

GRUPELEADER EPIGENETICS

Consultant | Manager Epigenetics Facility | Lecturer

CURRENT POSITION

Sep. 2007 - ... **Independent Group-Leader:** Epigenetics of Complex Diseases; Epigenetics Lab, Department of Medicine II, Klinikum rechts der Isar, Technical University of Munich

PROFESSIONAL EXPERIENCE

- Jan. 2006 – Aug. 2007 **Manager of the Genotyping facility of the *Klinikum Rechts der Isar* & Group-leader ‘Epigenetics of Complex Diseases’ at the Neurogenetics Laboratory; Dept. of Psychiatry, TU-Munich, Germany**
- Jul. 2004 – Dec. 2005 **Project-Leader: Microarray development at the Centre for Addiction and Mental Health, Toronto, Canada**
- Jan. 2003 - Jun. 2004 **Post-doctoral fellow at the Neurogenetics Department, Centre for Addiction and Mental Health, Toronto, Canada**
- Spring 2003 Visiting researcher at the Rudbeck Laboratories in **Uppsala, Sweden**
- Jul. 2002 – Dec. 2002 Post-doctoral fellow at the Centre for Molecular Medicine (ZMMK) in **Cologne, Germany**
- Jan. 2002 – Dec. 2002 Visiting researcher (neuronal-cell culture and neurogenesis of ES cells), Department I of Anatomy, University of Cologne, Germany
- Aug. 1999 - Nov. 1999 Visiting researcher (ES-technology and gene-targeting) in the lab of Prof. K. Rajewsky, the inventor of the ‘*Cre-lox*’ gene knock-out technology, University of Cologne, Germany
- Sept. 1994 Visiting researcher at the Institute of Genetics and Embryology, **St. Petersburg, Russia**
- Jan. 1994 – Jul. 1994 Research position at the Laboratory of Developmental Genetics and Imprinting, The Babraham Institute in **Cambridge, United Kingdom**

EDUCATION

- 2000-2002 **PhD in Genetics;** Institute of Genetics, Cologne
Thesis: *Gametic imprinting and neurogenesis: Analysis of the parental imprinted Snurf/Snrpn gene-cluster in humans and in mouse embryonic stem cells.* Grade: A+
- Aug. 1998 **Diploma of Biology** in the lab of Prof. Dr. Walter Doerfler, Cologne/GER and in collaboration with Prof. Dr. Bernhard Horsthemke, Essen/GER
Thesis: *Aspects of DNA-methylation: Genomic Imprinting and stability of de novo methylation-patterns.* Grade: A

PROFESSIONAL AFFILIATIONS

- ◆ Epigenetics Society
- ◆ American Society of Human Genetics
- ◆ National Genome Net Germany (NGFN)
- ◆ Epigenome Network of Excellence
- ◆ German Academic International Network (GAIN)
- ◆ Mars Society

TEACHING EXPERIENCE

- 2007- Present Supervision of postdoctoral fellows, technicians and graduate-students at the Epigenetics Lab plus co-supervision of members of the Gastrolab II; Klinikum rechts der Isar; TU-Munich/Germany
- 2006- 2007 Supervision of postdoctoral fellows, technicians and graduate-students at the Neurochemistry and Neurogenetics Lab; TU-Munich/Germany
- 2004 - Present Consulting function (epigenetics technology) for industry/academia
- 2003 - 2005 Supervision of postdoctoral fellows, technicians, Ph.D. and Master's-students at the CAMH Epigenetic Laboratory, Toronto/CAN
- 2002 - Present Numerous presentations or invited talks and poster-presentations
- 2002 - Present Seminars on epigenetic profiling in complex genomes in several institutes in Sweden, Germany and Canada
- 1997 - 2002 Training courses for diploma-students in human genetics and virology, Cologne/GER
- 1998 - 2001 Lectures on human genetics, virology and epigenetics at the University of Cologne/GER
- 1997 Organization of international Epigenetics symposium Cologne/GER
- 1995 - 1997 Training courses genetics for undergraduate students, Institute of Genetics, Cologne/GER

PATENTS

- 2005 **A. Schumacher & A. Petronis (2005).** Epigenetic microarrays: CpG-Amplicon and Arrays protocol. **US patent** WO/2005/078121; **European patent** EP1723256; **International patent** PCT/CA2005/000211
- 2006 Patent licensed to leading international Biotech company.

