

**WILLIAM WISDEN,  
MA, PhD, FMedSci**

**Present Posts**

- Feb 2009 - Chair of Molecular Neuroscience, Imperial College London (HEFC-non-clinical).  
Feb 2019 - Affiliate - Sainsbury Wellcome Centre, University College London

**Prior Appointments**

- 2005 - 2009 Professor & Chair of Neuroscience, University of Aberdeen, Scotland.  
2001 - 2005 Group Leader, IZN, University of Heidelberg, Germany.  
1993 - 2001 Group Leader, MRC Laboratory of Molecular Biology, Cambridge.

**Education and Post-doctoral Research Training**

*Education*

- 1976 - 1982 King's Manor Comprehensive School, Shoreham-By-Sea, UK.  
1982 - 1983 Laboratory technician, Beecham Pharmaceuticals, Worthing, UK.  
1983 - 1986 BA, Class I, Zoology, Natural Sciences, University of Cambridge.  
1986 - 1989 PhD, University of Cambridge & MRC Molecular Neurobiology Unit Cambridge.

*Post-doctoral Research*

- 1990 - 1992 EMBO Long-term Fellowship, ZMBH, University of Heidelberg.

**Selected Recent Committee Service**

- 2009 - 2011 Wellcome Trust Neuroscience & Mental Health Committee.  
2012 - 2016 MRC Neurosciences & Mental Health Board. Deputy Chair for last two meetings.  
2015 MRC Harwell, QQR committee, MRC Molecular and Cellular Medicine Board.  
2014 - 2019 Co-Director, Centre for Neurotechnology, Imperial College London.  
2012 - Advisory Board, Spemann Graduate School of Biology & Medicine, Freiburg.  
2018 - Scientific Advisory Board, MRC Toxicology Unit, Universities of Leicester & Cambridge  
2019 EPSRC Physics of Life Panel  
2019- Sir Henry Dale Fellowship Interview Committee (Royal Society & Wellcome Trust)

**Awards**

- Fellow of the Academy of Medical Sciences (elected April 2014).

**Active Grants**

*Co-Principal Investigator*

Wellcome Trust Investigator Award: *Capturing the neuronal ensembles underlying sleep and sedation*. £1.9 million. (joint PI: W Wisden & NP Franks) 107841/Z/15/Z (from 1<sup>st</sup> October 2015, for 5 years).  
20 hours/week

*Principal investigator*

UK Dementia Research Institute *The role of sleep in protecting against amyloid and glial pathology in dementia* (1 Sept 2017- 31 Aug 2022)  
7 hours/week

### Funding Applied for (or to be Applied for)

Co-Principal Investigator

Wellcome Trust Investigator Award: *Neuronal circuitry of sleep*. £2.5 million. (joint PI: W Wisden & NP Franks) Will be submitted Feb 2020.

20 hours/week

### 10 Selected Peer Reviewed Publications (2014-19)

>135 peer reviewed publications<sup>1</sup>

*h Index 69 (Google Scholar)*

Ma Y, Miracca G, Yu X, Harding EC, Miao A, Yustos R, Vyssotski AL, Franks NP\*, **Wisden W\*** (2019) Galanin neurons unite sleep homeostasis and  $\alpha 2$  adrenergic sedation. *Curr Biol* 29: 1-8 (\*WW & NPF are co-senior authors).

Yu X, Li W, Ma, Y, Tossell K, Harris JJ, Harding EC, Ba, W Miracca G, Wang D, Li L, Chen M, Li Y, Yustos R, Vyssotski AL, Burdakov D, Yang Q, Dong H\*, Franks NP\*, **Wisden W\*** (2019). GABA and glutamate neurons in the VTA regulate sleep and wakefulness. *Nature Neuroscience* 22: 106-119 (\*DH, NPF and WW are co-senior authors).

