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EDUCATION**College:**

Anhui College of Traditional Chinese Medicine (Hefei, China). B.M. (Bachelor of Medicine Integrative Medicine/Acupuncture), September, 1981 to July, 1986.

Graduate/Medical School:

Anhui College of Traditional Chinese Medicine, Graduate School (Hefei, China). M.S./M.D. (Physiology/ Integrative Medicine/Acupuncture), September, 1986 to July, 1989.

Fudan University Medical School (Former Shanghai Medical University) (Shanghai, China).

Ph.D. (Neuropharmacology/Integrative Medicine), September, 1992 to July, 1995.

Ph.D. thesis: Alterations of central opioid systems in rats following treatment with D2 receptor antagonists and electro-acupuncture.

Postgraduate Training:

- Postdoc: 1. Meharry Medical College, Mentor: Dr. Chin-Ho Chen
(Molecular Biology, Mibrobiology and Immunology) (1998-2001)
2. Vanderbilt University, Mentors: Dr. Randy Blakely
(Molecular Neuroscience)(2001-2004).

ACADEMIC APPOINTMENTS

- 1989~1991 Anhui College of Traditional Chinese Medicine, Institute of Acupuncture, Junior investigator
- 1995~1996 Fudan University School of Medicine, Department of Neurobiology, Lecturer
- 1997~1998 Fudan University School of Medicine, Department of Neurobiology, Associate professor
- 2005~2010 Vanderbilt University, Department of Pharmacology, Research Assistant Professor.
- 2010~2012 Vanderbilt University, Department of Pharmacology, Research Associate Professor.
- 2012 ~ Vanderbilt University, Osher Center for Integrative Medicine, Associate Professor.
Vanderbilt University Medical Center, Nursing School, Associate Professor.
Vanderbilt University Medical Center, PM&R Department, Associate Professor.

HOSPITAL/CLINIC APPOINTMENTS

1995 ~ 1998 Fudan University Medical Center (Pain Clinic). Physician

2007 ~ present Osher Center for Integrative Health at Vanderbilt, Acupuncturist, Associate Professor

PROFESSIONAL EXPERIENCES

Research

1. Acupuncture in the emergency department for pain management: a feasibility study
2. Effect of acupuncture for treatment of neurological and mental disorder (Osher Center for Integrative Medicine)
3. Regulation of antidepressant sensitive serotonin transporters: signaling pathways, pharmacological & genetic manipulations and behaviors (Vanderbilt University)
4. Molecular and immunological basis of human Immunodeficiency virus (HIV) entry (Meharry Medical College).
5. Neuropharmacology of pain modulation and acupuncture-induced analgesia: receptors, gene expressions and behaviors (Fudan University Medical School).

Teaching

1. Medical School: Physiology of Acupuncture, Anhui Traditional Medical College, 1990-1992
2. Graduate School: Neurobiology/Neuropharmacology, Fudan University Graduate School, 1995-1998
3. Molecular Neuroscience, Graduate School, Vanderbilt University 2005-2012
4. Acupuncture/TCM, Osher Center for Integrative Medicine, 2012-current (for medical students, graduates, residents, fellows, and interns)

Honors and awards

1. Five Star Excellence Award (Vanderbilt, Provider practice services, 2021)
2. Five Star Excellence Award (Vanderbilt, Provider practice services, 2020)
3. Five Star Excellence Award (Vanderbilt, Outpatient Clinic services, 2015)
4. Five Star Excellence Award (Vanderbilt, Outpatient Clinic services, 2014)
5. Five Star Excellence Award (Vanderbilt, Outpatient Clinic services, 2013)
6. NIMH award (R21, 2010-2012)
7. Vanderbilt StarBRITE award (2009 & 2010)
8. Vanderbilt Conte Center Pilot Award (2008-2009)
9. NASARD Young Investigator Award (2005-2007, NASARD)
10. Award for Science and Technology Progress (1999, Shanghai)
11. National Award for Outstanding Young Scientist (1998, China).
12. National Award for Science and Technology Progress (1998, China).
13. National Award for Outstanding Accomplishment of Science and Technology (1997, China).
14. National Award for Science and Technology Progress (1996, China).
15. Guanghua Scholarship (1994, Fudan University School of Medicine)

