of Medicine, Boston, MA  
 Virginia Commonwealth University NIDA Seminar Series, Richmond, VA  
 National Neuroscience Meeting, Los Angeles, CA  
 Fudan University, Shanghai, China  
 College of Pharmacy, Second Military Medical University, Shanghai, China  
 Shanghai Institute of Organic Chemistry, Chinese Academy of Science, China  
 Institute of Materia Medica- Chinese Academy of Medicine, Shanghai, China  
 Qing Hua University, Shanghai, China  
 International Cannabinoid Research Society, Palais des Congres, La Grande Motte, France
- 1999 University of Cyprus, Nicosia, Cyprus  
 Boston University, School of Medicine, Boston, MA  
 8th Cyprus Conference on New Methods in Drug Research, Limassol, Cyprus  
 American Association of Pharmaceutical Scientists Annual Meeting, New Orleans, LA  
 FASEB Summer Research Conference, Copper Mountain, CO  
 2nd Annual BEACON SYMPOSIUM Drug Discovery, Design and Delivery Symposium (**Keynote**)  
 NIDA IRP Special Seminar, Bethesda, MD  
 American Chemical Society Regional Meeting, Boston, MA  
 University of Connecticut Health Center, Farmington, CT  
 Harvard Medical School-McLean Hospital, Belmont, MA
- 2000 RBI Sigma, Natick, MA  
 American Chemical Society National Meeting, San Francisco, CA  
 Yale Psychosis Research Seminar Series, New Haven, CT  
 University of Connecticut Health Center, Farmington, CT  
 University of Connecticut, Physiology and Neurobiology, Storrs, CT  
 Synaptic Pharmaceutical Corporation, Paramus, NJ  
 New Perspectives in the Therapeutic Uses of Endocannabinoids, Madrid, Spain  
 University of Minnesota, Minneapolis, MN  
 University of Connecticut, School of Pharmacy All-School Seminar Series, Storrs, CT  
 Pacificchem Joint American and Japanese Chemical Society 2000 Conference, Honolulu, HI
- 2001 Harvard Medical School-McLean Hospital, Belmont, MA  
 Wayne State University, Detroit, MI  
 University of Connecticut Chemistry Colloquium, Storrs, CT  
 Abbott Laboratories, Chicago, IL  
 American Chemical Society National Meeting, Chicago, IL  
 NIDA Symposium on Cannabinoids: Chemistry and Biology Meeting, Bethesda, MD  
 AstraZeneca R&D, Montreal, Canada
- 2002 National Institute of Mental Health, Bethesda, MD  
 Purdue University, Indianapolis, IN  
 University of Louisville, Louisville, KY

NIDA Symposium on Structural Biology & Structural Genomics/Proteomics, Bethesda, MD  
 International Behavioral Neuroscience Society 11th Annual Meeting, Capri, Italy  
 International Symposium on Medicinal Chemistry, Barcelona, Spain  
 Scientific Seminar Series at the University of Connecticut, Groton, CT  
 Mini-Symposium on Current Trends in Drug Abuse Research, Storrs, CT **(Keynote)**  
 American Association of Pharmaceutical Scientists Annual Meeting, Toronto, Ontario, Canada  
 Marine Sciences, University of Connecticut, Groton, CT  
 Center for Genetics and Molecular Medicine, University of Louisville, Louisville, KY