Yu X, Ma Y, Harding EC, Yustos R, Vyssotski AL, Franks NP\*, **Wisden W\*** (2019). Genetic lesioning of histamine neurons increases sleep-wake fragmentation and reveals their contribution to modafinil-induced wakefulness. *Sleep* 42 (5). (\*WW & NPF are co-senior authors).

Harding EC, Yu X, Miao A, Andrews N, Ma Y, Ye Z, Lignos L, Miracca G, Ba W, Yustos R, Vyssotski AL, **Wisden W\***, Franks NP\* (2018). A Neuronal Hub Binding Sleep Initiation and Body Cooling in Response to a Warm External Stimulus. *Curr Biology* 28:2263-2273 e2264. (\*WW & NPF are co-senior authors).

Gelegen C, Miracca G, Ran MZ, Harding EC, Ye Z, Yu X, Tossell K, Houston CM, Yustos R, Hawkins ED, Vyssotski AL, Dong HL, **Wisden W\***, Franks NP\* (2018) Excitatory pathways from the lateral habenula enable propofol-induced sedation. *Curr Biol* 28:580-587 e585. (\*WW & NPF are co-senior authors).

Uygun DS, Ye Z, Zecharia AY, Harding EC, Yu X, Yustos R, Vyssotski AL, Brickley SG, Franks NP\*, **Wisden W\*** (2016). Bottom-up versus top-down induction of sleep by zolpidem acting on histaminergic and neocortex neurons. *J Neurosci* 36: 11171-11184. (\*WW & NPF are co-senior authors).

Yu X, Ye Z, Houston CM, Zecharia AY, Ma Y, Zhang Z, Uygun DS, Parker S, Vyssotski AL, Yustos R, Franks NP\*, Brickley SG\*, **Wisden W\***. 2015. *Wakefulness Is governed by GABA and histamine cotransmission*. *Neuron* 87:164 (\*WW, SGB & NPF, co-senior authors)

Zhang Z, Ferretti V, Güntan I, Moro A, Steinberg EA, Ye Z, Zecharia AY, Yu X, Vyssotski AL, Brickley SG, Yustos R, Pillidge ZE, Harding EC, **Wisden W\***, Franks NP\*. 2015. *Neuronal ensembles sufficient for recovery sleep and the sedative actions of alpha2 adrenergic agonists*. *Nat Neurosci*.18:553-6. (\*WW & NPF are co-senior authors)

Yu X, Zecharia A, Zhang Z, Yang Q, Yustos R, Jager P, Vyssotski AL, Maywood ES, Chesham JE, Ma Y, Brickley SG, Hastings MH, Franks NP\* & **Wisden W\*** (2014). Circadian factor BMAL1 in histaminergic neurons regulates sleep architecture. *Current Biology* 24: 2838-2844. (\*WW & NPF are co-senior authors).

Baker R, Gent TC, Yang Q, Parker S, Vyssotski AL, **Wisden W\***, Brickley SG\* & Franks NP\* (2014) Altered activity in the central medial thalamus precedes changes in the neocortex during transitions

into both sleep and propofol anesthesia. *J Neurosci* 34: 13326-13335. (\*WW, SGB & NPF are co-senior authors).