RESEARCH PROGRAMS

1. Acupuncture in the emergency department for pain management: a Bravenet multi-center feasibility study (ACUITY) (NCCIH, 2020-2023, site acupuncturist)
2. **1R21MH86033-1A1** Interleukin-1 (IL-1) Receptor-Mediated Modulation of Serotonin Transporters (NIMH, 2010-2012, Principal investigator)
3. **1R01HD65278** Transgenic Mouse Model to Address Heterogeneity in Autism Spectrum Disorders (NIMH, 2009-2011, Key investigator)
4. Phosphorylation and activation of serotonin transporter by p38 MAPK (NASARD, 2005-2007, principal investigator)
5. **97QB14018** Role and molecular mechanisms of orphanin FQ, a newly discovered peptide, on pain modulation (Shanghai Foundation of Science and Technology, 1997-2000, Principal Investigator)
6. **39670901** Molecular mechanisms of orphanin FQ on acupuncture analgesia (National Natural Science Foundation of China, 1996-1999, Principal Investigator).
7. **39260731** Receptor and molecular mechanisms of acupuncture analgesia (National Natural Science Foundation of China, 1992 – 1997, Key Investigator).

PUBLICATIONS

Journal articles

1. Nielsen A , Olson J, Quesada M, Zhu CB, et al. Acupuncture intervention for acute pain in the Emergency Department trial: a consensus process. *Acupuncture in Medicine* Aug;40(4):339-346. doi: 10.1177/09645284221076507. Epub 2022 Mar 1. PMID: 35229658 Review.
2. Zhu CB. Covid-19 :what do we know about and how to deal with it – from TCM perspective. Draft.
3. Zhu, CB, Reddy, S, Ye H, Ring M, Longiving H. Role of acupuncture in integrative medicine. *J of Alternative and Complementary Medicine*, To Be published.
4. Matthew J. Robson, **Chong-Bin Zhu**, Meagan A. Quinlan, David A. Botschner, Nicole L. Baganz, Kathryn M. Lindler, Jason G. Thome, William A. Hewlett, Randy D. Blakely. Generation and Characterization of Mice Expressing a Conditional Allele of the Interleukin-1 Receptor Type 1. *Plos One*, published online March 1, 2016, <http://dx.doi.org/10.1371/journal.pone.0150068>
5. Nicole L. Baganz, Kathryn M. Lindler, Chong-Bin Zhu, et al: A requirement of serotonergic p38 α mitogen-activated protein kinase for peripheral immune system activation of CNS serotonin uptake and serotonin-linked behaviors. *Transl Psychiatry*. 2015 Nov 3;5:e671. doi: 10.1038/tp.2015.168.
6. Campbell NG, **Zhu CB**, Lindler KM, et al. Rare coding variants of the adenosine A3 receptor are increased in autism: on the trail of the serotonin transporter regulome. *Mol Autism*. 2013 Aug 16;4(1):28. doi: 10.1186/2040-2392-4-28.
7. **Zhu CB**, Lindler KM, et al. Colocalization and regulated physical association of presynaptic serotonin transporters with a3 adenosine receptors. *Mol Pharmacol*. 2011 Sep;80(3):458-65. Epub **2011** Jun 24

