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Education and academic positions

1980 – 1986 Study of Biology at the Justus-Liebig Universität Giessen; April 1986, Diploma (*magna cum laude*)

1986 – 1989 Dissertation in the laboratory of Prof. Groß at the Max Planck Institute for Biophysical Chemistry

July 1989 PhD degree (*summa cum laude*)

1989 – 1991 Postdoctoral researcher, DFG-Fellow, National Institute of Mental Health (NIMH), USA

1991 – 2000 Section Head at the NIMH

1991 – 1995 Visiting Associate

1995 – 1997 Visiting Scientist

1997 – 2000 Investigator

1997 – 1999 Adjunct Professor, Department of Pharmacology, Georgetown University Medical School, Washington, DC, USA

1999 – 2005 Professor for Molecular Neurobiology (C3), University of Bonn

2005 – 2006 Professor of Cell Biology (W3), University of Bielefeld

Since 07/2006 Professor of Molecular Psychiatry (W3), Director, Institute for Molecular Psychiatry, Rheinische Friedrich-Wilhelms-University Bonn

Research interests

Molecular mechanisms of neuropsychiatric disorders with a focus on addiction, pain and affective disorders; molecular biology of modulatory neurotransmitters; molecular biology of aging

Memberships and professional functions

German Society of Genetics; German Society of Neurosciences; International Society of Psychiatric Genetics; International Mammalian Genome Society; International Narcotics Research Conference; BONFOR Research Committee; Advisory Board, Taiwan Mouse Clinic; Coordinator Research Group FOR926

Honors and awards

1987-1989, Max-Planck-Fellow; 1990-1992, DFG-Fellow; 2000, U.S. Department of Health and Human Services Special Act or Service Award.

Publications

H-Index: 45
142 original papers, 26 reviews, books and book chapters

A) Original Manuscripts

1. Jost E, Lepper K, Högner D, **Zimmer A**, Boschek B. (1986). Redistribution of nuclear lamins in mitotic cells. *Biol. Cell*, 57: 111-126.
2. Schulze F, Chowdhury K, **Zimmer A**, Drescher U, Gruss P. (1987). The murine homeo box gene product, Hox 1.1 protein, is growth-controlled and associated with chromatin. *Differentiation*, 36: 130-137.
3. **Zimmer A**, Gruss P. (1989). Production of chimaeric mice containing embryonic stem (ES) cells carrying a homoeobox Hox 1.1 allele mutated by homologous recombination. *Nature*, 338: 150-3.
4. Reynolds K, Mezey E, **Zimmer A**. (1991). Activity of the beta-retinoic acid receptor promoter in transgenic mice. *Mech. Dev.*, 36: 15-29.
5. **Zimmer A**, Zimmer A. (1992). Induction of a RAR beta 2-lacZ transgene by retinoic acid reflects the neuromeric organization of the central nervous system. *Development*, 116: 977-983.
6. Eisel U, Reynolds K, Riddick M, Zimmer A, Niemann H, **Zimmer A**. (1993). Tetanus toxin light chain expression in Sertoli cells of transgenic mice causes alterations of the actin cytoskeleton and disrupts spermatogenesis. *EMBO J*, 12: 3365-72.
7. **Zimmer A**, Zimmer A, Reynolds K. (1994). Gene targeting constructs: effects of vector topology on co-expression efficiency of positive and negative selectable marker genes. *Biochem. Biophys. Res. Commun.*, 201: 943-949.
8. **Zimmer A**, Zimmer AM, Reynolds K. (1994). Tissue specific expression of the retinoic acid receptor-beta-2: Regulation by short open reading frames in the 5'-noncoding region. *J. Cell Biol.*, 127: 1111-1119.
9. Kurtz A, **Zimmer A**, Schnütgen F, Brüning G, Spener F, Müller T. (1994). The expression pattern of a novel gene encoding brain-fatty acid binding protein correlates with neuronal and glial cell development. *Development*, 120: 2637-2649.
10. Kurtz A, **Zimmer A**. (1995). The mouse homolog of the human Miller-Dieker chromosomal region (MDCR) maps to mouse chromosome-11 in close proximity to Mov9 and D11Nds1. *Mamm. Genome*, 6: 145-146.
11. Kurtz A, **Zimmer A**. (1995). Interspecies fluorescence in-situ hybridization further defines synteny homology between mouse Chromosome-11 and human Chromosome-17. *Mamm. Genome*, 379-380.
12. Hellmich HL, Kos L, Cho ES, Mahon KA, **Zimmer A**. (1996). Embryonic expression of glial cell-line derived neurotrophic factor (GDNF) suggests multiple developmental roles in neural differentiation and epithelial-mesenchymal interactions. *Mech. Dev.*, 54: 95-105.
13. Robinson GW, Smith GS, Gallahan D, **Zimmer A**, Furth PA, Hennighausen L. (1996). Understanding mammary gland development through the imbalanced expression of growth regulators. *Dev. Dyn.*, 206: 159-168.
14. Reynolds K, Zimmer AM, **Zimmer A**. (1996). Regulation of RAR beta 2 mRNA expression: Evidence for an inhibitory peptide encoded in the 5'-untranslated region. *J Cell Biol.*, 134: 827-835.
15. König M, Zimmer AM, Steiner H, Holmes PV, Crawley JN, Brownstein MJ, **Zimmer A**. (1996). Pain responses, anxiety, and aggression in mice deficient in pre-proenkephalin. *Nature*, 383: 535-538.