LANGUAGES

Fluent in German and English, good French reading and speaking capabilities.

CERTIFICATES/COURSES

- 2000 Certificate for working with laboratory animals (i.e. mice), University of Cologne
- 2004 Ethical Conduct for Research Involving Humans, CAMH/Toronto
- 2006 Seminar-series 'Biotech Entrepreneurship 101' at the MaRS Business Resource Centre, Toronto
- 2007 Neuropathology course at the Technical University/Munich
- 2007 Seminar-series on high-tech business models, UnternehmerTUM GmbH

OTHER PROFESSIONAL ACTIVITIES

- ◇ Referee for several journals such as: *Nucleic Acid Research, Molecular Psychology, Neuropsychiatric Genetics, Schizophrenia Research, American J. of Medical Genetics, Schizophrenia Bulletin, J. of Neurochemistry, Human Mol. Genetics, BioTechniques; British J. of Cancer, Neurobiology of Aging and Nature Genetics.*
- ◇ Referee/Consultant, *National Alliance for Research On Schizophrenia and Depression, NARSAD*
- ◇ Webmaster *Epigenomics.ca, Grailmaster.com, MethyLogiX.com*
- ◇ Consulting (epigenetic technologies)
- ◇ Departmental administrative duties such as organizing seminars, inviting speakers and managing the tissue & DNA banks, Graduate Admissions Committee TU-Munich

SPECIAL EXPERTISE

- ◇ Epigenetics
- ◇ Neuroscience
- ◇ High-throughput genotyping
- ◇ DNA- methylation profiling
- ◇ Microarray technology (different platforms)
- ◇ Mass spectrophotometry (Sequenom; Bruker)
- ◇ Biomarker discovery
- ◇ Bisulfite sequencing
- ◇ Transgene technology
- ◇ Conditional gene-knockout
- ◇ Embryonic stem cell technology
- ◇ Cancer Genetics
- ◇ Pharmacoeogenomics
- ◇ ES cell differentiation
- ◇ Mouse genetics/breeding
- ◇ Alzheimer's disease
- ◇ Bipolar disorder
- ◇ Frontotemporal dementia
- ◇ Schizophrenia
- ◇ All standard lab methods
- ◇ Association studies, HapMap

COMPUTER SKILLS

HTML & CSS programming, Microsoft Office (Word, Excel, Outlook, Power Point), Photoshop, Adobe Acrobat, Corel Draw, Endnote, Acuity Statistical Software, GenePix Microarray Software, Misc. PCR designer software, Macromedia HomeSite, MassARRAY Designer, EpiTyper, FTP and networking, among many others. Currently learning 'R' programming for biostatistical computing and graphics.

RESEARCH INTERESTS

- ◇ Epigenetic profiling of complex diseases (i.e. late-onset Alzheimer's, cancer, PTSD)
- ◇ Pharmacoeigenomics (drug-epigenome interactions)
- ◇ Influence of environment (e.g. nutrition, radiation) on human health and epigenetic integrity
- ◇ Development of epigenetic profiling methods (microarrays and nucleotide chemistry)
- ◇ Cognitive processes and game-theory (i.e. chess, currently writing a book on the science of chess, especially focused on cognition & psychology)

AWARDS

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| 2004 | NARSAD Young Investigator Award, USA |
| 2004 | CIHR Award for Schizophrenia Research 2004, CAN |