8. **Zhu CB**, Lindler KM, Owens WA, Daws LC, Blakely DR, Hewlett WA. Il-1 receptor activation by systemic lipopolysaccharide induces behavioral despair linked to MAPK regulation of CNS serotonin transporters. *Neuropsychopharmacology*. 2010 Dec;35(13):2510-20. Epub 2010 Sep 8.
9. Carneiro AM, Airey DC, Thompson B, **Zhu CB**, Lu L, Chesler EJ, Erikson KM, Blakely RD. Functional coding variation in recombinant inbred mouse lines reveals multiple serotonin transporter-associated phenotypes. *Proc Natl Acad Sci U S A*. 2009 Feb 10;106(6):2047-52
10. **Zhu CB**, Steiner JA, Munn JL, Daws LC, Hewlett WA, Blakely RD. Rapid stimulation of presynaptic serotonin transport by A3 Adenosine Receptors. *JPET* 2007, 322:332-340.
11. **Zhu CB**, Hewlett WA, Blakely RD. Pro-inflammatory cytokines interleukine-1beta and tumor necrosis factor-alpha stimulate serotonin transport in rat raphe cell line and mouse synaptosome. *Neuropsychopharmacology*. 2006, 31:2121-2131.
12. Prasad H, **Zhu CB**, Han Q, Hewlett WA, Shelton R, Sutcliffe J, Blakely RD. Loss of PKG/p38 MAPK sensitivity in polymorphic variants of the human serotonin transporter, *Proc Natl Acad Sci U S A*. 2005; 102:11545-11550.
13. **Zhu CB**, Hewlett WA, Blakely RD, et al. p38 MAP kinase Activation elevates serotonin transport activity via a trafficking-independent, PP2A-dependent process. *J Bio Chem*, 2005; 280(16):15649-58.
14. **Zhu CB**, Hewlett WA, Blakely RD, et al. Adenosine receptor, protein kinase G and P38 MAP kinase dependent up-regulation of Serotonin transporters involves both transporter trafficking and activation. *Mol Pharmacol*. 2004; 65:1462-1474.
15. **Zhu CB**, Hewlett WA, Blakely RD, et al. Stimulation of Serotonin Transport by the Cyclic GMP Phosphodiesterase-5 Inhibitor Sildenafil. *Eur J Pharmacol* 2004 504:1-6.
16. **Zhu CB**, Mathews TJ, Chen CH. Neutralization epitopes of the HIV-1 primary isolate DH012. *Vaccine* 2003; 21:3301-3306.
17. **Zhu CB**, Zhu L, Holz-Smith S, et al. The role of the third beta strand in gp120 conformation and neutralization sensitivity of the HIV-1 primary isolate DH012. *Proc Natl Acad Sci U S A*. 2001 Dec 18;98(26):15227-32.
18. Chen CH, Jin L, **Zhu CB**, et al. Induction and characterization of neutralizing antibodies against an HIV-1 primary isolate. *J. Virol*. 2001. 75:6700-4.
19. Yu CX, **Zhu CB**, Xu SF, et al. Selective MT2 melatonin receptor antagonist blocks melatonin-induced antinociception in rats. *Neurosci. Lett.*, 2000, 282:161-4.
20. Wang JL, **Zhu CB**, et al. Distinct effect of intracerebroventricular and intrathecal injections of nociceptin/orphanin FQ in the rat formalin test. *Regulatory Peptide*, 1999, 79:159-163.
21. Wang YQ, **Zhu CB**, Wu GC, et al. Effects of orphanin FQ on endomorphin-1 induced analgesia. *Brain Res.*, 1999, 835:241-246.
22. Wang YQ, **Zhu CB**, Wu GC, et al. Supraspinal hyperalgesia and spinal analgesia by [Phe¹Ψ(CH₂-NH)Gly²]nociceptin-(1-13)-NH₂ in rat. *European J. of Pharmacol.*, 1999, 376:R1-3.
23. Li XY, **Zhu CB**, Chen HN, Zhu YH, Wu GC, Xu SF. Effects of fenfluramine combined with electroacupuncture on monoamine release in periaqueductal gray of rat brain. *Acta Pharmacol. Sin.*, 1999, 20:597-600.
24. **Zhu CB**, Zhang XL, Xu SF, Cao XD, Wu GC. Antagonistic effect of Orphanin FQ on opioid analgesia in rat. *Acta Pharmacol. Sin.*, 1998, 19:10-14.
25. Wang H, **Zhu CB**, Wu GC., et al. Effect of microinjection of orphanin FQ into periaqueductal gray of rat on pain and acupuncture analgesia. *Acta Physiol. Sin.*, 1998, 50(3):382-388.

