CURRICULUM VITAE

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1. EDUCATION

Year	Degree	Institution
1990-1993	B.Sc. (Chemistry)	University of Mumbai, India
1993-1995	M.Sc. (Chemistry)	Indian Institute of Technology (IIT), Mumbai, India
1995-2000	Ph.D. (Organic Chemistry)	Institute of Chemical Technology, Mumbai, India.

2. POSTDOCTORAL TRAINING

07/2000- 08/2003 Postdoctoral Fellow, Department of Pharmaceutical Sciences, School of Pharmacy, University of Connecticut, Storrs, CT.
Supervisor: Dr. Alexandros Makriyannis

3. UNIVERSITY APPOINTMENTS

09/2003-10/2004 Assistant Research Professor, Department of Pharmaceutical Sciences, School of Pharmacy, University of Connecticut, Storrs, CT.
11/2004-06/2005 Senior Research Scientist, Center for Drug Discovery, NEU, Boston, MA, USA
07/2005- 08/2010 Assistant Research Professor, Center for Drug Discovery, NEU, Boston, MA, USA.
09/2010- 06/2016 Assistant Professor (Tenure-track), Department of Pharmaceutical Sciences, Northeastern University, Boston, MA, USA.
07/2016 onwards- Associate Professor (Tenured), Department of Pharmaceutical Sciences, Northeastern University, Boston, MA, USA.

4. AWARDS AND HONORS

1995 Recipient of Fellowship of University Grant Commission (UGC) as a Junior Research Fellow
1998 Recipient of Fellowship of University Grant Commission (UGC) as a Senior Research Fellow
1998 Recipient of "Best Paper Presentation Award" in XIVth Carbohydrate Conference Conducted by Indian Institute of Technology (IIT) in collaboration with Association of Carbohydrate Chemists & Technologists, India.
2009 Early Career Development Award in Chemistry of Drug Abuse and Addiction (ECHEM) from NIDA.
2011 Excellence in Teaching Award, School of Pharmacy, Northeastern University, Boston, MA 02115
2014 The Schumacher Award for Excellence in Research, Northeastern University, Boston MA 02115
2014 NIH Study Section, Drug Discovery for the Nervous System, Ad Hoc reviewer, June 2014
2014 NIH Study Section, Special Emphasis Panel, Molecular Probes, Ad Hoc Reviewer, June 2014
2014 NIH Study Section, Drug Discovery for the Nervous System, Ad Hoc reviewer, October 2014
2014 NIH Study Section, Special Emphasis Panel, Molecular Probes, Ad Hoc Reviewer, October 2014
2015 RISE (Research, Innovation, Scholarship and Expo) Award in Health Sciences, NEU, Boston, 2015
2015 Nominated for Northeastern University's University-wide "Excellence in Teaching Award"
2015 Nominated for "Bouve College Distinguished Educator Award" for year 2015.
2015 Guest Speaker, Rho Chi Society's Annual Lecture Series, 2015.
2016 RRD8 Study Section, Career Development Award Review Committee, US Department of Veteran Affairs, Ad Hoc Reviewer, Feb.2016

SCOPUS ANALYSIS: (as of 06/25/2016)**: H-index = 19**; Total Citation = **1220**; Total publications = **58**; Total patents = **6**.

4. IN NEWS/MEDIA:

1) " Last Dance with Mary Jane" http://www.northeastern.edu/news/2014/03/thakur/
2) " A Promising Alternative to Medical Marijuana: http://www.northeastern.edu/news/2014/09/promising-alternative-medical-marijuana/
3) "Smarten Up" http://www.northeastern.edu/news/2014/03/smarten-up/
4) "Local researchers work to eliminate high from medical marijuana" http://boston.cbslocal.com/tag/ganesh-thakur/
5) "Hope the prescription can mimic marijuana's benefits" https://www.bostonglobe.com/lifestyle/health-wellness/2014/11/17/some-parents-children-who-have-seizures-are-hoping-that-prescription-drug-will-able-mimic-marijuana-benefits/KoGizuhG99EO3w0RkyOrcO/story.html

5. MAJOR COMMITTEE ASSIGNMENTS

Department of Pharmaceutical Sciences, College of Pharmacy, NEU

2011- 2013	Member, Faculty Research Development and Mentoring.
2012- Present	Scholarship and Award Committee.
2012	John Neumeyer Award Committee.
2013-Present	Assessment Committee.
2013-Present	Faculty Search Committee/Bouve College.

NIH

2014	Drug Discovery for the Nervous System Study Section (DDNS), *Ad hoc* Reviewer
2014	NIH Study Section, Special Emphasis Panel, Molecular Probes, *Ad Hoc Reviewer*

Reviewer

1) Chemical Biology and Drug Design
2) Expert Opinion on Therapeutic Patents
3) Bio-organic Medicinal Chemistry
4) ChemBioChem (Wiley VCH-de)
5) Recent Patents on CNS Drug Discovery
6) Life Sciences
7) Journal of Pharmacology and Experimental Therapeutics (JPET)
8) Neuropsychopharamcology, Nature Publishing Group (NGP)
9) Bio-organic Medicinal Chemistry Letters
10) Drugs of the Future
11) ACS Chemical Neuroscience

6. MEMBERSHIP PROFESSIONAL SOCIETIES

1999-current	Association of Carbohydrate Chemists and Technologists
2000-current	American Chemical Society
2003-current	International Cannabinoid Research Society (ICRS)
2008-current	Member of NIDA Networking Project (NNP)
2010-current	Member of American Association of Pharmaceutical Scientists (AAPS)
2011-current	Member of Rho Chi Honor Society
2015-current	Member of Society of Neuroscience

7. RESEARCH GRANTS

1. **1R01 EY024717-01/NIH-NEI**
   Title: A Novel Pharmacotherapy for Glaucoma
   Role: PI
   Date: 09/01/2014- 08/30/2019
2. **1R01CA206028-01/NIH/NCI**
   Title: Mitigation of Chemotherapy Induced Peripheral Neuropathy
   Role: PI on the subcontract with VCU
   Date: 04/15/2016- 04/14/2017
3. **1R43MH103936-01 NIH/NIMH**
   Title: Novel treatment of posttraumatic stress disorder
   Role: PI on the subcontract
   Date: 08/01/2014-07/31/2016
4. **Instruments and Supplies:** Received from Pharma Industries (estimated cost = ~120K).

Recently completed grants:

1. **RO3 DA027113/NIH-NIDA**
   Early Career Development Award in Chemistry of Drug Abuse and Addiction (ECHEM)
   Title: Allosteric Modulators of CB1 Cannabinoid Receptor
   Role: PI
   Requested Start Date: 08/01/2009-07/31/2013

2. **Indo-US Singh Obama Post-doctoral Fellowship Program**
   Title: Development of peripherally acting CB2-selective ligands.
   (Dr. Ganesh Chaturbhuj, post-doctoral fellow)
   Role: Mentor
   Date: 10/01/2013- 09/30/2014

3. **1R01DA026795/NIH-NIDA**
   Title: Novel Medications for Cannabis Dependence
   Role: Co-I
   Date: 07/15/2009- 05/31/2014

4. **Davis Foundation Post-doc Fellowship Program in Eating Disorder Research**
   Title: Positive Allosteric Modulators of CB1 Cannabinoid Receptor for treatment of Anorexia Nervosa. (Dr. Pushkar Kulkarni, postdoctoral fellow)
   Role: Mentor
   Date: 07/01/2012- 06/30/2015

8. MAJOR TEACHING EXPERIENCE

2006-2010: Assistant Research Professor (Northeastern University)
2010-Present: Assistant Professor (tenure-track; Northeastern University)

Graduate Courses
2011-Present : Drug Discovery Journal Club (PHSC6300-003)- **Course Coordinator**
2011 : Chemistry and Biology of Drugs of Abuse (PHSC6222)
2013- Present: Pharmacokinetics and Drug Metabolism (PMST6252)