REFERENCES

1. Prof. Art Petronis The Krembil Family Epigenetics Laboratory, Centre for Addiction and Mental Health, 250 College St, Toronto, ON, Canada M5T 1R8
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Email: walter.doerfler@viro.med.uni-erlangen.de
3. Dr. Jon Mill Social, Genetic and Developmental Psychiatry Centre, King's College London, De Crespigny Park London, United Kingdom, SE5 8AF
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4. Assist. Prof. John Vincent Molecular Neuropsychiatry & Development laboratory, Centre for Addiction and Mental Health, 250 College St, Toronto, ON, Canada M5T 1R8;
Phone: +1-416-5358501-6487; Fax: +1-416-979-4666
Email: john_vincent@camh.net
5. Prof. James Kennedy Neurogenetics department, Centre for Addiction and Mental Health, 250 College St, Toronto, ON, Canada M5T 1R8
Phone: +1-416-9794987; Fax: +1-416-979-4666
Email: james_kennedy@camh.net

Peer reviewed publications

- S.-C. Wang, B. Oelze & **A. Schumacher** (2008). Age-specific epigenetic drift in late-onset Alzheimer's disease. PLoS ONE; Jul 16; 3(7): e2698.
Note 1: Worldwide the first proof of whole genome epigenetic abnormalities in late-onset Alzheimer's disease. **Note 2:** Featured in many newspaper articles around the globe. **Note 3:** Paper has been selected by the Alzheimer Research Foundation as an "ARF Recommends" paper. **Note 4:** Selected by the *Faculty of 1000 Medicine* as landmark 'must read' paper.
- J. Mill, T. Tang, Z. Kaminsky, T. Khare, S. Yazdanpanah, L. Bouchard, P. Jia, A. Assadzadeh, J. Flanagan, **A. Schumacher**, S.-C. Wang & A. Petronis (2008). *Epigenomic Profiling Reveals DNA Methylation Changes Associated with Major Psychosis*. American Journal of Human Genetics; Mar; 82(3): 696-711. (IF: 12.6).
Note 1: 2nd highest ranked journal in the Genetics field. **Note 2:** Cover story, which was featured in many newspaper articles around the globe. **Note 3:** This was the worldwide the first proof of whole genome epigenetic changes in schizophrenia and bipolar disorder.
- **A. Schumacher**, A. Weinhäusl & A. Petronis (2008). *Design and application of microarrays in DNA methylation profiling*. Methods Mol Biol. 439: 109-29.
- **A. Schumacher**, P. Friedrich, J. Diehl-Schmid, B. Ibach, R. Perneczky, T. Eisele, R. Vukovich, H. Förstl & M. Riemenschneider (2007). *No association of TDP-43 with sporadic frontotemporal dementia*. Neurobiology of Aging, Jul 3; (IF: 5.6).
Note: Highest ranked journal in the Aging, Geriatrics & Gerontology field
- **A. Schumacher**, P. Friedrich, J. Diehl, B. Ibach, A. Schoepfer-Wendels, J.C. Mueller, L. Konta, S.M. Laws, A. Kurz, H. Förstl, M. Riemenschneider (2007). *No association of common VCP variants with sporadic frontotemporal dementia*. Neurobiology of Aging, Jul 4; (IF: 5.6).
Note: Highest ranked journal in the Aging, Geriatrics & Gerontology field
- **A. Schumacher**, P. Friedrich, J. Schmid, B. Ibach, T. Eisele, S.M. Laws, H. Förstl, A. Kurz & M. Riemenschneider (2006). *No association of chromatin-modifying protein 2B with sporadic frontotemporal dementia*. Neurobiology of Aging, Sept 14; (IF: 5.6).
Note: Highest ranked journal in the Aging, Geriatrics & Gerontology field. **Note 2:** First introduction of 'epigenetic' SNPs.
- J. Flanagan, V. Pependikyte, N. Pozdniakovaite, M. Sobolev, A. Assadzadeh, **A. Schumacher**, M. Zangeneh, L. Lau, C. Virtanen, S-C. Wang & A. Petronis (2006). *Intra- and Inter- Individual Epigenetic Variation in Human Germ Cells*. American Journal of Human Genetics; 79: 67-84 (IF: 12.6).
Note 1: A Nature Reviews Genetics Research Highlight for 2006! **Note 2:** 2nd highest ranked journal in the Genetics field.
- **A. Schumacher**, P. Kapranov, J. Flanagan, Z. Kaminsky, A. Assadzadeh, P. Yau, C. Virtanen, J. Cheng, N. Winegarden, T. Gingeras, & A. Petronis (2006). *Microarray-based DNA methylation profiling: technology and applications*. Nucleic Acids Res., Vol.34, 2: 528-542 (IF: 7.3)
Note 1: On NAR top 'hot papers' list 2006. **Note 2:** Cover story of this issue.
- **A. Schumacher** & A. Petronis (2006). *Epigenetics in complex diseases: from theory to laboratory praxis*. Current Topics in Microbiology and Immunology: 310: 81-115. (IF: 3.0)