27. Gao X, Xin BM, **Zhu CB**, Wu GC, Xu SF. Effect of intrathecal injection of dopamine receptor agonists/antagonists on pain and acupuncture analgesia in rats. Acta Physiol. Sin., 1998, 50:43-8. (Chinese with English abstract).
28. **Zhu CB**, Cao XD, Xu SF, Wu GC. Orphanin FQ potentiates formalin-induced pain behavior and antagonizes morphine analgesia in rats. Neurosci. Lett., 1997, 235:37-40.
29. **Zhu CB**, Xu SF, Wu GC, Cao XD. Research on combination of acupuncture with drugs. World J. Acup-Mor. 1997, 7:54-59.
30. **Zhu CB**, Li XY, Xu SF, Wu GC. Alterations of monoamine content in microdialysate of rat brain following droperidol enhanced electroacupuncture analgesia. Acta Physiol. Sin., 1997, 49:382-388.
31. **Zhu CB**, Li XY, Xu SF. Preproopiomelanocortin and prodynorphin mRNA expressions in rat brain after electroacupuncture+ droperidol. Acta. Pharmacol. Sin., 1997, 18:53-55.
32. **Zhu CB**, Zhang XL, Xu SF, Cao XD, Wu GC. Effect of intracerebroventricular or intrathecal injection of orphanin FQ on pain and acupuncture analgesia in rats. Chin. J. Physiol. Sci., 1997, :182-8.
33. Zhang XL, **Zhu CB**, et al. Intrathecal or intracerebroventricular administration of OFQ attenuates fentanyl analgesia on rats. Chin. Pharmacol. Bull., 1997, 13:422-4.
34. **Zhu CB**, Xu SF, Cao XD, Wu GC. Antagonistic action of orphanin FQ on acupuncture analgesia in rat brain. Acupuncture & Electrother. Res. INT J. 1996, 21:199-205.
35. **Zhu CB**, Li XY, Zhu YH, Xu SF. Preproenkephalin mRNA enhanced by combination of droperidol with electroacupuncture. Acta Pharmacol. Sin., 1995; 16(3):201-4.
36. **Zhu CB**, et al. Binding sites of mu receptor increased when acupuncture analgesia was enhanced by droperidol: an autoradiographic study. Acta Pharmacol. Sin. 1995; 16(4):311-314)
37. **Zhu CB**, Jin L, Xu SF. Release of enkephalin and beta -endorphin in rat brain accelerated by combination of droperidol with electroacupuncture. Chinese J. Physiol.Sci., 1995, 11: 123-128.
38. **Zhu CB**, Liu YH, Xu SF. Opioid receptor binding sites in rat brain further increased when acupuncture analgesia was enhanced by droperidol: an autoradiographic study. Chin. J. Neurosci., 1995, 2(1):1-13.
39. Li XY, **Zhu CB**, Zhu YH, Xu SF. Expression of preproenkephalin mRNA during electroacupuncture analgesia enhanced by fenfluramine. Acta Pharmacol. Sin. 1995; 16: 431-434.
40. **Zhu CB**, Li XY, Wang HH, Xu SF. Effect of dopamine blockers on acupuncture analgesia. Neurosci. lett., 1994, 45:22.
41. Li XY, **Zhu CB**, Xu SF. Alterations of opioid receptor in rat brain during fenfluramine enhanced acupuncture analgesia. Acta Acad.Med.Shanghai, 1994; 21:50-55.
42. **Zhu CB**, et al. Enhancement of preproenkephalin mRNA expression in rat brain by electro-acupuncture: an in situ hybridization histochemistry study. Chin. J. Neurosci., 1994; 1(3):21-28.
43. **Zhu CB**, Xu SF, et al. Alterations of central delta and kappa opioid receptor binding sites in droperidol enhanced acupuncture analgesia. Acta. Academia Med. Shanghai, 1994, 21:14-18.

Conference presentations (presenter underlined)