- 2003 National Institute on Drug Abuse, Rockville, MD  
 Northeastern University, Boston, MA  
 University of Connecticut School of Pharmacy Advisory Board, Storrs, CT  
 American Society for Pharmacology and Experimental Therapeutics, San Diego, CA  
 Crompton Corporation Chapter of Sigma Xi, Middlebury, CT **(Keynote)**  
 NIDA's Southern Africa Initiative, Cape Town, South Africa  
 Center for Vascular Biology, University of Connecticut Health Center, Farmington, CT  
 National Hellenic Research Foundation, Athens, Greece **(Keynote)**  
 4th International Symposium on Pharmaceutical Chemistry, Istanbul, Turkey  
 Institute of Living Neuroscience Rounds, Hartford, CT
- 2004 Virginia Commonwealth University, Richmond, VA  
 Signaling Lipids and Drugs of Abuse for the National Institute on Drug Abuse, Washington, D.C.  
 NIDA on Medications Development for Cannabis Dependence, Rockville, MD  
 National Institute on Drug Abuse and the American Psychiatric Association, New York, NY  
 10th Cyprus Conference on New Methods in Drug Research, Limassol, Cyprus  
 Meeting for the College on Problems of Drug Dependence (CPDD), San Juan, Puerto Rico  
 International Cannabinoid Research Society (ICRS) Satellite Meeting, Paestum, Italy  
 CMCR Conference: Future Directions in Cannabinoid Therapeutics, Paestum, Italy  
 American Chemical Society National Meeting, Philadelphia, PA  
 AAPS-NIDA Symposium, Bethesda, MD  
 Northeastern University, Boston, MA  
 Northeastern University, Massachusetts Council of Biotechnology, Boston, MA **(Keynote)**  
 1st Hellenic Symposium ORGANIC SYNTHESIS, U. of Athens, Greece **(Keynote)**  
 Institute of Montreal Pfizer Lecture Series, Montreal, Canada  
 NIDA for the American College of Neuropsychopharmacology, San Juan, Puerto Rico
- 2005 Symposium Chair for the Center for Drug Discovery and Northeastern University, Boston, MA  
 Provost's Innovations in Research, Northeastern University, Boston, MA  
 Washington University, St. Louis, MO  
 15th Noordwijkerhout-Camerino Symposium, Amsterdam, Netherlands  
 Boehringer-Ingelheim Pharmaceutical, Ridgefield, CT  
 XV Annual International Cannabinoid Research Society Symposium, Clearwater, FL  
 Moderator for AAPS National Biotechnology Conference, San Francisco, CA  
 NIDA SPIRDAP Special Emphasis Panel, Bethesda, MD  
 Columbia University, Department of Medicine and Sanofi-Aventis, New York, NY  
 Panel Moderator and Presenter, ACNP Annual Meeting, Waikoloa, HI
- 2006 NIDA, Bethesda, MD  
 ICRS 16th Annual Symposium on the Cannabinoids, Tihany, Hungary  
 GRASP, Northeastern University, Boston, MA **(Keynote)**  
 SBIR, Governor's Office of Workforce Competitiveness, East Hartford, CT **(Keynote)**

- 2007 10th IBN Sina International Conference on Pure and Applied Heterocyclic Chemistry, Luxor, Egypt  
The Threat of Obesity, Northeastern University, Boston, MA **(Keynote)**  
Kenneth E. Avis Distinguished Visiting Professor Lecture, Memphis, TN **(Keynote)**  
ASPET, Washington, D.C.  
Camerino Lectures, Camerino, Italy  