<sup>1</sup><https://pubmed.ncbi.nlm.nih.gov/?term=wisden+w>

## FULL REFERENCE LIST

**Wisden has 122 publications listed on PubMed (h-index 60; total citations 18757)**

### Refereed Publications

1. Levitan ES, Schofield PR, Burt DR, Rhee LM, **Wisden W**, Köhler M, Fujita N, Rodriguez H, Stephenson FA, Darlison MG, Barnard EA, Seeburg PH (1988). Structural and functional basis for GABA<sub>A</sub> receptor heterogeneity. *Nature* 335:76-79.
2. **Wisden W**, Morris BJ, Darlison MG, Hunt SP, Barnard EA (1988). Distinct GABA<sub>A</sub> receptor  $\alpha$ -subunit mRNAs show differential patterns of expression in bovine brain. *Neuron* 1: 937-947.
3. **Wisden W**, Morris BJ, Darlison MG, Hunt SP, Barnard EA (1989). Localization of GABA<sub>A</sub> receptor  $\alpha$  subunit mRNAs in relation to receptor subtypes. *Mol Brain Res* 5: 305-310.
4. **Wisden W**, McNaughton LA, Darlison MG, Hunt SP, Barnard EA (1989). Differential distribution of GABA<sub>A</sub> receptor mRNAs in bovine cerebellum - Localization of  $\alpha$ 2 mRNA in Bergmann glia layer. *Neurosci Lett* 106: 7-12.
5. Morris BJ, **Wisden W**, Dunnett SB, Sirinathsinghji DJS (1989). Cellular localization of somatostatin mRNA and neuropeptide Y mRNA in foetal striatal tissue grafts implanted into the ibotinic acid-lesioned rat neostriatum. *Neurosci Lett* 103: 121-126.
6. Sirinathsinghji DJS, Morris BJ, **Wisden W**, Northrop A, Dunnett SB, Hunt SP (1990). Gene expression in striatal grafts - I. Cellular localization of neurotransmitter mRNAs. *Neuroscience* 34: 675-686.
7. Morris BJ, Hicks AA, **Wisden W**, Darlison MG, Hunt SP, Barnard EA (1990). Distinct regional expression of nicotinic acetylcholine receptor genes in chick brain. *Mol Brain Res* 7: 305-315.
8. Gundlach AL, **Wisden W**, Morris BJ, Hunt SP (1990). Localization of preprogalanin mRNA in rat brain: *in situ* hybridization with a synthetic oligonucleotide probe. *Neurosci Lett* 114: 241-247.
9. Rusak B, Robertson HA, **Wisden W**, Hunt SP (1990). Light pulses that shift rhythms induce gene expression in the suprachiasmatic nucleus. *Science* 248: 1237-1240.
10. **Wisden W**, Errington ML, Williams S, Dunnett SB, Waters C, Hitchcock D, Evan G, Bliss TVP, Hunt SP (1990). Differential expression of immediate early genes in the hippocampus and spinal cord. *Neuron* 4: 603-614.
11. Keinänen K, **Wisden W**, Sommer B, Werner P, Herb A, Verdoorn TA, Sakmann B, Seeburg PH (1990). A family of AMPA-selective glutamate receptors. *Science* 249: 556-560.

12. Sommer B, Keinänen K, Verdoorn TA, **Wisden W**, Burnashev N, Herb A, Köhler M, Takagi T, Sakmann B, Seeburg PH (1990). Flip and Flop: A cell-specific functional switch in glutamate-operated channels in the CNS. *Science* 249: 1580-1585.
13. Ymer S, Draguhn A, **Wisden W**, Werner P, Keinänen K, Schofield PR, Sprengel R, Pritchett DB, Seeburg PH (1990). Structural and functional characterization of the  $\gamma 1$  subunit of GABA<sub>A</sub>/benzodiazepine receptors. *Embo J.* 9: 3261-3267.
14. Seeburg PH, **Wisden W**, Verdoorn TA, Pritchett DB, Werner P, Herb A, Lüddens H, Sprengel R, Sakmann B (1990). The GABA<sub>A</sub> receptor family: molecular and functional diversity. *Cold Spring Harbour Symposia on Quant Biol.* LV: 29-40. (review article)
15. Bateson AN, Harvey RJ, **Wisden W**, Glencorse TA, Hicks AA, Hunt SP, Barnard EA, Darlison MG (1991). The chicken GABA<sub>A</sub> receptor  $\alpha 1$ -subunit: cDNA sequence and localization of the corresponding mRNA. *Mol Brain Res* 9: 333-339.
16. **Wisden W**, Gundlach AL, Barnard EA, Seeburg PH, Hunt SP (1991). Distribution of GABA<sub>A</sub> receptor subunit mRNAs in rat lumbar spinal cord. *Mol Brain Res* 10: 179-183
17. Monyer H, Seeburg PH, **Wisden W** (1991). Glutamate-operated channels: Developmentally early and mature forms arise by alternative splicing. *Neuron* 6: 799-810.
18. Werner P, Voigt M, Keinänen K, **Wisden W**, Seeburg PH (1991). Cloning of a putative high-affinity kainate receptor expressed predominantly in hippocampal CA3 cells. *Nature* 351: 742-744.
19. **Wisden W**, Herb A, Wieland H, Keinänen K, Lüddens H, Seeburg PH (1991). Cloning, pharmacological characteristics and expression pattern of the rat GABA<sub>A</sub> receptor  $\alpha 4$  subunit. *FEBS Lett* 289: 227-230.
20. Ultsch A, Schuster CM, Betz H, **Wisden W** (1991). *In situ* hybridization with oligonucleotides: a simplified method to detect *Drosophila* transcripts. *Nucleic Acid Res* 19: 3746.
21. Marqueze-Pouey B, **Wisden W**, Malosio ML, Betz H (1991). Differential expression of synaptophysin and synaptoporin mRNAs in the postnatal rat central nervous system. *J Neurosci.* 11: 3388-3397.
22. Lüddens H, **Wisden W** (1991). Function and pharmacology of multiple GABA<sub>A</sub> receptor subunits. *Trends Pharmacol Sci* 12: 49-51. (review article)
23. **Wisden W**, Seeburg PH (1992). GABA<sub>A</sub> receptor channels: from subunits to functional entities. *Curr Opinion Neurobiol* 2: 263-269. (review article)