Undergraduate Courses

2006-Present : Pharmacology and Medicinal Chemistry I (PHSC4501); Principal instructor for teaching medicinal chemistry

2007-Present : Pharmacology and Medicinal Chemistry II (PHSC4502); Principal instructor for teaching medicinal chemistry (**Course Coordinator**)

2014-Present : Anti-infective Agents (PHSC5360)

9. RESEARCH MENTORING: (* indicate students for whom my role is mentor as well as advisor)

UNDERGRADUATE MENTORING:

#	Year	Student's name	Degree	Current Position
1	08/2011-12/2011	Shivan Acharya	Pharm.D.	Graduated from NEU
2.	01/2012-04/2012	Monica Tiang	Pharm D	Graduated from NEU
3.	02/2014- 09/2014	Olatokunbo Onabanjo	Pharm.D.	Student at NEU (P4)
4.	02/2014- 08/2014	Lucia Zhu	Pharm.D.	Student at NEU (P4)

PH.D./M.S. THESIS MENTORING:

1.	1999-2001	Alok Singh^{+}	M.S. Med. Chem.	Novartis (NIBR), MA.
2.	2003-2006	Jin Zhang^{+}	M.S. Med. Chem.	Harvard Medical School, MA.
3.	01/2007-08/2007	Vince Abeyta^{+}	M.S. Med. Chem.	Boehringer Ingelheim, CT.
4.	2007-2011	Heidi Teng^{+}	Ph.D. Med. Chem.	Aldrich, MA.
5.	2010-09/2011	Abhijit Kulkarni*	M.S. Med. Chem.	Pursuing Ph.D. NEU
6.	09/2011-04/2012	Khushbu Shah*	M.S. Med. Chem.	Pursuing Ph.D. Duquesne Univ.
7.	09/2012-09/2014	Prisca Mungalachetty*	M.S. Med Chem.	Novartis (NIBR), Boston
8.	09/2011-12/2012	Ameya Ranade*	M.S. Med. Chem.	Pursuiing Ph.D. in Canada
9.	10/2011-11/2013	Vasantha Duggirla*	M.S. Med Chem.	
10.	2007-06/2012	Marsh D'Souza^{+}	Ph.D. Med. Chem.	Post-doc at Scripps
11.	2006-06/2012	Rishi Sharma^{+}	Ph.D. Med. Chem.	Scientist at MicroConstants Inc.
12.	2007-08/2012	Shama Bajaj**	Ph.D. Med. Chem.	MIT, Cambridge, MA.
13.	10/2008-10/2012	Ritesh Tichkule**	Ph.D. Med Chem.	Novartis (NIBR), Boston.
14.	09/2011-contd	Abhijit Kulkarni*	Ph.D. Med. Chem.	Pursuing Ph.D. NEU
15.	02/2014-08/2015	Siddhi Honavar*	M.S. Med. Chem.	GSK, Philadelphia
16.	09/2014-contd	Sharvik Shirodkar*	M.S. Med Chem.	Working on his M.S. Degree
17.	09/2014-contd	Ninad Dixit*	M.S. Med Chem.	Working on his M.S. Degree
18.	01/01/2016-	Peter Schaffer	M.S. Med Chem.	Working on his M.S. Degree
19.	01/01/2016-	Lucas Cantwell	M.S. Med Chem	Working on his M.S. Degree

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* indicates my role as advisor; ** indicates my role as co-advisor; + indicates my role as mentor

POST-DOCTORAL FELLOW MENTORING:

1.	2005-2008	Dr. Vidyanand Shukla+	---	Aldrich, Natick, MA.
2.	2007-2009	Dr. Shaine Cararas+	---	--
3.	02/2011-08/2015	Dr. Pushkar Kulkarni --- (Davis Foundation Fellowship)		Barnett Institute/Department of Pharm. Sci. NEU
4.	10/2013-09/2014	Dr. Ganesh Chaturbhuj --- (Indo-US project; Raman Fellowship)		Department of Pharm. Sci. NEU
5.	01/2015-present	Dr. Sumanta Garai (NIH Post-doc Fellow)	--	Department of Pharm. Sci. NEU
6.	05/2015-present	Dr. Gopalkrushna Waghule (NIH Post-doc Fellow)		Department of Pharm. Sci. NEU

GRADUATE STUDENT THESIS COMMITTEE

1.	2007-2012	Shama Bajaj, Ph.D. (Medicinal Chemistry)
2.	2007-2012	Ritesh Tichkule, Ph.D. (Medicinal Chemistry)
3.	2011- 2013	Namita Dodwadkar, Ph.D. (Pharmaceutics)
4.	2011-2013	Vasantha Duggirala, M.S. (Pharm. Sci.)
5.	2011-2013	Ameya Ranade, M.S. (Pharm. Sci.)
6.	2012-2014	Madhura Deshpande, Ph.D. (Pharmaceutics)
7.	2012-2014	Prisca Mungalachetty, M.S. (Pharm. Sci.)
8.	2013-2015	Siddhi Honavar, M.S. (Medicinal Chemistry)
9.	2012-Current	Pranali Deshpande, Ph.D. (Pharmaceutics)
10.	2012- Current	Abhijit Kulkarni, Ph.D. (Medicinal Chemistry)
11.	2014- Current	Ninad Dixit, M.S. (Medicinal Chemistry)
12.	2014- Current	Sharvik Shirodkar (Medicinal Chemistry)
13.	2012- Current	Aditi Jhaveri (Pharmaceutics)

10. RESEARCH INTERESTS

My research interests are focused on developing novel medications for the treatment of diseases that represent unmet medical need such as: **drug addiction**, **glaucoma and associated neurodegeneration**, **chronic pain**, **neuropathic pain**, **eating disorders** and **cognition** and **memory deficits** associated with **Alzheimer's disease** and **Schizophrenia** (with emphasis on auditory gating). The drug targets include currently being pursued in my lab are: CB1/CB2 receptors, α7 nAChR and nNOS-PSD95.

Targeting Cannabinoid Receptors for the Treatment of Pain, Glaucoma, PTSD, Huntington Disease and GI Disorders/Molecular Characterization of CB1 orthosteric/allosteric site(s)

Δ^9-Tetrahydrocannabinol (Δ^9-THC), the major psychoactive constituent of marijuana (*Cannabis Sativa L.*) produces its physiological effects by interaction with cannabinoid receptors (CB1 and CB2). Cannabinoid receptors influence diverse cellular signal-transduction pathways. CB1 receptors are mainly located in the central nervous system, whereas the CB2 receptors are found mainly in peripheral tissues, such as spleen, tonsils and immunocytes. The adverse CNS side effects of Δ^9-THC are mainly mediated by brain CB1 receptors. The CB2 subtype is of particular interest since it has been identified as a potential target for immune- modulator therapies. Several CB selective and CB1/CB2 mixed agonists have demonstrated preclinically potential clinical utility in treating pain, glaucoma, depression and GI disorders. CB2 selective agonists have potential utility in the treatment of peripheral and neuropathic pain and inflammation without any undesirable CB1 mediated CNS side effects which include dizziness, dry mouth, tiredness/fatigue, muscle pain and palpitations.

A. Development of sub-type selective orthosteric ligands of CB receptors:

1) Development of CB1 selective and water-soluble cannabinoids
2) Development of CB2 selective cannabinoids
3) Development of peripherally-restricted cannabinoids

B. Mapping the Binding-Sites of Cannabinoid Receptors (both Orthosteric and Allosteric sites):

In order to improve the selectivity of CB-receptor ligands with an eye towards their therapeutic use, the three-dimensional structure of CB receptors (and virtually all other GPCRs) needs to be characterized. In the absence of experimentally determined structures of cannabinoid receptors, information about their ligand-binding sites may best be obtained through the use of affinity probes coupled with mass spectrometric analysis of labeled protein. This project involves design and synthesis of:

1) Covalent and electrophilic probes
2) "Click-chemistry" probes

Currently, my laboratory has developed key covalent probes for CB1 allosteric sites that have been characterized in functional assays are evaluated in receptor labeling studies. **One key probe, GAT100 is the FIRST EVER PROBE that has been shown to label the CB1 receptor allosteric site covalently and represents a pure NAM that lacks inverse agonist activity.** Two papers on this work are currently under review.