NU Today Event, Northeastern University, Boston, MA  
American Chemical Society National Meeting, Boston, MA  
NIDA/NIH, Rockville, MD  
ECSN Scientific Forum, Boca Raton, FL
- 2008 Medications Development for Treatment of Cannabis-Related Disorders, NIDA/NIH, Bethesda, MD  
National Hellenic Research Foundation, Athens, Greece **(Keynote)**  
235th ACS Spring National Meeting and Burger Award, New Orleans, LA  
American Society of Addiction Medicine, Toronto, Canada  
11th Cyprus Conference on "New Methods in Drug Research", Limassol, Cyprus  
NU Board of Trustees Annual Corporation Faculty Symposium, Boston, MA **(Keynote)**
- 2009 University of Hawaii, Honolulu, HI  
Northeastern University Pharmaceutical Sciences Showcase, Boston, MA **(Keynote)**  
Northeastern University Chemistry and Chemical Biology Retreat, Boston, MA  
National Institute of Health, Bethesda, MD  
The College on Problems of Drug Dependence Special Symposium, Reno, NV  
American Association of Colleges of Pharmacy, Boston, MA  
Gordon Research Conference: Cannabinoid Function in the CNS, Biddeford, ME  
Biogen Idec, Cambridge, MA
- 2010 Northeastern University, Special Topics in Chemistry, Boston, MA  
COST Chemistry: Free Radicals in Chemical Biology, Athens, Greece **(Keynote)**  
Alnylam Biotherapeutics, Cambridge, MA, March 2010  
28th Camerino-Cyprus-Noordwijkerhout Symposium, Camerino, Italy  
International Narcotics Research Conference, Malmö, Sweden  
Beijing Institute of Materia Medica, Chinese Academy of Medical Sciences, Beijing, China  
International Symposium, Nanjing University, Nanjing, China **(Keynote)**  
Shanghai Institute of Materia Medica, Chinese Academy of Sciences, Shanghai, China  
Fudan University, School of Pharmacy, Shanghai, China  
Shanghai Institute of Organic Chemistry, Shanghai, China  
Behavior, Biology, and Chemistry: Translational Research in Addiction, San Antonio, TX **(Keynote)**
- 2011 The Royal Danish Academy of Sciences and Letters, Copenhagen, Denmark  
Philip S. Portoghese Symposium, University of Minnesota, Minneapolis, MN  
Drug Discovery, Delivery & Development, Northeastern University, Boston, MA  
12th Cyprus Conference on "New Methods in Drug Research", Limassol, Cyprus  
NIDA Training Grant Symposium, University of Kentucky, Lexington, KY  
Northeastern University Pharmaceutical Sciences Research Showcase, Boston, MA  
Behavior, Biology, and Chemistry: Translational Research in Addiction Conference, San Antonio, TX  
Brigham and Women's Hospital Presentation, Harvard University, Cambridge, MA
- 2012 Department of Pharmaceutical Sciences Seminar, University of Pittsburgh, Pittsburgh, PA  
18<sup>th</sup> Society on Neuroimmune Pharmacology Scientific Conference, Honolulu, HI  
33<sup>rd</sup> National Medicinal Chemistry Symposium, University of Arizona, Tucson, AZ  
Arcade Conference on Chemistry for Health, Athens, Greece  
The Foundation for Research and Technology- Hellas 30<sup>th</sup> Anniversary Celebration, Heraklion, Crete  
Northeastern University Honors Special Topics in Health Care, Boston, MA