24. Herb A, **Wisden W**, Lüddens H, Puia G, Vicini S, Seeburg PH (1992). The third  $\gamma$  subunit of the GABA<sub>A</sub> receptor superfamily. *Proc Natl Acad Sci USA* 89:1433-1437
25. Müller F, Greferath U, Wässle H, **Wisden W**, Seeburg PH (1992). Glutamate receptor gene expression in the rat retina. *Neurosci Lett* 138: 179-182.
26. **Wisden W**, Laurie DJ, Monyer H, Seeburg PH (1992). The distribution of 13 GABA<sub>A</sub> receptor subunit mRNAs in the rat brain. I. Telencephalon, diencephalon, mesencephalon. *J Neurosci* 12: 1040-1062.
27. Laurie DJ, Seeburg PH, **Wisden W** (1992). The distribution of 13 GABA<sub>A</sub> receptor subunit mRNAs in the rat brain II. Olfactory bulb and cerebellum. *J Neurosci* 12: 1063-1076.
28. Laurie DJ, **Wisden W**, Seeburg PH (1992). The distribution of 13 GABA<sub>A</sub> receptor subunit mRNAs in the rat brain. III. Embryonic and postnatal development. *J Neurosci* 12: 4151-4172.
29. Herb A, Burnashev N, Werner P, Sakmann B, **Wisden W**, Seeburg PH (1992). The KA-2 subunit of excitatory amino acid receptors shows widespread expression in brain and forms ion channels with distantly related subunits. *Neuron* 8: 775-785.
30. Burnashev N, Khodorova A, Jonas P, Helm PJ, **Wisden W**, Monyer H, Seeburg PH, Sakmann, B. (1992). Calcium permeable AMPA/KA receptors in fusiform cerebellar glial cells. *Science* 256: 1566-1570.
31. Lomeli H, **Wisden W**, Köhler M, Keinänen K, Sommer B, Seeburg PH (1992). High-affinity kainate and domoate receptors in rat brain. *FEBS Lett.* 307: 139-143.
32. Lomeli H, Sprengel R, Laurie DJ, Köhr G, Herb A, Seeburg PH, **Wisden W** (1993). The rat  $\delta 1$  and  $\delta 2$  subunits extend the excitatory amino acid receptor family. *FEBS Lett.* 315: 318-322
33. **Wisden W**, Seeburg PH (1993). A complex mosaic of high-affinity kainate receptors in rat brain *J. Neurosci* 13: 3582-3598.
34. Tölle TR, Berthele A, Zieglgänsberger W, Seeburg PH, **Wisden W** (1993). The differential expression of 16 NMDA and non-NMDA receptor subunits in the rat spinal cord and periaqueductal grey. *J Neurosci* 13: 5009-5028
35. **Wisden W**, Parker EM, Mahle CD, Grise DA, Nowak HP, Yocca FD, Felder CC, Seeburg PH, Voigt MM (1993). Cloning and characterization of the rat 5-HT<sub>5B</sub> receptor: evidence that the 5-HT<sub>5B</sub> receptor couples to a G protein in mammalian cell lines. *FEBS Lett* 333: 25-31.
36. **Wisden W**, Seeburg PH (1993). Mammalian ionotropic glutamate receptors. *Curr Opin Neurobiol* 3: 291-298 (review article)