C. Allosteric Modulators of CB1 Cannabinoid Receptors

Recent discovery of an allosteric binding site on the cannabinoid CB1 receptor invites new approaches to potential drugs that modulate cannabinoid signaling for therapeutic benefit. Several GPCRs have been shown to contain allosteric binding sites for endogenous/synthetic ligands which are discrete from the agonist binding (orthosteric) site. The binding of allosteric modulators leads to a conformational change which affects the affinity and/or efficacy of the orthosteric (endogenous) ligands, thereby fine-tuning its actions. Putative advantages of CB1-receptor allosteric inhibitors, and very recently discovered functional enhancers, include greater receptor subtype selectivity and reduced side effects. My research work, which is funded by NIH, is focused on developing novel CB1 selective allosteric modulators which include both ***Positive Allosteric Modulators*** (PAMs) and ***Negative Allosteric Modulators*** (NAMs). We have developed some potent and functionally selective allosteric modulators which are well-characterized *in vitro* and *in vivo*. Our current finding shows that CB1 PAMs may provide all or most of the beneficial effects of CB1 activation but are devoid of CB1 agonist related side effects. We hope that this work together with the allosteric covalent probe/LAPS studies will contribute significantly towards the understanding of structural requirements of the CB1 receptor's allosteric binding site and facilitate the development of preclinical candidates. The most potent CB1 PAMs have already established their utilities for treatment of Glaucoma, PTSD, Neuropathic Pain Huntington's Disease and Anorexia Nervosa in animal models and the results received so far are extremely promising.

Development of Inhibitors of nNOS-PSD95 protein-protein interaction:

In 2012, we initiated our efforts on developing novel inhibitors of nNOS-PSD95 protein-protein interactions for the treatment of neuropathic pain, chemotherapy-induced neuropathy, TBI and post-traumatic stress disorder. We have recently reported (publication in *neuropharmacology, 2015, 97; 464-75; doi:*

10.1016/j.neuropharm.2015.05.038) that such novel inhibitors are very effective in treating pain and chemotherapy induced neuropathy but are devoid of CNS side effects commonly seen with current medication on market for treating neuropathic pain. Two key ligands GAT404 and GAT405 have been shown to be more potent than literature established tools and are being currently further evaluated. These novel inhibitors are also effective in treating PTSD, a disorder with an unmet medical need. This work has been currently supported by a 2-year Phase-I, SBIR grant from NIMH/NIH.

Development of Selective and Potent Allosteric Modulators of α7 Nicotinic Acetylcholine Receptors/ Molecular Characterization of α7 allosteric site(s)

Nicotinic acetylcholine receptors (nAChR), members of Cys-loop superfamily of cationic ligand-gated ion channels are involved in the physiological responses to the neurotransmitter acetylcholine (ACh) and are distributed throughout the central and peripheral nervous systems. The α7 nAChRs are expressed at high levels in areas involved with learning and memory and play pivotal roles in modulating neurotransmission in these area. It has been considered a promising target for improving cognitive impairments in diseases such as Alzheimer's (AD) and schizophrenia as well as for treatment of inflammation and neuropathic pain. So far our laboratory has developed potent α7 nAChR PAMs and ago-PAMs and the lead molecule GAT107 shown good potency in ***improving memory and cognition*** in animal models as well as reducing pain in animal models of ***neuropathic and chronic pain***. We show that these compounds are orally bioavailable, non-cytotoxic and very selective for a7 nAChR subtype. More than 100 compounds have been synthesized so far in my laboratory to identify structural requirement for ago-PAM activity. A series of publications that involves medical chemistry as well as structural biology have been communicated recently and are under review.

11. PEER-REVIEWED PUBLICATIONS (IN CHRONOLOGICAL ORDER)

1. Rao, P. S., **Thakur, G.A.**, Lahiri, G. K., Synthesis, characterization and redox properties of ruthenium (II) phenolato Schiff base mixed ligand complexes. *Indian J. Chem., Sect. A: Inorg., Bio-inorg., Phys., Theor., Anal. Chem.*, **1996**, 35A (11), 946-51.
2. Santra, B. K., **Thakur G. A.**, Ghosh, P., Pramanik, A., Lahiri, G. K., A novel example of metal mediated aromatic thiolation in ruthenium complex: crystal structure of RuII (SC6H4N:NC5H4N)2. *Inorg. Chem.*, **1996**, 35(10), 3050-2.
3. **Thakur, G. A.**, Narayanswami, K., Lahiri, G. K., Synthesis, characterization and redox properties of ruthenium (II) dithiocarbonato complexes having 2,2'-bipyridine co-ligands. *Indian J. Chem., Sect. A: Inorg., Bio-inorg., Phys., Theor., Anal. Chem.*, **1996**, 35A (5), 379-84.
4. Nikas, S. P., **Thakur, G. A.**, Makriyannis, A., A convenient and effective synthesis of 3-(3,5-Dimethoxyphenyl)propanal. *Synth. Comm.*, **2002**, 32(11), 1751-1756.