1. Chongbin Zhu, Sanjay Reddy, Helene Longevin, Miranda Ring, Helen Ye. Role of

- acupuncture in integrative medicine. International Congress on Integrative Medicine & Health. Baltimore, 2018, May 8-11.
2. **Chong-Bin Zhu**, Lindsey C. McKernan, Linda Manning. Integration of acupuncture and relaxation techniques for anxiety and chronic pain. Conference for Lifestyle Medicine, American College of Lifestyle Medicine, Nashville, 2015, November 1-4.
 3. **Zhu CB**. Keep it simple: NADA is music to the ears. National Acupuncture Detoxification Association, Nashville, TN, May 29-31, 2014
 4. **Zhu, CB**, Lindler, KM, **Baganz NL**, Hewlett, WA, Blakely, RD. Native Immune System Regulation of the Brain Serotonin Transporter. *Anxiety and Depression: 21st Neuropharmacology Conference*. November 10-11, 2011, Virginia.
 5. **Zhu, CB**, Lindler, KM, **Baganz NL**, Hewlett, WA, Blakely, RD. Participation of interleukin (IL)-1 receptor and p38 MAPK in immunological stress-modulation of serotonin transporter in vivo. *The 9th Annual Conferences on Cytokines and Inflammation*. January 27-28, 2011, San Diego, CA
 6. **Zhu, CB**, Lindler, KM, Baganz NL, Deneris E Hewlett, WA, Blakely, RD. Systemic Lipopolysaccharide (LPS)-induced increases in serotonin uptake in mouse brain are dependent upon expression of p38 MAPK within central serotonergic neurons. *66th Annual Meeting, Society of Biological Psychiatry*. May 12-14, 2011, San Francisco, CA.
 7. **Zhu CB**, **Lindler KM**, Wright J, Baganz N, Deneris E, Hewlett WA, Blakely RD. Genetic manipulation of PKG and p38 MAPK dependent modulation of the serotonin transporter. *Society for Neurosciences, 40th Annual Meeting*, November 13-17, 2010, San Diego CA, USA
 8. **Zhu CB**, Blakely, RD, Lindler KM, Owens WA, Daws LC, **Hewlett, WA**. Activation of mouse brain serotonin transporters (SERT) following peripheral stimulation of the native immune system is associated with depressive-like behavior in the tail suspension test (TST). *The Serotonin Club Meeting*, July 9-11, 2010, Montreal, Quebec, Canada.
 9. **Zhu CB**, Owens WA, Daws LC, **Blakely, RD**, Hewlett, WA. Immune activation of CNS serotonin transporters (SERT) is associated with depressive-like behavior in the mouse tail suspension test (TST). *48th Annual Meeting for the American College of Neuropsychopharmacology*. December 6-10, 2009 The Westin Diplomat, Hollywood, Florida.
 10. **Zhu CB**, Lindler KM, Hewlett WA, **Blakely RD**. A Regulated, Physical Association of Serotonin Transporters with A3 Adenosine Receptors. *Society for Neurosciences, 39th Annual Meeting*, October 17-21, 2009, Chicago, IL, USA.
 11. **Zhu CB**, Owens WA, Daws LC, Blakely, RD, Hewlett, WA. Interleukin (IL)-1 receptor and p38 MAPK are critical mediators of immunological stress-enhanced activity of serotonin transporter in mice. *Society for Neurosciences, 38th Annual Meeting*, November, 2008, Washington DC, USA.
 12. **Zhu CB**, Blakely RD, Hewlett WA. Peripheral Cytokine-Inducers, LPS and Poly I:C, Upregulate CNS Serotonin Transporter (SERT) Activity and Induce Depression-Like Behavior in the Mouse via a p38 MAPK-Dependent Mechanism. 63rd Annual Scientific Convention & Meeting, Society of Biological Psychiatry, May 1-3, 2008, Washington DC.
 13. **Zhu CB**, Blakely RD, **Hewlett WA**. Proinflammatory cytokine-inducers, lipopolysaccharide (LPS) and polyribonucleic acid (poly I:C) elevate midbrain serotonin transporter (SERT) activity. 46th Annual Meeting for the American College of Neuropsychopharmacology. December 9-13, 2007 Boca Raton, Florida.