16. Bhattacharyya N., Dey A., Minucci S., **Zimmer A.**, John S., Hager G., Ozato K. (1997). Retinoid-induced chromatin structure alterations in the retinoic acid receptor beta 2 promoter. *Mol. Cell Biol.* 17:6481-6490.
17. Wojnowski L, **Zimmer A.** (1997). Use of transgenic mice to study the activation of retinoic acid-responsive promoters. *Meth. Enzymol.* 282: 77-85.
18. Wojnowski L, Zimmer AM, Beck TW, Hahn H, Bernal R, Rapp UR, **Zimmer A.** (1997). Endothelial apoptosis in Braf-deficient mice. *Nature Genetics*, 16: 293-297.
19. Young WS, 3rd, Shepard E, DeVries AC, **Zimmer A.**, LaMarca ME, Ginns EI, Amico J, Nelson RJ, Hennighausen L, Wagner KU. (1998). Targeted reduction of oxytocin expression provides insights into its physiological roles. *Adv. Exp. Med. Biol.*, 449: 231-40.
20. Wojnowski L., Bernal R., Park C.M., Handel M.A., Hollander W.F., **Zimmer A.** (1998) Reduced activity of Braf protein kinase in hop and hop(hpy) mouse mutants. *Mamm. Genome*, 9: 905-906.
21. Wojnowski L, Stancato LF Zimmer AM, Beck TW, Larner AC, Rapp UR, **Zimmer A.** (1998). Craf-1 kinase is essential for mouse development. *Mech. Dev.*, 76: 141-149.
22. **Zimmer A.**, Zimmer AM, Baffi J, Reynolds K, Usdin T, Palkovits M, Mezey E. (1998). Hypoalgesia in mice with a targeted deletion of the tachykinin 1 gene. *Proc. Natl. Acad. Sci. USA*, 95: 2630-2635.
23. Inoue M, Tokuyama S, Shimohira I, Yoshida A, Kobayashi M, Kozaki S, **Zimmer A.**, Ueda H. (1998). Nociceptin/orphanin FQ-induced nociceptive responses through substance P release from peripheral nerve endings in mice. *Proc. Natl. Acad. Sci. USA*, 95: 10949-10953.
24. Josephson R, Müller T, Pickel J, Okabe S, Reynolds K, Turner PA, **Zimmer A.**, McKay RDG. (1998). POU transcription factors control expression of CNS stem cell specific genes. *Development*, 125: 3087-3100.
25. Hahn H, Wojnowski L, Zimmer AM, Hall J, Miller G. **Zimmer A.** (1998). Rhabdomyosarcomas and radiation hypersensitivity in a mouse model of Gorlin syndrome. *Nature Medicine*, 4: 619-622.
26. Steiner H, Bonner T, Zimmer AM, Kitai ST, **Zimmer A.** (1999). Altered gene expression in striatal projection neurons in CB1 cannabinoid receptor knockout mice. *Proc. Natl. Acad. Sci. USA*, 96: 5786-5790.
27. **Zimmer A.**, Zimmer AM, Hohman A, Herkenham M, Bonner T. (1999). Increased mortality, hypoactivity, and hypoalgesia in cannabinoid CB1 receptor knockout mice. *Proc Natl. Acad. Sci. USA*, 96: 5780-5785.
28. Inoue M, Shimohira I, Yoshida A, **Zimmer A.**, Mantyh P, Takeshima H, Sakurada T, Ueda H. (1999). Dose-related opposite modulation by nociceptin/orphanin FQ of substance P nociception in the nociceptors and spinal cord. *J. Pharmacol. Exp. Ther.*, 291: 308-313.