5. Palmer, S., **Thakur, G. A.**, Makriyannis, A., Cannabinergic ligands. *Chem. and Phys. of Lipids*, **2002**, 121(1-2), 3-19.
6. Nikas, S. P., **Thakur, G. A.**, Makriyannis, A., Synthesis of side chain specifically deuterated(-)-Δ^9-tetrahydrocannabinoids. *J. Label Compd. Radipharm.*, **2002**, 45, 1-12.
7. Nikas, S. P., **Thakur, G. A.**, Makriyannis, A., Regiospecifically deuterated (-)-Δ^9-tetrahydrocannabivarins. *J. Chem. Soc. Perkin. Trans.*1, **2002**, 22, 2544-2548.
8. **Thakur, G. A.,** Palmer, S., Harrington, P. E., Stergiades, I. A., Tius, M. A., Makriyannis, A., Enantiomeric resolution of a novel chiral cannabinoid receptor ligand. *J. Biochem. Biophys. Methods*, **2002**, 54(1-3), 415-422.
9. Lu, D., Meng, Z., **Thakur, G. A.**, Fan, P., Steed, J., Tartal, C. L., Hurst, D. P., Reggio, P. H., Deschamps, J. R., Parrish, D. A., George, C., Jarbe, T. U., Lamb, R. J., Makriyannis, A., Adamantyl Cannabinoids: A novel class of cannabinergic ligands. *J. Med. Chem.*, **2005**, 48 (14), 4576-4585.
10. McLaughlin, P. J., Lu, D., Winston, K. M., **Thakur, G. A.**, Swezey, L. A., Makriyannis, A., Salamone, J. D., Behavioral effects of the novel cannabinoid CB1 agonist AM411. *Pharmacol. Biochem. Behav.*, **2005**, 81(1), 78-88.
11. McLaughlin, P. J., Brown, C. M., Winston, K. M., **Thakur, G. A.**, Lu, D., Makriyannis, A., Salamone, J. D., The novel cannabinoid agonist AM 411 produces a biphasic effect on accuracy in a visual target detection task in rats. *Behav. Pharmacol.*, **2005**, 16(5-6), 477-486.
12. Picone, R. P., Khanolkar, A. D., Xu, W., Ayotte L. A., **Thakur, G. A.**, Hurst, D. P., Abood, M. E., Reggio, P. H., Fourier, D. J., Makriyannis, A., (-)-7'-Isothiocyanato-11-hydroxy-1',1'-dimethylheptylhexahydrocannabinol (AM841), a high-affinity electrophilic ligand, interacts covalently with a cysteine in helix six and activates the CB1 cannabinoid receptor. *Mol. Pharmacol.*, **2005**, 68 (6), 1623-1635.
13. **Thakur, G. A.**, Nikas, S. P., Makriyannis, A., CB1 Cannabinoid receptor ligands. *Mini Reviews in Medicinal Chemistry*, **2005**, 5(7), 631-640.
14. **Thakur, G. A.**, Duclos, R.,I.,Jr., Makriyannis, A., Natural cannabinoids: templates for drug discovery. *Life Sci.*, **2005**, 78(5), 454-466.
15. Pavlopoulos, S., **Thakur, G. A.**, Nikas, S. P., Makriyannis, A., Cannabinoid receptors as therapeutic targets. *Curr. Pharm. Design*, **2006**, 12(14), 1751-1769.
16. Kapur, A., Hurst, D. P., Fleischer, D., Whitnell, R., **Thakur, G. A.**, Makriyannis, A., Reggio, P. H., Abood, M. E., Mutation studies of Ser7.39 and Ser2.60 in the human CB_1 cannabinoid receptor: evidence for a serine induced bend in CB_1 transmembrane helix 7. *Mol. Pharmacol.*, **2007**, 71(6), 1512-1524.
17. Nikas, S. P., **Thakur, G. A.**, Parrish, D. A., Alapafuja, S. O., Huestis, M., Makriyannis, A., A concise methodology for the synthesis of (−)-Δ^9-tetrahydrocannabinol and (−)-Δ^9-tetrahydrocannabivarin metabolites and their regiospecifically deuterated analogs. *Tetrahedron*, **2007**, 63, 8112-8123.
18. Khanolkar, A. D., Lu, D., Ibrahim, M., Duclos, R.I. Jr., **Thakur, G. A.**, Malan, T. P. Jr., Porreca, F., Veerappan, V., Tian, X., George, C., Parrish, D. A., Papahatjis, D. P., Makriyannis, A., Cannabilactones: a novel class of CB2 selective agonists with peripheral analgesic activity. *J. Med. Chem.*, **2007**, 50 (26), 6493-6500.
19. Sink, K.S., McLaughlin, P.J., Wood, J.A., Brown, C., Fan, P., Vemuri, V.K., Peng, Y., Olzewska, T., **Thakur, G.A.**, Makriyannis, A., Parker, L.A., Salamone, J.D. (**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. *Neuropsychopharmacology*, 33(4), 946-955.
20. Kapur, A., Samaniego, P., **Thakur, G. A.**, Makriyannis, A., Abood, M. E., Mapping the structural requirements in the CB1 cannabinoid receptor transmembrane helix II for signal transduction. *JPET*, **2008**, 325 (1), 341-8.
21. Bergman, J., Delatte, M. S., Paronis, C. A., Vemuri, V. K., **Thakur, G. A.**, Makriyannis, A., Some effects of CB1 antagonists with inverse agonist and neutral biochemical properties. *Physiol. Behav.*, **2008**, 93(4-5), 666-70.

22. Rahn, E. J., Zvonok, A. M., **Thakur, G. A.**, Khanolkar, A. D., Makriyannis, A., Hohmann, A. G., Selective activation of cannabinoid CB_2 receptors suppresses neuropathic nociception induced by treatment with the chemotherapeutic agent paclitaxel in rats. *JPET.*, **2008**, 327(2), 584-91.
23. Pei, Y., Mercier, R. W., Anday, J. K., **Thakur, G. A.**, Zvonok, A. M., Reggio, P. H., Janero, D. R., Makriyannis, A., Ligand-binding architecture of human CB2 cannabinoid receptor: evidence for a receptor subtype-specific binding motif and modeling GPCR activation. *Chem. Biol.*, **2008**, 15(11), 1207-19.
24. Sink K. S., Segovia K. N., Nunes E. J., Collins L. E., Vemuri V. K., **Thakur G. A.**, Makriyannis A., Salamone J. D. Intracerebroventricular administration of cannabinoid CB1 receptor antagonists AM251 and AM4113 fails to alter food-reinforced behavior in rats. *Pschopharmacology* (Berl.), **2009**, 206(2), 223-232.
25. **Thakur, G. A**.,*Tichkule, R., Bajaj, S., Makriyannis, A., Recent advances in cannabinoid receptor agonist. *Expert Opinion on Therapeutic Patents*. **2009**, 19 (12), 1647-73.
26. Dixon, D. D., Sethumadhavan, D., Benneche, T., Banaag, A. R., Tius, M. A., **Thakur, G. A.**, Bowman, A., Wood, J., Makriyannis, A. Heteroadamantyl Cannabinoids. *J. Med. Chem.*, **2010**, 53(15), 5656-66.
27. Rahn, E., **Thakur, G. A.**, Zvonok, A. M., Vemuri, V. K., Makriaynnis, A., Hohmann, A. G., Pharmacological characterization of putative cannabinoid CB2 agonist from the cannabilactone class: Antinociception without central nervous system side-effects. *Pharmacology, Biochemistry & Behavior*, **2011**, 98, 493-502.
28. Teng, H.[1], **Thakur, G. A.[1]**, Makriyanis, A. Conformationally restricted analogs of BAY59-3074 as novel cannabinoid receptor ligands. *Bioorg Med Chem Lett*, **2011**, 21, 5999-6002. (**1**= Equal author contribution)
29. Szymanski,D. W., Papanastasiou, M., Melchior, K., Zvonok, N., Mercier, R. W., Janero, D. R., **Thakur, G. A.**, Cha, S., Wu, B., Karger, B., Makriyannis, A. Mass spectrometry-based proteomics of human cannabinoid receptor 2: covalent cysteine 6.47(257)-ligand interaction affording megagonist receptor activation, *J. Proteom. Res.* **2011**, 10, 4789-4798.
30. Wilkerson, J.L., Gentry, K.R., Dengler, E.C., Wallace, J.A., Kerwin, A.A., Kuhn, M.N., Zvonok, A.M., **Thakur, G.A.,** Makriyannis, A., Milligan, E.D. Immunofluorescent spectral analysis reveals the intrathecal cannabinoid agonist, AM1241, produces spinal anti-inflammatory cytokine responses in neuropathic rats exhibiting relief from allodynia. *Brain and Behaviour*, **2012**, 2(2), 155-177.
31. Wilkerson, J.L., Gentry, K.R., Dengler, E.C., Wallace, J.A., Kerwin, A.A., Armijo, L.M., Kuhn, M.N., **Thakur, G.A.,** Makriyannis, A., Milligan, E.D., Intrathecal cannabilactone CB(2)R agonist, AM1710, controls pathological pain and restores basal cytokine levels. Pain, **2012**, 153(5), 1091-1106.
32. Dixon, D.D., Tius, M.A., **Thakur,** G.A., Zhou, H., Bowman, A.L., Shukla, V.G., Peng, Y., Makriyannis, A. C3-Heteroaroyl cannabinoids as photolabeling ligands for the CB2 cannabinoid receptor. *Bioorg Med Chem Lett.*, **2012**, 22(16), 5322-5325.
33. Deng, L., Guindon, J., Vemuri, K.V., **Thakur, G.A.**, White, F.A., Makriyannis, A., Hohmann, A.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. *Molecular Pain* **2012**, 8: 71.
34. Desai, R.V., **Thakur, G.A.**, Vemuri, K.V., Bajaj, S.B., Makriyannis, A., Bergman, A. Analysis of tolerance and behavioral/physical dependence during chronic CB1 agonist treatment: effects of CB1 agonists, antagonists, and noncannabinoid drugs. *JPET*, **2013**, *344*, 319-328.
35. Paronis, C.A., **Thakur, G.A.**, Bajaj, S.B., Nikas, S.P., Vemuri, K.V., Makriyannis, A., Bergman, J. Diuretic Effects of Cannabinoids. *JPET*, **2013**, *314*, 8-14.
36. **Thakur, G.A.*,** Bajaj, S.B., Paronis, C.A., Peng, Y., Bowman, A.L. Barak, L., Caron, M.G. Parrish, D.A., Deschamps, J., Makriyannis, A. Novel Adamantyl Cannabinoids as CB1 Receptor Probes, *J. Med. Chem.* **2013**, 6(10):3904-3921. (PMID:23621789)