**MENTORING ACTIVITIES:**

*Graduate and Post-Doctoral Students Directly Advised Since 1995 (University of Connecticut and Northeastern University)*

1. S. Lin, M.Sc., Ph.D., 1988-1995.
2. X. Li, Ph.D., 1990-1995.
3. V. Abadji, Postdoctoral, 1992-1995.
4. A. Khanolkar, Postdoctoral, 1992-1998.
5. A. Goutopoulos, M.Sc., Ph.D., 1992-1999.
6. X. Xie, Ph.D., Postdoctoral, 1993-1995.
7. W. Lang, Postdoctoral, 1993-1996.
8. X. Tian, Ph.D., 1993-2005; Postdoctoral, 2006-2011.
9. A. Z. Khaled, Ph.D., 1994-1995.
10. W.A.G. Hill, Postdoctoral, 1994-1997.
11. S. Lin, Postdoctoral, 1994-1998.
12. D. Lu, Ph.D., 1994-2006.
13. C. Qin, M.Sc., Ph.D., 1994-1997.
14. A.J. Lotsikas, Graduate Student, 1995-1996.
15. R. Lan, Postdoctoral, 1995-1997.
16. H.F. Deng, M.Sc., Ph.D., 1995-2000.
17. R. Picone, Ph.D., 1995-2001; Postdoctoral, 2002-2004.
18. Y. Yang, M.Sc., 1995-1996.
19. J. Zhao, M.Sc., 1995-1998.
20. J. Negreira, Visiting Scholar (Spain), 1996-1997.
21. S. Pavlopoulos, Postdoctoral, 1996-1998.
22. T. Kourouli, Visiting Scholar (Greece), 1996-2001.
23. X.Z. Lai, Ph.D., 1996-2004.
24. J. Guo, Ph.D., 1996-2005.
25. Q. Liu, M.Sc., 1996-2002.
26. J. Kawakami, Postdoctoral, 1997-1998.
27. Y. Sha, Visiting Scholar (China), 1997-1998.
28. W. Yang, Visiting Scholar (China), 1997-1998.
29. S. Krishnaswami, M.Sc., 1997-1998.
30. R. Chari, Ph.D., 1998-2005.
31. A. Ramamurthy, M.Sc., 1998-2001.
32. T. Mavromoustakos, Visiting Scholar (Greece), 1999.
33. A.K. Singh, M.Sc., 1999-2001.
34. S. Palmer, Postdoctoral, 1999-2002.
35. M. Sommer, Postdoctoral, 1999-2000.
36. C. Souli, Postdoctoral, 1999-2000.
37. F.M. Yao, Postdoctoral, 1999-2001.
38. Y. Zhuang, Postdoctoral, 1999-2001.
39. A. Zvonok, Postdoctoral, 1999-2002.
40. S. Nikas, Postdoctoral, 1999-2003.
41. R. Mercier, Postdoctoral, 2000-2006.
42. T. Neelands, Postdoctoral, 2000-2001.
43. H. Hu, Postdoctoral, 2000-2001.
44. G. Thakur, Postdoctoral, 2000-2003.
45. W. Xu, Ph.D., 2000-2006.
46. C. Li, M.Sc., 2001-2004.
47. C.R. Ramanathan, Postdoctoral, 2001-2004.
48. R. Thotapally, Postdoctoral, 2001-2004.
49. Y.C. Leung, Postdoctoral, 2001-2004.
50. P. McLaughlin, Postdoctoral, 2001-2005.
51. J. Anday, Ph.D., 2001-2006.
52. K. Winston, Ph.D., 2001-2006.
53. S. Filppula, Postdoctoral, 2001-2006.
54. S. Yaddanapudi, Ph.D., 2001-2007.
55. P. Fan, Visiting Scholar (China), 2001-2007; 2009-2010; 2011-.
56. Y. Mao, Postdoctoral, 2002-2003.
57. L. Pandarinathan, Postdoctoral, 2002-2003.
58. G. Choi, Postdoctoral, 2002-2004.
59. J. Zhao, M.Sc., 2002-2005.
60. Y. Pei, Ph.D., 2002-2007.
61. S. Kazolias, M.Sc., 2002-2005.
62. C. Rajan, M.Sc., 2002-2005.
63. J. Wood, Postdoctoral, 2002-2005.
64. S. Varadarajan, Postdoctoral, 2003-2004.
65. L. Bizeta, Postdoctoral, 2003-2004.
66. V. Veerappan, Postdoctoral, 2003-2004.
67. T. Olszewska, Postdoctoral, 2003-2005.
68. K.V. Subramanian, Postdoctoral, 2003-2005.
69. J. Zhang, M.Sc., 2003-2006.
70. D. Fortin, Ph.D., 2003-2006.
71. Y. Peng, M.Sc., 2003-2007; 2008-2009.
72. J. Guo, Postdoctoral, 2004-2005.
73. C. Hale, Postdoctoral, 2004-2005.
74. J. Williams, Ph.D., 2004-2007.
75. K.R. Vemuri, Postdoctoral, 2004-2007.
76. O.S. Alapafuja, Ph.D., 2004-2009.
77. J. Zhai, Postdoctoral, 2005-2006.
78. P. Holmberg, Postdoctoral, 2005-2006.
79. E. Jutkiewicz, Postdoctoral, 2005-2006.
80. K. Dzenko, Postdoctoral, 2005-2006.