37. Bahn S, Volk B, **Wisden W** (1994). Kainate receptor gene expression in the developing rat brain. *J Neurosci* 14: 5525-5547.
38. Tölle TR, Berthle A, Zieglgänsberger W, Seeburg PH, **Wisden W** (1995). Flip and Flop variants of AMPA receptors in the rat lumbar spinal cord. *Eur J Neurosci* 7: 1414-1419.
39. **Wisden W**, Korpi ER, Bahn S (1996). The cerebellum: a model system for studying GABA<sub>A</sub> receptor diversity. *Neuropharmacology* 35: 1139-1160 (review article)
40. Bahn S, Harvey RJ, Darlison MG, **Wisden W** (1996) Conservation of GABA<sub>A</sub> receptor  $\alpha 6$  subunit gene expression in cerebellar granule cells. *J Neurochem* 66: 1810-1818.
41. Jones A, Bahn S, Grant AL, Köhler M, **Wisden W** (1996) Characterization of a cerebellar granule cell-specific gene encoding the GABA<sub>A</sub> receptor  $\alpha 6$  subunit. *J Neurochem* 67: 907-916.
42. Mäkelä R, Lehtonen M, **Wisden W**, Lüddens H, Korpi ER (1996) Blunted furosemide antagonism of cerebellar GABA<sub>A</sub> receptors in ANT rats selectively bred for high alcohol sensitivity. *Neuropharmacology* 35: 1493-1502.
43. Grant AL, Jones A, Thomas KL, **Wisden W** (1996). Characterization of the rat hippocalcin gene: the 5' flanking region directs expression to the hippocampus. *Neuroscience* 75: 1099-1115
44. Grant AL, **Wisden W** (1997). DNA regions supporting hippocalcin gene expression in cell lines. *Mol Brain Res* 52:323-325
45. Herb A, **Wisden W**, Catania MV, Marachel D, Dresse A, Seeburg PH (1997) Prominent dendritic localization in forebrain neurons of a novel mRNA and its product, dendrin. *Mol Cell Neurosci.* 8: 367-374.
46. Jones A, Korpi ER, McKernan RM, Pelz R, Nusser Z, Mäkelä R, Mellor JR, Pollard S, Bahn S, Stephenson FA, Randall AD, Sieghart W, Somogyi P, Smith AJH, **Wisden W** (1997). Ligand-gated ion channel subunit partnerships: GABA<sub>A</sub> receptor  $\alpha 6$  subunit gene inactivation inhibits  $\delta$  subunit expression. *J. Neurosci.* 17: 1350-1362
47. Mäkelä R, Uusi-Oukari M, Homanics GE, Quinlan JJ, Firestone LL, **Wisden W**, Korpi ER (1997). Cerebellar GABA<sub>A</sub> receptors: pharmacological subtypes as revealed by mutant mouse lines. *Mol. Pharmacol* 52: 380-388
48. Bahn S, Jones A, **Wisden W** (1997). Directing gene expression to cerebellar granule cells using GABA<sub>A</sub> receptor  $\alpha 6$  subunit transgenes. *Proc Natl Acad Sci USA* 94: 9417-9421.
49. Mellor JR, Merlo D, Jones A, **Wisden W\***, Randall AD\* (1998). Mouse cerebellar granule cell differentiation: electrical activity regulates the