37. McLaughlin, P.J., **Thakur, G. A.**, McClure, E.D., Brown, C.M., Winston, K.M., Wood, J.T., Makriyannis, A., Salamone, J.D. Behavioral effects of the novel potent cannabinoid CB1 agonist AM4054, *Pharmcol. Biochem. Behav.* **2013**, 119:16-22, (PMID: 23603029)
38. Miller R.L., **Thakur G. A.**, Stewart W.N., Bow J.P., Bajaj S., Makriyannis A., McLaughlin P.J. Effects of a novel CB1 agonist on visual attention in male rats: role of strategy and expectancy in task accuracy. Exp Clin Psychopharmacol. **2013**; 21(5):416-25.(PMID: 24099361)
39. Kangas BD, Delatte M.S., Vemuri V.K., **Thakur G.A.**, Nikas SP, Subramanian KV, Shukla VG, Makriyannis A, Bergman J. Cannabinoid discrimination and antagonism by CB(1) neutral and inverse agonist antagonists.. *J. Pharmacol. Exp. Ther.* **2013**, 344(3):561-567. (PMID:23287700)
40. Chopda, G. R., Vemuri, V. K., Sharma, R., **Thakur, G.A.,** Makriyannis, A., Paronis, C.A. Diuretic effects of cannabinoid agonists in mice. *Eur J. Pharmacol.* **2013**; 721(1-3):64-9. doi: 10.1016/j.ejphar.2013.09.053. (PMID: 24099963)
41. Kulkarni AR, **Thakur G.A.***. Microwave-assisted Expeditious and Efficient Synthesis of Cyclopentene Ring-fused Tetrahydroquinoline Derivatives Using Three-component Povarov Reaction. *Tetrahedron Lett.* **2013**, 54(48), 6592-6595. (PMID: 24421568)
42. Papke RL, Horenstein NA, Kulkarni AR, Stokes C, Corrie LW, Maeng CY, **Thakur G.A.***. The activity of GAT107, an allosteric activator and positive modulator of α7 nAChR, is regulated by aromatic amino acids that span the subunit interface. *J. Biol. Chem.* **2014**, 289(7), 4515-4517.
43. **Thakur G.A. ***, Kulkarni AR, Deschamps JR, Papke RL. Expeditious Synthesis, Enantiomeric Resolution, and Enantiomer Functional Characterization of (4-(4-Bromophenyl)-3a,4,5,9b-tetrahydro-3H-cyclopenta[c]quinoline-8-sulfonamide (4BP-TQS): An Allosteric Agonist-Positive Allosteric Modulator of α7 Nicotinic Acetylcholine Receptors. *J. Med. Chem.* **2013**; 56(21):8943-7. (PMID: 24090443)
44. Sharma R, Nikas SP, Paronis CA, Wood JT, Halikhedkar A, Guo JJ, **Thakur G.A.**, Kulkarni S, Benchama O, Raghav JG, Gifford RS, Järbe TU, Bergman J, Makriyannis A. Controlled-detoxification Cannabinergic Ligands. *J. Med. Chem.* **2013**, 56(24):10142-10157. (PMID:24286207)
45. Gamage, T., Ignatowska-Jankowska, B. M., Abdelrahman, M., Trembleau. L., **Thakur, G. A.,** Tichkule, R. B. ; Poklis, J. ; Ross, R. A., Pertwee, R. G. and Lichtman, A. H. Investigation of the *in vivo* pharmacological effects of the CB1 receptor allosteric modulator Org-27569. *Behav. Pharmacol.* **2014** Apr;25(2):182-5. doi: 10.1097/FBP.0000000000000027.
46. Rahn, E.J., Deng, L., **Thakur, G.A.,** Vemuri, V.K., Zvonok, A. M., Lai, Y. Y. Makriyannis, A. and Hohmann, A.G. Prophylactic cannabinoid administration blocks the development of paclitaxel-induced neuropathic nociception during analgesic treatment and following cessation of drug delivery *Molecular Pain*. **2014**, 10(1):27; doi:10.1186/1744-8069-10-27
47. Fichna J, Bawa M, **Thakur G.A.**, Tichkule R, Makriyannis A, McCafferty DM, Sharkey KA, Storr M. Cannabinoids alleviate experimentally induced intestinal inflammation by acting at central and peripheral receptors. *PLoS One*. **2014** Oct 2; 9(10):e109115. doi: 10.1371/journal.pone.0109115. eCollection **2014**.
48. Nikas SP, Sharma R, Paronis CA, Kulkarni S, **Thakur G.A.**, Hurst D, Wood JT, Gifford RS, Rajarshi G, Liu Y, Raghav JG, Guo JJ, Järbe TU, Reggio PH, Bergman J, Makriyannis A. Probing the Carboxyester Side Chain in Controlled Deactivation (-)-Δ^8-Tetrahydrocannabinols. *J Med Chem.* **2015,** 58(2), 665-681.
49. Keenan C.M, Storr, M.A., **Thakur G.A.,** Wood J.T., Wager-Miller J., Straiker A., Eno M.R., Nikas S.P., Bashashati M., Hu H., Mackie K., Makriyannis A. and Sharkey K.A. AM841, a covalent cannabinoid ligand, powerfully slows gastrointestinal motility in normal and stressed mice in a peripherally-restricted manner. *Br. J. Pharmacol.* **2015**, Jan 9. doi: 10.1111/bph.13069. [Epub ahead of print] PMID:25572435
50. Lee, W.H.; Xu, Z.; Ashpole, N.; Hudmon, A.; Kulkarni, P.M.; **Thakur, G.A.**; Lai, Y.; Hohmann, A.H. Small molecule inhibitors of protein-protein interaction as novel analgesics; *Neuropharmacology*, **2015**; 97:464-75. doi: 10.1016/j.neuropharm. **2015**.05.038.