14. **Zhu CB**, Blakely RD, Hewlett WA. Enhanced activity of brain serotonin transporter induced by immunological challenge in mice. *Society for Neurosciences, 37th Annual Meeting*, November 03-07, 2007, San Diego CA, USA
15. **Zhu CB**, Steiner, JA, Lund DR, et al. Specific and Region-Dependent Modulation of Antidepressant Serotonin Transporters by A3 Adenosine Receptors *Society for Neurosciences, 36th Annual Meeting*, October 14-18, 2006, Atlanta GA, USA
16. **Zhu CB**, Hewlett WA, Blakely RD. Activation of Serotonin Transporters by Pro-Inflammatory Cytokines Interleukin-1beta and Tumor Necrosis Factor -Alpha: A role of p38 MAPK. *IUPHAR 2006*, July 2-7, Beijing, China.
17. **Zhu CB**, Hewlett WA, **Blakely RD**. Stimulation of serotonin transport by pro-inflammatory cytokines interleukine-1beta and tumor necrosis-alpha in rat raphe cell line and mouse synaptosome. *Society for Neurosciences, 35th Annual Meeting*, October 23-27, 2005, Washington DC, USA
18. **Daws LC**, Munn JL, Faulkner JL, Owens WA, **Zhu CB**, Blakely RD. Evidence that adenosine receptor-linked protein kinase g and p38mapk acutely regulate the serotonin transporter *in vivo*. *Society for Neurosciences, 35th Annual Meeting*, October 23-27, 2005, Washington DC, USA.
19. **Zhu CB**, Hewlett WA, Blakely RD. Interleukine-1beta stimulates serotonin transport via p38 MAPK-linked pathway. FASEB Summer Research Conferences—Perspectives in Transport Biology, July23-28, 2005, Saxtons River, Vermont.
20. **Zhu CB**, Carneiro, AM, Hewlett WA, Blakely RD. p38 MAPK Activators Enhance Serotonin Transporter Catalytic Activity.. *Society for Neurosciences, 34th Annual Meeting*, October 23-27, 2004, San Diego, USA
21. **Blakely RD**, **Zhu CB**, Hewlett WA, Dostmann WR, Buck E, Jayanthi LD Ramamoorthy S. Protein kinase G-mediated phosphorylation of SERT is required for adenosine receptor triggered stimulation of serotonin transporters. *Society for Neurosciences, 34th Annual Meeting*, October 23-27, 2004, San Diego, USA.
22. **Daws LC**, Blakely RD, Munn JL, **Zhu CB**, Davis N, Owens WA. Evidence that Adenosine Receptor-Linked Protein Kinase G and p38MAPK Acutely Regulate the Serotonin Transporter *In Vivo*. *ACNP annual meeting*, December 4-8, 2004, Puerto Rico.
23. **Zhu CB**, Hewlett WA, Feoktistoiv I, Biaggioni I, Blakely RD. Signaling pathways supporting adenosine receptor-mediated 5-HT transport: trafficking dependent and independent modes. *ASPET, EB2004 conference*, April 17-21, 2004, Washington D.C., USA.
24. **Zhu CB**, Hewlett WA, Feoktistoiv I, Biaggioni I, **Blakely RD**. Evaluation of adenosine receptor-mediated regulation of serotonin transporters reveals trafficking dependent and independent modes of regulation. *ACNP annual meeting*, December 5-8, 2003, Puerto Rico.
25. **Zhu CB**, Blakely RD, Hewlett WA. Adenosine receptor-mediated up-regulation of 5-HT transporter: signaling pathway and surface expression. *Society for Neurosciences, 33rd Annual Meeting*, November 8-12, 2003, New Orleans, USA
26. **Zhu, C.B.**, Jin, L., Chen, CH, et al. The neutralization determinant of DH012, a HIV-1 primary isolate. *Keystone symposium* (NIH sponsored), April, 2000, Colorado, USA, Abstract p85.
27. **WU GC**, **Zhu CB**. Distinct role of Orphanin FQ in rat brain and spinal cord in pain modulation. *Proceedings of the 3rd Congress of Chinese Society for Neuroscience*, November 1999, Beijing, China. Abstract p40.
28. **Wang YQ**, **Zhu CB**, Xu SF, et al. Orphanin FQ: effects on neurotransmitters release in spinal cord dorsal horn and possible role in neuropathic pain in rats. *Society for Neurosciences, 29th Annual Meeting*, October 1999, Miami, FL, USA, Abstract p928.
29. Wang JL, **Zhu CB**, **Cao XD**, et al. Distinct role of orphanin FQ and alteration of orphanin FQ immunoreactivity in formalin pain or electroacupuncture-induced analgesia at brain and

- spinal levels. *Society for Neurosciences, 28th Annual Meeting*, November 1998, Los Angeles, CA, USA, Abstract p891.
30. **Zhu CB**, Xie ZQ, Wang YQ, Wu GC. Effect of interleukin-2 and Orphanin FQ on endomorphine-induced analgesia. *Proceedings of XX Chinese Physiological Conference*, September 1998, Lushan, China. Abstract p132.
 31. Yu J, Li XY, Chen HN, **Zhu CB**. Recovery of preference to sucrose solution by electroacupuncture combined with chlorpromazine on chronic mild stress induced rat model of depression. *Proceedings of XX Chinese Physiological Conference*, September 1998, Lushan, China. Abstract p113.
 32. **Zhu CB**, Wang YQ, Wang JL, et al. Orphanin FQ produces distinct effect on pain response and endomorphin-induced analgesia in brain and spinal cord of rats. *29th International Narcotic Research Conference*, July 1998, Garmisch-Partenkirchen, Germany.
 33. **Zhu CB**, Chen HF, Cao XD, Xu SF and Wu GC. Orphanin FQ enhances pain behavior of rats and antagonizes morphine and acupuncture analgesia in formalin test. *International Narcotic Research Conference*, July 1997, Hong Kong.
 34. **Zhu CB**, Chen HF, Cao XD, et al. Effect of orphanin FQ on formalin pain and acupuncture analgesia in rats. *Society for Neurosciences, 27th Annual Meeting*, October 1997, New Orleans, LA, USA, Abstract p1017.
 35. **Zhu CB**, Xu SF, Cao XD, Wu GC, et al. Intracerebroventricular injection of orphanin FQ induces hyperalgesia and attenuates acupuncture analgesia in rats. *Society for Neurosciences, 26th Annual Meeting*, November 1996, Washington DC, USA. Abstract p1368.
 36. **Zhu CB**, Wang YQ, Wu GC et al. Antagonists of DA receptor enhance acupuncture analgesia. *Society for Neurosciences, 24th Annual Meeting*, November 1995, San Diego, USA Abstract p1417.