29. Brady LS, Herkenham M., Rothman RB, Partilla JS, König M., Zimmer AM, **Zimmer A.** (1999). Region-specific up-regulation of opioid receptor binding in enkephalin knockout mice. *Brain Res. Mol. Brain Res.*, 68: 193-197.
30. Hook S, Camberis M, Prout M, König M, **Zimmer A.**, Heeke GV, Gros GL. (1999). Preproenkephalin is a Th2 cytokine but is not required for Th2 differentiation in vitro. *Immunol. Cell Biol.*, 77: 385-390.
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33. Wojnowski L, Stancato LF, Lerner AC, Rapp UR, **Zimmer A.** (2000). Overlapping and specific functions of Braf and Craf-1 proto-oncogenes during mouse embryogenesis. *Mech. Dev.*, 91:97-104.
34. Járαι Z, Wagner JA, Goparaju SK, Wang L, Razdan RK, Sugiura T, Zimmer AM, TI Bonner, **Zimmer A**, Kunos G. (2000). Cardiovascular effects of 2-arachidonyl glycerol in anesthetized mice. *Hypertension*, 35: 679-684.
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37. Hahn H, Wojnowski L, Specht K, Kappler R, Calzada-Wack J, Potter D, Zimmer A, Müller U, Samson E, Quintanilla-Martinez L, and **Zimmer A.** 2000. Patched target Igf2 is indispensable for the formation of medulloblastoma and rhabdomyosarcoma. *J. Biol. Chem.*, 37: 28341-28344.
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39. Di Marzo V, Breivogel CS, Tao Q, Bridgen DT, Razdan RK, Zimmer AM, **Zimmer A**, Martin BR. (2000). Levels, metabolism, and pharmacological activity of anandamide in CB1 cannabinoid receptor knockout mice: Evidence for non-CB1, non-CB2 receptor-mediated actions of anandamide in mouse brain. *J. Neurochem.*, 75: 2434-2444.
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41. Hopley RL, **Zimmer A.** (2001). MouseBank: A Database application for managing transgenic mouse breeding programs. *BioTechniques*, 30: 130-132.
42. Selley DE, Rorrer WK, Breivogel CS, Zimmer AM, **Zimmer A**, Martin B, Sim-Selley LJ. (2001). Agonist efficacy and receptor efficiency in heterozygous CB1 knockout mice: Relationship of reduced CB1 receptor density to G-protein activation. *J. Neurochem.* 77: 1048-1057.
43. Kathmann M, Weber B, **Zimmer A**, Schlicker E. (2001) Enhanced acetylcholine release in the hippocampus of cannabinoid CB1 receptor-deficient mice. *Br. J. Pharm.* 132: 1169-1173.
44. Paria BC, Song H, Wang X, Schmid PC, Krebsach RJ, Schmid HHO, Bonner TI, **Zimmer A**, Dey SK. (2001). Dysregulated cannabinoid signaling disrupts uterine receptivity for embryo implantation. *J. Biol. Chem.* 8: 276: 20523-20528.
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46. Kingery WS, Sawamura S, Agashe GS, Davies MF, Clark JD, **Zimmer A.** (2001). Enkephalin release and opioid receptor activation does not mediate the antinociceptive or sedative/hypnotic effects of nitrous oxide. *Eur. J. Pharm.* 427: 27-35.