51. Abalo, R.; Chen, C.; Vera, G.; Fichna, J.; **Thakur, G. A**.; López-Pérez, A. E., Makriyannis, A.; Martín-Fontelles, M. I.; Storr, M. In vitro and non-invasive in vivo effects of the cannabinoid-1 receptor agonist AM841 on gastrointestinal motor function in the rat. *Neurogastroenterol Motil.* **2015** Sep 20. doi: 10.1111/nmo.12668. PMID: 26387676
52. Papke R.L., Bagdas, D., Kulkarni, A.R., Gould, T., AlSharari, S.D., **Thakur, G. A.**, Damaj, M. I. The analgesic-like properties of the alpha7 nAChR silent agonist NS6740 is associated with non-conducting conformations of the receptor. *Neuropharmacology*. **2015**; 91:34-42. doi: 10.1016/j.neuropharm.2014.12.002.PMID:25497451
53. P. M. Kulkarni, A. R. Kulkarni, A. Korade, R. B. Tichkule, R. B Laprairie, E. M. Denovan-Wright, A. Makriyannis, N. Zvonok, R. G. Pertwee, **G. A. Thakur***. Design, Synthesis and Biochemical Evaluation of Potent Electrophilic and Covalent Probes of the CB1 Receptor Allosteric Site(s). *J. Med. Chem **2015***. PMID:26529344
54. Critical determinants of α7 nicotinic acetylcholine receptor allosteric activation: separation of allosteric activation and positive allosteric modulation. N. A. Horenstein, R.L. Papke, A. R. Kulkarni, C. Stokes, M. Khan and **G. A. Thakur*** *Journal of Biological Chemistry*. **2016**, PMID: 26742843
55. Mapping Cannabinoid 1 Receptor Allosteric Site(s): Critical Molecular Determinant and Signaling Profile of GAT100, a Novel, Potent, and Irreversibly Binding Probe. Laprairie RB, Kulkarni AR, Kulkarni PM, Hurst DP, Lynch D, Reggio PH, Janero DR, Pertwee RG, Stevenson LA, Kelly ME, Denovan-Wright EM, **Thakur GA***. *ACS Chem Neurosci*. **2016**, Jun 15;7(6):776-98; PMID: 27046127
56. Jarbe, T. U.; LeMay, B. J.; **Thakur, G. A.***, and Makriyannis, A. A high efficacy cannabinergic ligand (AM4054) used as a discriminative stimulus: Generalization to other adamantyl analogs and Δ_9-THC in rats. *Pharmacol Biochem Behav. **2016** Jun 2; 148:46-52. doi: 10.1016/j.pbb.2016.06.001. PMID:27264437*
57. Smith, A. E.; Xu, A.; Lai, Y. Y.; Kulkarni, P. M.; **Thakur, G. A.**; Hohmann, A. H. and Crystal, J. D. Source memory in rats is impaired by an NMDA receptor antagonist but not by PSD95-nNOS protein-protein interaction inhibitors. *Behav Brain Res. **2016** May 15; 305:23-9. PMID:26909849*
58. Bagdas, D.*; Wilkerson, J. L.; Kulkarni, A. R.; Toma, T.; AlShararia, S.; Gul, Z.; Lichtman, A. H.; Papke, R. L.; **Thakur, G. A.*;** Damaj, M.; The α7 nicotinic receptor dual allosteric agonist and positive allosteric modulator GAT107 reverses nociception in mouse models of inflammatory and neuropathic pain, *Br J Pharmacol. **2016** May 31. doi: 10.1111/bph.13528. PMID:27243753*

12. BOOK CHAPTERS

1. **Thakur, G. A.**, Nikas, S. P., Li, C., Makriyannis, A., Structural requirements for cannabinoid receptor probes. *Handbook of Experimental Pharmacology*, **2005**, 168, 209-246.
2. **Thakur, G. A.**, Nikas, S. P., Duclos, R. I., Jr., Makriyannis, A. Methods for the synthesis of cannabinergic ligands. *Methods Mol. Med.*, **2006**, 123, 113-148.

13. PATENTS

1. Alexandros Makriyannis, Spyros P. Nikas, Atmaram Khanolkar, **Ganesh A. Thakur** and Dai Lu, (**2007**) Methods of preparations and use of novel bicyclic cannabinoids, PCT Int. Appl. U.S. Patent Application No. 10/483,482, US 2007135388.
2. Alexandros Makriyannis, **Ganesh A. Thakur**, Rishi Sharma. Cannabinoids with controlled detoxification (US19539292, August 2012)
3. Alexandros Makriyannis, Marsha D'Souza, Shama Bajaj, Spyros Nikas, **Ganesh A. Thakur** Novel resorcinol derivatives as cannabinergic ligands. Application No.61714914, October 2012.
4. **Ganesh A. Thakur** and Pushkar M. Kulkarni, Allosteric Modulators of CB1 Cannabinoid Receptor, PCT/US13/20543; Filed January 7, 2013 (provisional date: January 2012)

5. **Ganesh A. Thakur**, Ritesh, B. Tichkule, Pushkar M. Kulkarni, Abhijit R. Kulkarni "Allosteric Modulators of CB1 Cannabinoid Receptor" PCT/US2014/052304, Date of Filing: August 22, 2014 (Provisional Date: August 22, 2013)
6. **Ganesh A. Thakur**, Abhijit R. Kulkarni and Roger L. Papke. "Novel Ligands for the α7 Nicotinic Acetylcholine Receptors" US Provisional Application No. 62/028, Date of Filing: July 23, 2014

14. INVITED LECTURES

1. "*Endocannabinoid System as an Emerging Therapeutic Target*" given at Institute of Chemical Technology (ICT, formerly UDCT), Matunga, Mumbai (2011). This lecture was sponsored by Department of Pharmaceutical Sciences and Technology, UGC-Center for Advance Studies, India.
2. "*Cannabinoid Receptors as Therapeutic Targets*" given at Bombay College of Pharmacy (BCP), Mumbai, India (2011).
3. "*Targeting Obesity with Negative Allosteric Modulators of CB1 Cannabinoid Receptor*" in Discovery of Target meeting, (2012).
4. "*Tuning the Endocannabinoid System: Alllosteric Modulators of CB1 Cannabinoid Receptor*" given in the department of Pharmaceutical Sciences, St. John University, (2013).
5. "*Allosteric Modulators of CB1 Cannabinoid Receptor*" given in the department of pharmacology and therapeutics, University of Florida, (2013).
6. "*Tuning Endocannabinoid System for Therapeutic Gain*" given at ICT, India, on 28th March 2014.
7. "*Novel Therapeutic Opportunities via Allosteric Modulation of CB1 Cannabinoid Receptor*" given at Indian Institute of Science Education and Research (IISER), Pune, India, (2014).
8. "*Tuning the Endocannabinoid System: Allosteric Modulators of CB1 Cannabinoid Receptor*" given at Indian Institute of Technology (IIT), Bombay, India, (2014).
9. "*Novel Therapeutic Opportunities via Allosteric Modulation of CB1 Cannabinoid Receptor"* given at McLean Hospital, Harvard Medical School, Belmont, MA, (2014).
10. "Tuning the Endocannabinoid System: Allosteric Modulators of CB1 Cannabinoid Receptors" given at School of Medicine, Dept. of Neuroscience, University of New Mexico, Albuquerque, NM, (2014).
11. "*Tuning the Endocannabinoid System: Allosteric Modulators of CB1 Cannabinoid Receptors*" given at Dept. of Chemistry and Biochemistry, UMASS Dartmouth, MA, (2014).
12. "*Tuning the Endocannabinoid System: Allosteric Modulators of CB1 Cannabinoid Receptors*" given at the *Department of Pharmaceutical Sciences, Eugene Applebaum College of Pharmacy and Health Sciences (EACPHS), Wayne State University, Detroit, MI,* (2014).
13. "*Safer Medications through Allosteric Modulation of CB1 Cannabinoid Receptor*" given at the Dept. of Pharmaceutical Sciences, Duquesne University, Pittsburg, PA, (2014).
14. "*Safer Medications through Allosteric Modulation of CB1 Cannabinoid Receptor*" given at the Dept. of Pharmacology and Molecular Sciences, John Hopkins School of Medicine, Baltimore, MD, (2014).
15. "*Safer Medications through Allosteric Modulation of CB1 Cannabinoid Receptor*" given at the Stark Neuroscience Research Institute, Indiana University School of Medicine, Indianapolis, IN, (2014).
16. "*Safer Medications through Allosteric Modulation of CB1 Cannabinoid Receptor*" given at 2nd International Congress of Society for Ethnopharmacology, Nagpur, India, (2015).
17. "*Safer Medications through Allosteric Modulation of CB1 Cannabinoid Receptor*" given at National Chemical Laboratory, NCL, Pune, (2015).

15. CONFERENCES:

1. Synthesis of tetrasaccharide of Erylusamine-B, by **Ganesh A. Thakur** and K.G. Akamanchi. presented in XIIIth Carbohydrate Conference, conducted by Forest Research Institute in collaboration with Association of Carbohydrate Chemists & Technologist, India in Nov. **1998**.
2. A novel catalytic approach for selective anomeric deacetylation of per-O-acetylated aldoses, by **Ganesh A. Thakur** and K.G. Akamanchi, in XIVth Carbohydrate Conference conducted by Indian

Institute of Technology in collaboration with Association of Carbohydrate Chemists & Technologists, India in Dec-**1999**.