- GABA<sub>A</sub> receptor  $\alpha 6$  subunit gene. *J Neurosci* 18:2822-2833. (\*WW and ADR are co-senior authors)
50. Emson CL, Bell SE, Jones A, **Wisden W**, McKenzie ANJ (1998). Interleukin (IL)-4-independent induction of immunoglobulin (Ig)E, and perturbation of T Cell development in transgenic mice expressing IL-13. *J Exp Med* 188:399-404
  51. Korpi ER, Koikkaliainen P, Vekovischeva OY, Mäkelä R, Kleinz R, Uusi-Oukari M, **Wisden W** (1999). Cerebellar granule cell-specific GABA<sub>A</sub> receptors attenuate benzodiazepines-induced ataxia: evidence from  $\alpha 6$  subunit-deficient mice. *Eur J Neurosci* 11:233-240.
  52. Nusser Z, Ahmad Z, Tretter V, Fuchs K, **Wisden W**, Sieghart W and Somogyi P (1999) Alterations in the expression of GABA<sub>A</sub> receptor subunits in cerebellar granule cells after the disruption of the  $\alpha 6$  subunit gene. *Eur J Neurosci* 11:1685-1697.
  53. Bahn S, **Wisden W**, Dunnett SB, Svendsen C (1999). The intrinsic specification of GABA<sub>A</sub> receptor  $\alpha 6$  subunit gene expression in cerebellar granule cells. *Eur J Neurosci* 11:2194-2198.
  54. Mäkelä R, **Wisden W**, Korpi ER (1999). Loreclezole and lanthium differentiate cerebellar cell GABA<sub>A</sub> receptor subtypes. *Eur J Pharamcol* 367:101-105
  55. Mellor JR, **Wisden W**, Randall AD (2000). Somato-synaptic variation of GABA<sub>A</sub> receptors in cultured murine cerebellar granule cells: investigation of the role of the  $\alpha 6$  subunit. *Neuropharmacology* 39:1495-1513.
  56. Uusi-Oukari M, Heikkilä J, Sinkkonen ST, Mäkelä R, Hauer B, Homanics GE, Sieghart W, **Wisden W**, Korpi ER (2000). Long range interactions in neuronal gene expression: evidence from gene targeting in the GABA<sub>A</sub> receptor  $\beta 2$ - $\alpha 6$ - $\alpha 1$ - $\gamma 2$  subunit gene cluster. *Mol Cell Neurosci* 16:34-41
  57. Paterlini M, Revilla V, Grant AL, **Wisden W** (2000). Expression of the neuronal calcium sensor family in the rat brain. *Neuroscience* 99:205-216.
  58. Brickley SG, Revilla V, Cull-Candy SG, **Wisden W**, Farrant M (2001) Adaptive regulation of neuronal excitability by a voltage-independent K<sup>+</sup> conductance. *Nature* 409: 88-92 (see the N&V, [Nature 409: 24 – 27, 2001](#))
  59. Campos ML, de Cabo C, **Wisden W**, Juiz JM, Merlo D (2001). Expression of GABA<sub>A</sub> receptor subunits in brain stem auditory pathways: cochlear nuclei, superior olivary complex, and nucleus of the lateral lemniscus. *Neuroscience* 102: 625-638.
  60. Bedford FK, Kittler JT, Muler E, Thomas P, Uren JM, Merlo D, **Wisden W**, Triller A, Smart TG, Moss SJ (2001) GABA<sub>A</sub> cell surface number and subunit



stability are regulated by the ubiquitin protein Plic-1. *Nature Neuroscience* 4:908-916