47. **Zimmer A**, Valjent E, König M, Zimmer AM, Clarke S, Robledo P, Chen CC, Hahn H, Valverde O, Hill RG, Kitchen I, Maldonado R. (2001). Absence of delta-9-tetrahydrocannabinol dysphoric effects in dynorphin-deficient mice. *J. Neurosci.* 21: 9499-9505.
48. Yoshida T, Hashimoto K, **Zimmer A**, Maejima T, Araishi K, Kano M. (2002). The Cannabinoid CB₁ Receptor Mediates Retrograde Signals for Depolarization-Induced Suppression of Inhibition in Cerebellar Purkinje Cells. *J. Neurosci.*, 22: 1690-1697.
49. Ohno-Shosaku T., Tsubokawa H., Mizushima I., Yoneda N., **Zimmer A.**, Kano M. (2002). Presynaptic cannabinoid sensitivity is a major determinant of depolarization-induced retrograde suppression at hippocampal synapses. *J. Neurosci.*, 22: 3864-3872.
50. Chen CC, Zimmer A., Sun WH, Hall J, Brownstein MJ, **Zimmer A.** (2002). A role for ASIC3 in the modulation of high-intensity pain stimuli. *Proc. Natl. Acad. Sci. USA*, 99: 8992-8997.
51. Boldogkői Z, Schütz B, Sallach J, **Zimmer A.** (2002) P2X(3) receptor expression at early stages of mouse embryogenesis. *Mech. Dev.*, 118: 255-260.
52. Bilkei-Gorzo A, Radcz I, **Zimmer A.** (2002). Diminished Anxiety- and Depression-Related Behaviors in Mice with Selective Deletion of the Tac1 Gene. *J. Neurosci.*, 22: 10046-10052.
53. The FANTOM Consortium* and The RIKEN Genome Exploration Research Group # (*Okazaki Y, Furuno M, Kasukawa T, Adachi J, Bono H, Kondo S, Nikaido I, Osato N, Saito R, Suzuki H, Yamanaka I, Kiyosawa H, Yagi K, Tomaru Y, Hasegawa Y, Nogami A, Schonbach C, Gojobori T, Baldarelli R, Hill DP, Bult C, Hume DA, Quackenbush J, Schriml LM, Kanapin A, Matsuda H, Batalov S, Beisel KW, Blake JA, Bradt D, Brusica V, Chothia C, Corbani LE, Cousins S, Dalla E, Dragani TA, Fletcher CF, Forrest A, Frazer KS, Gaasterland T, Gariboldi M, Gissi C, Godzik A, Gough J, Grimmond S, Gustincich S, Hirokawa N, Jackson IJ, Jarvis ED, Kanai A, Kawaji H, Kawasaki Y, Kedzierski RM, King BL, Konagaya A, Kurochkin IV, Lee Y, Lenhard B, Lyons PA, Maglott DR, Maltais L, Marchionni L, McKenzie L, Miki H, Nagashima T, Numata K, Okido T, Pavan WJ, Pertea G, Pesole G, Petrovsky N, Pillai R, Pontius JU, Qi D, Ramachandran S, Ravasi T, Reed JC, Reed DJ, Reid J, Ring BZ, Ringwald M, Sandelin A, Schneider C, Semple CA, Setou M, Shimada K, Sultana R, Takenaka Y, Taylor MS, Teasdale RD, Tomita M, Verardo R, Wagner L, Wahlestedt C, Wang Y, Watanabe Y, Wells C, Wilming LG, Wynshaw-Boris A, Yanagisawa M, Yang I, Yang L, Yuan Z, Zavolan M, Zhu Y, **Zimmer A**) (#Carninci P, Hayatsu N, Hirozane-Kishikawa T, Konno