3. Selective anomeric deacetylation of per-O-acetylated aldoses by catalytic iodine in methanol, by **Ganesh A. Thakur** and K.G. Akamanchi, International Conference on Chemistry and 36th Annual Convention of Chemists conducted by Indian Chemical Society and Indian Association for Cultivation of Sciences (IACS) in Calcutta, India, in Dec.**1999**.
4. Hypervalent iodine compound mediated bromoacetoxylation of olefinic natural products, by Sachin S. Chaudhari, G.V. Ramanarayanan, **Ganesh A. Thakur** and K. G. Akamanchi, 5th IUPAC International Symposium on Bioorganic Chemistry, conducted by International Union of Pure and Applied Chemistry at National Chemical Laboratory, Pune, India in Jan-Feb **2000**.
5. Total Synthesis of Erylusamine-B - A potent Interleukin-6 Antagonist, by **Ganesh A. Thakur**, Smita G. Kavishwar and K.G. Akamanchi, 5th IUPAC International Symposium on Bioorganic Chemistry, conducted by International Union of Pure and Applied Chemistry at National Chemical Laboratory, Pune, India in Jan-Feb **2000**.
6. New efficient synthesis of deuterated 5-alkylresorcinols and their application in the preparation of Δ^9-THC, Δ^9-THCV, and their metabolites by Spyros Nikas, **Ganesh A. Thakur**, Alexandros Makriyannis, in 222nd ACS National Meeting, Chicago, IL, United States, Aug. **2001**.
7. Adamantyl cannabinoids, by Dai Lu, **Ganesh A. Thakur**, Peter J. McLaughlin, Lynn A. Swezey, Keisha M. Winston, Ania Wisniecki, John D. Salamone, Toby U. C. Jarbe, Patricia H. Reggio, Clifford George, Alexandros Makriyannis, 13th Annual International Cannabinoid Research Society (ICRS) Symposium, Cornwall, Ontario, Canada, June **2003**.
8. A comparision of the novel CB1 agonist AM411 with the muscarinic antagonist Scopolamine a spatial discrimination task in rats by P. J. McLaughlin, K. M. Winston, L. A. Swezey, D. Lu, **G. A. Thakur**, A. Makriyannis, J. D. Salomone, Washington, DC: Society for neuroscience, **2004**.
9. Some behavioral effects of the novel CB1-receptor agonist AM 411 in squirrel monkeys, by M. S. Delatte, M. Zielstroff, **G. Thakur**, A. Makriyannis, and J. Bergman, CPDD 67th annual meeting, Orlando, FL, June 18-23, **2005**. McLean Hospital, Belmont, MA and University of Connecticut, Storrs, CT.
10. Synthesis and SAR of CB1 selective classical/non-classical hybrid cannabinoids, **Ganesh A. Thakur** and Alexandros Makriyannis, 229th ACS National Meeting, San Diego, CA, United States, March 13-17, **2005**.
11. A ligand based structural biology approach for the characterization of the cannabinoid receptor binding domains, by John Williamns, Suma Yaddanapudi, Wei Xu, **Ganesh A. Thakur**, Nikolai Zvonok, Paul Vouros, Alexandros Makriyannis, 54th ASMS Conference on mass Spectrometry, in May-June **2006**, Seattle, Washington. *FASEB J.* 2007 21:631.6.
12. Physiological and behavioral effects of novel CB1-receptor agonists AM 411 and AM 4054 in monkeys, by M.S. Delatte, **G.A. Thakur**, M. Riolo, A. Makriyannis and J. Bergman, Experimental Biology (Advancing the biomedical frontier), San Francisco, California, April 1-5, **2006**.
13. Physiological and behavioral effects of novel CB1-receptor agonists AM 411 and AM 4054 in monkeys, by Marcus S Delatte, **G.A. Thakur**, Matthew Riolo, Alexandros Makriyannis, and Jack Bergman, Experimental Biology Annual Meeting, Washington, D.C. April 28-May2, **2007** *FASEB J.* 2006 20:A682.
14. Discriminative stimulus effects of methamphetamine and in vivo microdialysis in rat, by R. I. Desai, C. A. Paronis, A. Makriyannis, **G. A. Thakur**, and J. Bergman, Experimental Biology Annual Meeting, Washington, D.C. April 28-May2, **2007**, *FASEB J.* 2007 21:715.3
15. Partial agonist and antagonist effects of Δ^9-tetrahydrocannabinol (Δ^9THC) in Rats, by Carol A Paronis; **Ganesh A Thakur**; Kiran Vemuri; Alex Makriyannis; Jack Bergman, Experimental Biology Annual Meeting, Washington, D.C. April 28-May2, **2007**, *FASEB J.* 2007 21:562.2

16. Effects of a Selective Cannabinoid Agonist and Antagonist on Body Temperature in Rats, by Carol A Paronis; **Ganesh A Thakur**; Kiran Vemuri; Alex Makriyannis; Jack Bergman, Experimental Biology Annual Meeting, Washington, D.C. April 28-May 2, **2007**, *FASEB J.* 2007 21:562.1
17. Synthesis of (-)-Δ^9-tetrahydrocannabinol and (-)-Δ^9-tetrahydrocannabivarin metabolites and their regiospecifically deuterated analogs, by Nikas, Spyros P.; **Thakur, Ganesh A.**; Parish, Damon; Alapafuja, Shakiru O.; Huestis, Marilyn A.; Makriyannis, Alexandros. Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, **2007**, MEDI-031
18. Diuretic effect of cannabinoid agonists, by Carol A. Paronis, J. Martin, J. Bergman, **G. A. Thakur**, A. Zvonok and A. Makriyannis 12th European Behavioural Pharmacology Society, Tübingen, Germany, Aug 31-Sept 03, **2007**,
19. New and efficient synthesis of regiospecifically deuterated covalent probes for cannabinoid receptors, by **Thakur Ganesh A.**; Sharma, Rishi; Makriyannis, Alexandros , 240th ACS National Meeting, Boston, MA, United States, August 22-26, **2010**, MEDI 63.
20. Hybrid adamantyl cannabinoids by Bajaj, Shama; **Thakur G.A.**; Tichkule, Ritesh; Makriyannis, Alexandros, 240th ACS National Meeting, Boston, MA, United States, August 22-26, **2010**, MEDI-370.
21. Structure activity relationship study of BAY 59-3074, a partial agonist of the CB1 cannabinoid receptor by Teng, Heidi; **Thakur, Ganesh A.**; Makriyannis, Alexandros. 240th ACS National Meeting, Boston, MA, United States, August 22-26, **2010**, MEDI-353.
22. Conformationally constrained analogs of BAY 59-3074, a CB1 cannabinoid receptor partial agonist by Teng, Heidi; **Thakur, G. A**., Makriyannis, Alexandros. 240th ACS National Meeting, Boston, MA, United States, August 22-26, **2010**, MEDI-216.
23. The cannabinoid-1 (CB1) agonist AM841 slows GI motility in the rat by peripheral actions. *R. Abalo*, C. Chen, G Vera, M.A. Castillo, J. Fichna, **G.A. Thakur**, A. Makriyannis, M.I. Martín, M Storr. Neurogastroenterology and Motility Joint International meeting (NGM), August 26-29, **2010** Boston, Massachusetts.
24. Cannabinoid CB2 receptors activation suppresses neuropathic pain evoked by the chemotherapeutic agent cisplatin in rats by Josée Guindon, Spyridon Nikas, **Ganesh A. Thakur**, V. Kiran Vemuri, Alexandros Makriyannis and Andrea G. Hohmann. 21st Annual symposium of the International Cannabinoid Research Society, St. Charles, IL, USA, July 05-10, **2011**.
25. Intrathecal cannabinoid receptor 2 (CB2) agonists alter spinal and dorsal root ganglion inflammatory factors in neuropathic rats, by Jenny L. Wilkerson, Ellen C. Dengler, James A. Wallace, Audra A. Kerwin, **Ganesh A. Thakur**, Alexandros Makriyannis, and Erin D. Milligan. 21st Annual symposium of the International Cannabinoid Research Society, St. Charles, IL, USA, July 05-10, **2011**.
26. Amino acids D2.63 and K373 are important for maintaining the CB1R binding pocket, while residues K3.28 and S1.39 are involved in selective ligand recognition, by Jahan P. Marcu, Ankur Kapur, Megan Trznadel, Patricia H. Reggio, Ganesh A.Thakur, Alexandros Makriyannis, and Mary E. Abood. 21st Annual symposium of the International Cannabinoid Research Society, St. Charles, IL, USA, July 05-10, **2011**.
27. Cannabinoid and κ-opioid mediated diuresis in rats, by Carol A. Paronis, **Ganesh A. Thakur**, and Alexandros Makriyannis. 21st Annual symposium of the International Cannabinoid Research Society, St. Charles, IL, USA, July 05-10, **2011**.
28. Diuresis: a simple and efficient measure to screen cannabinoids, by Girish R Chopda, Joseph B Anderson, **Ganesh A Thakur**, Alexandros Makriyannis, and Carol A Paronis. 21st Annual symposium of the International Cannabinoid Research Society, St. Charles, IL, USA, July 05-10, **2011**.
29. The selective cannabinoid receptor 2 (CB_2R) agonist AM1710 acts independently of cannabinod receptor 1 (CB_1R) responses in neuropathic mice. Jenny L. Wilkerson, Ellen C. Dengler, James A. Wallace, Audra A. Kerwin, Lauren B. Alberti, Brandi Bowman, Pamela S. Platero, **Ganesh A. Thakur**, Alexandros Makriyannis, Erin D. Milligan. Society of Neuroscience meeting, Washington, D.C., USA, November 12-16, **2011**.