81. D. Karanian, Postdoctoral, 2005-2007.  
 82. S. Divakaramenon, Postdoctoral, 2005-2007.  
 83. T. Parkkari, Visiting Scholar (Finland), 2005-2007.  
 84. V. Magriotti, Visiting Scholar (Greece), 2006.  
 85. P. Salgaonkar, Postdoctoral, 2006-2007.  
 86. X. Han, Visiting Scholar (China), 2006-2007.  
 87. P.W. Qin, Graduate Student, 2006-2008.  
 88. A. Kastal, Graduate Student, 2006-2009.  
 89. J. Zhuang, Postdoctoral, 2006-2009.  
 90. R. Sharma, Ph.D., 2006-2011.  
 91. M. Johnston, Ph.D. Candidate, 2006-.  
 92. I. Karageorgos, Ph.D. Candidate, 2006-.  
 93. E. Shelnut, Ph.D. Candidate, 2006-.  
 94. D. Szymanski, Ph.D. Candidate, 2006-2011.  
 95. W. Aizu, Postdoctoral, 2006-2007.  
 96. L. Song, Postdoctoral, 2006-2007.  
 97. V. Shukla, Postdoctoral, 2006-2009.  
 98. H. Teng, Ph.D., 2006-2011.  
 99. D. Anagnostopoulos, Visiting Scholar (Greece), 2007.  
 100. F. Desarnaud, Postdoctoral, 2007.  
 101. H. Jang, Postdoctoral, 2007.  
 102. S. Tyukhtenko, Postdoctoral, 2007-2010.  
 103. C. Freni, M.Sc., 2007-2008.  
 104. C. Kearn, Postdoctoral, 2007-2008.  
 105. S. Gopalakrishnan, M.Sc., 2007-2008.  
 106. S. Cararas, Postdoctoral, 2007-2008.  
 107. A. Bowman, Postdoctoral, 2007-2009.  
 108. I. Kendrick, Ph.D., 2007-.  
 109. M. Papanastasiou, Postdoctoral, 2007-2010.  
 110. P. LeBeaume, Ph.D., 2007-2010.  
 111. M. D'Souza, Ph.D. Candidate, 2007-.  
 112. S. Bajaj, Ph.D. Candidate, 2007-.  
 113. S. Tai, Ph.D. Candidate, 2007-.  
 114. P. Yin, Ph.D., 2007.  
 115. H. Zhou, Ph.D. Candidate, 2007-.  
 116. H. Li, Postdoctoral, 2007-2009.  
 117. R. Serbanescu, M.Sc., 2008-2010.  
 118. R. Tichkule, Ph.D. Candidate, 2008-.  
 119. M. Nasr, Ph.D. Candidate, 2008-.  
 120. K. Whitten, Ph.D. Candidate, 2008-.  
 121. C. Sallum, Postdoctoral, 2008-2009.  
 122. D. Smith, Postdoctoral, 2008-2010.  
 123. A. Rafalko, Ph.D., 2008-2011.  
 124. S. Sanghavi, M.Sc., 2008-2009.  
 125. S. Marathe, M.Sc., 2008-2009.  
 126. V. Kodumuru, Postdoctoral, 2008-2010.  
 127. S. Bhatt, M.Sc., 2009-2010.  
 128. M. Johnson, Ph.D. Candidate, 2009-.  
 129. S.H. Chalasani, M.Sc., 2009-2010.  
 130. B. Patel, M.Sc., 2009-2010.  
 131. C. Mushti, Postdoctoral, 2009-2010.  
 132. D. Finnegan, Postdoctoral, 2009-2011.  
 133. S. Ganguly, Ph.D. Candidate, 2010-.  
 134. G. Rajarshi, Ph.D. Candidate, 2010-.  
 135. F. Sekyere, M.Sc., 2010.  
 136. Y. Jmeian, Postdoctoral, 2010.  
 137. C. Habrukowich, Postdoctoral, 2010-.  
 138. A. Kulkarni, Ph.D. Candidate, 2010-2011.  
 139. J. Garcia, Postdoctoral, 2010-.  
 140. L. Shen, Postdoctoral, 2010-2011.  
 141. B. Zhang, Postdoctoral, 2010-2011.  
 142. D. DeFilippo, Ph.D. Candidate, 2011-.  
 143. A. Korde, Ph.D. Candidate, 2011-.

#### MINORITY ACTIVITIES:

Majority-Minority Interactive Research Program; Collaboration between the University of Connecticut, Florida A&M University; Special Summer Internship Program; NIDA Sponsored Collaboration with North Carolina A&T University (NCAT); Member, External Scientific Advisory Committee of the Minority Biomedical Research Program at NIH, Florida A&M; NIH Special Populations Research Development Effort

#### MINORITY INDIVIDUALS ADVISED SINCE 1996:

Student	University Attended	Dates Sponsored
Theresa Josef	University of Connecticut	1996-1998
Joel Kawakami	University of Hawaii	1997-1999
Wang Zhang	Florida A & M University	Summers 1997, 1998
Bereket Mochona	Florida A & M University	Summer 1999
Tefamichael Gebrekidan	Florida A & M University	Summer 1999
Mufeed Basti	North Carolina A&T	Summers 2000, 2001,

	Associate Professor	2003, 2004
Carl Engmann	University of Connecticut Undergraduate Student	Summer 2000
Sonya Palmer	University of Connecticut Post Doctoral Fellow	2000-2003
Keisha Winston	University of Connecticut Graduate Student	2001-2005
Jenine Anday	University of Connecticut Graduate Student	2001-2007
Sherrica Tai	Northeastern University Graduate Student	2007-
Elvis Tiburu	Northeastern University Assistant Research Professor	2007-
Joseph Allen	Northeastern University Undergraduate Student	2009-
Jessica Garcia	Northeastern University Post Doctoral Fellow	2010-