H, Nakamura M, Sakazume N, Sato K, Shiraki T, Waki K, Kawai J, Aizawa K, Arakawa T, Fukuda S, Hara A, Hashizume W, Imotani K, Ishii Y, Itoh M, Kagawa I, Miyazaki A, Sakai K, Sasaki D, Shibata K, Shinagawa A, Yasunishi A, Yoshino M, Waterston R, Lander ES, Rogers J, Birney E, Hayashizaki Y). (2002). Analysis of the Mouse Transcriptome based upon Functional Annotation of 60,770 full length cDNAs. *Nature*, 420: 563-573.
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57. Clarke S, **Zimmer A**, Zimmer AM, Hill RG, Kitchen I (2003). Region selective up-regulation of the mu-, delta- and kappa-opioid receptor but not opioid receptor-like 1 receptors in the brains of enkephalin and dynorphin knockout mice. *Neuroscience*, 122: 479-489
58. Abo-Salem OM, Hayallah AM, Bilkei-Gorzo A, Filipek B, **Zimmer A**[#], Müller CE. (2004). Anticociceptive effects of novel A2B adenosine receptor antagonists, *JPET*, 308: 358-366
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63. Bailey A, Weber D, **Zimmer A**, Zimmer AM, Hourani SM, Kitchen I. (2004). Quantitative autoradiography of adenosine receptors and NBTI-sensitive adenosine transporters in the brains of mice deficient in the preproenkephalin gene. *Brain Res.*, 1025: 1-9.
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- S, Nori F, Ohara O, Okazaki Y, Orlando V, Pang KC, Pavan WJ, Pavesi G, Pesole G, Petrovsky N, Piazza S, Qi D, Qu W, Reed J, Reid J, Ring BZ, Ringwald M, Rost B, Ruan Y, Sandelin A, Schneider C, Schönbach C, Sekiguchi K, Semple CAM, Seno S, Sessa L, Sheng Y, Shibata Y, Shimada H, Shimada K, Sperling S, Stupka E, Sugiura K, Sultana R, Takenaka Y, Taki K, Tammoja K, Tan SL, Tang S, Taylor MS, Tegner J, Teichmann S, Ueda HR, Verardo R, Wei CL, Yagi K, Yamanishi H, Zabarovsky E, Zhu S, **Zimmer A**, Hide W, Bult C, Grimmond SM, Teasdale RD, Liu ET, Brusica V, Quackenbush J, Wahlestedt C, Mattick J, Hume D; RIKEN Genome Exploration Research Group: Kai C, Sasaki D, Tomaru Y, Fukuda S, Kanamori M, Suzuki M, Aoki J, Arakawa T, Hori F, Hirakiyama A, Iida J, Imamura K, Imotani K, Itoh M, Kato T, Kawaji H, Kawagashira N, Kawashima T, Kojima M, Kondo S, Konno H, Murakami K, Nakano K, Ninomiya N, Nishio T, Nishiyori H, Okada M, Plessy C, Shibata K, Shiraki T, Suzuki S, Tagami M, Tsujimura Y, Waki K, Watahiki A, Oho Y, Suzuki H, Kawai J, Hayashizaki Y. (2005). The transcriptional landscape of the mammalian genome. *Science*, 309: 1559-1563.
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B) Reviews und book chapters

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