61. **Wisden W**, Cope D, Klausberger T, Hauer B, Sinkkonen ST, Tretter V, Lujan R, Jones A, Korpi ER, Mody I, Sieghart W, Somogyi P (2002) Ectopic expression of the GABA<sub>A</sub> receptor  $\alpha 6$  subunit in hippocampal pyramidal neurons produces extrasynaptic receptors and an increased tonic inhibition. *Neuropharmacology* 43: 530-549.
62. Aller MI, Jones A, Merlo D, Paterlini M, Meyer AH, Amtmann U, Brickley S, Jolin HE, McKenzie ANJ, Monyer H, Farrant M, **Wisden W** (2003). Cerebellar granule cell Cre recombinase expression. *Genesis* 36: 97-103.
63. Cope DW, Wulff P, Oberto A, Aller MI, Capogna M, Ferraguti F, Halbsguth C, Hoeger H, Jolin HE, Jones A, McKenzie AN, Ogris W, Poeltl A, Sinkkonen ST, Vekovischeva OY, Korpi ER, Sieghart W, Sigel E, Somogyi P, **Wisden W** (2004) Abolition of zolpidem sensitivity in mice with a point mutation in the GABA<sub>A</sub> receptor  $\gamma 2$  subunit. *Neuropharmacology* 47:17-34.
64. Lauder AJ, Jolin HE, Smith P, van den Berg JG, Jones A, **Wisden W**, Smith KG Dasvarma A, Fallon PG, McKenzie AN (2004). Lymphomagenesis, hydronephrosis, and autoantibodies result from dysregulation of IL-9 and are differentially dependent on Th2 cytokines. *J Immunol* 173:113-122.
65. Ogris W, Pörtl A, Hauer B, Ernst M, Oberto A, Wulff P, Höger H, **Wisden W**, Sieghart W (2004). Affinity of various benzodiazepine site ligands in mice with a point mutation in the GABA<sub>A</sub> receptor  $\gamma 2$  subunit. *Biochemical Pharmacology* 68: 1621-1629.
66. Sinkkonen ST, Vekovischeva OY, Möykkynen T, Ogris W, Sieghart W, **Wisden W**, Korpi ER (2004). Behavioral correlates of an altered balance between synaptic and extrasynaptic GABA<sub>A</sub>ergic inhibition in a mouse model. *Eur J Neurosci* 20:2168-2178.
67. Leppä E, Vekovischeva OY, Lindén A.-M., Wulff P, Oberto A, **Wisden W**, Korpi ER (2005). Agonistic effects of the  $\beta$ -carboline DMCM revealed in GABA<sub>A</sub> receptor  $\gamma 2$  subunit I77 point-mutated mice. *Neuropharmacology* 48:469-478.
68. Merlo D, Di Stasi AM, Bonini P, Mollinari C, Cardinale A, Cozzolino F, **Wisden W**, Garaci E (2005) DNA repair in post-mitotic neurons: a gene-trapping strategy. *Cell Death Differ* 12:307-309.
69. Cope DW, Halbsguth C, Karayannis T, Wulff P, Ferraguti F, Hoeger H, Leppä E, Linden AM, Oberto A, Ogris W, Korpi ER, Sieghart W, Somogyi P, **Wisden W**, Capogna M (2005) Loss of zolpidem efficacy in the hippocampus of mice with the GABA receptor  $\gamma 2$  F77I point mutation. *Eur J Neurosci* 21:3002-3016.
70. Aller MI, Veale EL, Linden AM, Sandu C, Schwaninger M, Evans LJ, Korpi ER, Mathie A, **Wisden W\***, Brickley SG\* (2005) Modifying the subunit

*composition of TASK channels alters the modulation of a leak conductance in cerebellar granule neurons. J Neurosci 25:11455-11467. (\*WW and SGB are co-senior authors)*