30. Selective activation of cannabinoid CB2 receptors suppresses chemotherapy-induced neuropathy independent of CB1 or CXCR4 receptor signaling. Deng, L., Guindon, J., Makie, K., White, F., **Thakur, G.A**., Makriyannis, A., and Hohmann, A.G. 22nd Annual symposium of the International Cannabinoid Research Society, Freiburg, Germany, July 22-27, **2012**.
31. Selective activation of cannabinoid CB2 receptors suppresses the maintenance of chemotherapy-induced neuropathy and is independent of CB1 signaling. Deng, L., Guindon, J., **Thakur, G.A**., Makriyannis, A., Mackie, K., and Hohmann, A.G. Society for Neuroscience, **2012**.
32. Positive Allosteric Modulators of CB1 as Pharmacotherapy of Anorexia Nervosa. Kulkarni, P. M., Jarbe, T.U., Goldberg, S., Barbarich-Marsteller, N., **Thakur, G. A.**, RISE, NEU, Boston, **2013**
33. Identification of a Potent Modulator of Nicotinic α7Acetylcholine Receptors for the Treatment of Cognitive Disorders. Kulkarni, A. R., Deschamps, J.R., Papke R.L and **Thakur, G. A.** RISE, Northeastern Univ. Boston, March 22nd, **2013**
34. Novel positive allosteric modulators of CB1 cannabinoid receptor for the treatment of anorexia nervosa By Kulkarni, Pushkar M.; Jarbe, Torbjorn; Goldberg, Steven; Barbarich-Marsteller, Nicole r; **Thakur, Ganesh A.** From Abstracts of Papers, 246th ACS National Meeting & Exposition, Indianapolis, IN, United States, September 8-12, 2013 (2013), MEDI-84.
35. Stereochemical requirements within the tetrahydroquinoline scaffold for the positive allosteric modulation at alpha7 nicotinic acetylcholine receptors. Kulkarni, Abhijit R.; Deschamps, Jeffrey; Papke, Roger L.; **Thakur, Ganesh A.** From Abstracts of Papers, 246th ACS National Meeting & Exposition, Indianapolis, IN, United States, September 8-12, 2013 (2013), MEDI-83.
36. Mutations of α7 nAChR W55 enhance the allosteric agonism of GAT107, the active isomer of 4BP-TQS, and decouple interactions between orthosteric and allosteric sites. R. L. Papke, N. A. Horenstein, C. Stokes, Cheol-Young Maeng, A. R. Kulkarni, and **G. A. Thakur**, Society for Neuroscience, New Orleans, LA, November 10, 2013.
37. Modifying CB1 receptor signaling to reduce IOP in a mouse model of ocular hypertension. Elizabeth A. Cairns, Michele L. Archibald, Alex J. Straiker, Pushkar M. Kulkarni, **Ganesh A. Thakur**, William H. Badridge and Melanie E.M. Kelly, International Cannabinoid Research Society (ICRS), Braveno, Italy, June 28-July 3, **2014**.
38. Design, Synthesis and Biochemical Evaluation of Novel Electrophilic and Photoaffinity Covalent Probes to Map the CB1 Receptor Allosteric Site(s). Kulkarni, A. R., Pushkar M. Kulkarni, Anisha Korde, Nikolai Zvonok, Maria G. Cascio, Alexandros Makriyannis, Roger Pertwee and **Ganesh A. Thakur**. World Pharma Congress **2014**, Boston, USA.

39. Positive allosteric modulation of CB1 with GAT211 suppresses paclitaxel-induced neuropathic pain while by passing unwanted side effects of CB1 receptor activation. Richard A. Slivicki, Liting Deng, Pushkar M. Kulkarni, Maria Cascio, Roger G. Pertwee, **Ganesh A. Thakur** and Andrea G. Hohmann. International Cannabinoid Research Society (ICRS), Braveno, Italy, June 28-July 3, **2014**.
**** This work received the best presentation award.***

40. Silent and Allosteric Agonists of α7Acetylcholine Receptors for the Treatment of Inflammation and Neuropathic Pain. R. L. Papke, N. A. Horenstein, C. Stokes, Cheol-Young Maeng, Abhijit. R.
41. Kulkarni, and **Ganesh A. Thakur**, Nicotinic Acetylcholine Receptor **2014** Conference, Cambridge (London), UK.

42. Expeditious Microwave-assisted Synthesis of 4BP-TQS, an ago-PAM of α7 nAChRs, its Stereochemical Requirement and the Target Amino Acids Responsible for Activity. Abhijit R. Kulkarni, Nicole A. Horenstein, Clare Stokes, Lu W Corrie, Cheol-Young Maeng, Jeffrey Deschamps, Roger L. Papke, **Ganesh A. Thakur** American Association of Pharmaceutical Scientists' (AAPS) NorthEast Regional Discussion Group (NERDG), Connecticut, USA, **2014**
**** This work received the best presentation award.***

43. Enantiomer-specific positive allosteric modulation of the type 1 cannabinoid receptor for the treatment of Huntington's disease. Robert B. Laprairie, Adel Zrein, Amina M. Bagher, Pushkar M. Kulkarni, **Ganesh A. Thakur**, Melanie E. Kelly, and Eileen M. Denovan-Wright, International Cannabinoid Research Society (ICRS), Wolfville, Canada, 2015.
**** This work received the best oral presentation award.***

44. Actions of the ago-PAM GAT211 and its enantiomer GAT229 on intraocular pressure and retinal ganglion cell loss in the nee mouse model of ocular hypertension. Elizabeth A. Cairns, Alex J. Straiker, Pushkar M. Kulkarni, Ganesh A. Thakur, William H. Badridge, and Melanie E.M. Kelly. International Cannabinoid Research Society (ICRS), Wolfville, Canada, **2015**.

45. Design, synthesis and biochemical evaluation of novel electrophilic and photoaffinity covalent probes to map the CB1receptor allosteric site(s). Abhijit R. Kulkarni, Pushkar M. Kulkarni, Anisha Korde, Nicolai Zvonok, Maria Cascio, Alexandros Makriyannis, Roger G. Pertwee and **Ganesh A. Thakur**. International Cannabinoid Research Society (ICRS), Wolfville, Canada, **2015**.
**** This work received the best oral/poster presentation award.***