71. Wulff P, **Wisden W** (2005) *Dissecting neural circuitry by combining genetics and pharmacology. Trends Neurosci 28:44-50 (review article)*
72. Linden AM, Aller MI, Leppä E, Vekovischeva O, Aitta-Aho T, Veale EL, Mathie A, Rosenberg P, **Wisden W**, Korpi ER (2006). *The in vivo contributions of TASK-1-containing channels to the actions of inhalation anesthetics, the  $\alpha 2$  Adrenergic sedative dexmedetomidine, and cannabinoid agonists. J Pharmacol Exp Ther 317:615-626.*
73. Meuth SG, Aller MI, Munsch T, Schuhmacher T, Scheidenbecher T, Meuth P, Kleinschütz C, Pape HC, Wiendl H, **Wisden W**, Budde T (2006). *The contribution of TASK-1-containing channels to the function of dorsal lateral geniculate thalamocortical relay neurons. Mol Pharmacol 69:1468-1476*
74. Korpi ER., Debus F, Linden A-M, Malecot C, Leppä E, Vekovischeva O, Rabe H, Bohme I, Aller MI, **Wisden W**, Luddens H (2007). *Does ethanol act preferentially via selected brain GABA<sub>A</sub> receptor subtypes? The current evidence is ambiguous. Alcohol 41: 163-176.*
75. Wulff P, Goetz T, Leppä E, Linden A-M, Renzi M, Swinny JD, Vekovischeva OY, Sieghart W, Somogyi P, Korpi ER, Farrant M, **Wisden W** (2007). *From synapse to behaviour: rapid modulation of defined neuronal types by engineered GABA<sub>A</sub> receptors. Nature Neuroscience 10: 923-929.*
76. Brickley SG, Aller MI, Sandu C, Veale EL, Alder FG, Sambhi H, Mathie A, **Wisden W** (2007). *TASK-3 two-pore domain potassium channels enable sustained high-frequency firing in cerebellar granule neurons. J. Neurosci 27: 9329-9340.*
77. Linden AM, Sandu C, Aller MI, Vekovischeva OY, Rosenberg PH, **Wisden W**, Korpi ER (2007). *TASK-3 knockout mice exhibit exaggerated nocturnal activity, impairments in cognitive functions, and reduced sensitivity to inhalation anesthetics. J Pharmacol Exp Ther 323:924-934.*
78. Aller MI, **Wisden W** (2008) *Changes in expression of some two-pore domain potassium channel genes (kcnk) in selected brain regions of developing mice. Neuroscience 151:1154-72*
79. Heitzmann D, Derand R, Jungbauer S, Bandulik S, Sterner C, Schweda F, Elwakil AE, Lalli E, Guy N, Mengual R, Reichold M, Tegtmeyer I, Bendahhou S, Gomez-Sanchez CE, Isabel Aller M, **Wisden W**, Weber A, Lesage F, Warth R, Barhanin J (2008). *Invalidation of TASK1 potassium channels disrupts adrenal gland zonation and mineralocorticoid homeostasis. Embo J 27: 179-817.*

80. Trapp S, Aller MI, **Wisden W**, Gourine AV (2008) A role for TASK-1 (KCNK3) channels in the chemosensory control of breathing. *J Neurosci* 28:8844-8850.
81. Linden AM, Aller MI, Leppa E, Rosenberg PH, **Wisden W**, Korpi ER (2008). K<sup>+</sup> channel TASK-1 knockout mice show enhanced sensitivities to ataxic and hypnotic effects of GABA<sub>A</sub> receptor ligands. *J Pharmacol Exp Ther.* 327:277-286
82. Gajendran N, Kapfhammer JP, Lain E, Canepari M, Vogt K, **Wisden W**, Brenner HR (2009) Neuregulin signaling is dispensable for NMDA- and GABA<sub>A</sub>-receptor expression in the cerebellum *in vivo*. *J Neurosci* 29:2404-2413.
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A histology picture ("Cerebros Warhol" by A. Summerfield & **W Wisden**) was reproduced at an art exhibition in Madrid – and published on p195 of "Paisajes neuronales: Homenaje a Santiago Ramon y Cajal". Co-ordinators, DeFelipe J, Markram H & Wagensberg J (Madrid 2007), Consejo Superior de Investigaciones Cientificas