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- T. Schwarzbraun, J.B. Vincent, **A. Schumacher**, D.H. Geschwind, J. Oliveira, Ch. Windpassinger, L. Ofner, M. Ledinegg, P.M. Kroisel, K. Wagner & E. Petek (2004). *Cloning, genomic structure, and expression profiles of TULIP1 (GARNL1), a brain-expressed candidate gene for 14q13-linked neurological phenotypes, and its murine homologue.*
Genomics, Sep; 84(3): 577-86. (IF: 3.5)
- **A. Schumacher** & W. Doerfler (2004). *Influence of in vitro manipulation on the stability of methylation patterns in the Snurf/Snrpn-imprinting region in mouse embryonic stem cells.*
Nucleic Acids Res., Volume 32, 5: 1566-1576 (IF: 7.3)
- **A. Schumacher**, S. Arnhold, K. Addicks & W. Doerfler (2003). *Staurosporine is a potent activator of neuronal, glial and "CNS stem cell"-like neurosphere differentiation in murine embryonic stem cells.*
Mol Cell Neurosci., Aug;23(4): 669-80 (IF: 5.4)
- **A. Schumacher** (2001). *Mechanisms and brain specific consequences of genomic imprinting in Prader-Willi and Angelman syndrome.*
Gene Funct. Dis., 2: No.1, 1-19.
Note: Wiley-VCH Top 10 downloaded paper 2001.
- **A. Schumacher**, P. Koetsier, J. Hertz & W. Doerfler (2000). *Epigenetic and genotype-specific effects on the stability of the novo imposed methylation patterns in transgenic mice.*
J. Biol. Chem., 275: 37915-37921 (IF: 7.7)
- **A. Schumacher**, K. Buiting, M. Zeschnigk, W. Doerfler & B. Horsthemke (1998). *Methylation analysis of the PWS/AS region does not support an enhancer-competition model.*
Nature Genet. 19: 324-325; (IF: 40.4)
Note: Highest ranked journal in the Genetics field.

Non-peer reviewed publications (selection)

- **A. Schumacher** (2003). *Calculation of cell densities and layer-numbers in staurosporine induced ovoid-like neurospheres.* Res Telegraph. (Rus), 1: 2-9. (Invited research communication).
- **A. Schumacher** (2007) Online tutorial: *Schumacher's Guide #1: Bisulfite conversion of DNA for methylation fine-mapping.* At www.MethyLogiX.com
- **A. Schumacher** (2007) Online tutorial: *Schumacher's Guide #2: Design and application of microarrays for identifying of DNA methylation.* At www.MethyLogiX.com

Recent posters/presentations (selection)

- **A. Schumacher**
Epigenetic drift in late-onset Alzheimer's disease and other neurobehavioral disorders.
Invited Presentation, MPI Tuesday Colloquium, Max-Planck-Institute for Psychiatry Munich/Germany.
- M. Kantlehner, P. Hartmann, E. Anbarci, M. Alunni-Fabbroni & **A. Schumacher**
A Reproducible High-throughput Methylome Analysis of a Single Cell
Poster Presentation, HUGO's 13th Human Genome Meeting; Hyderabad/India 2008
- **A. Schumacher & M. Ebert**
Transgenerational epigenetic effects and Pharmacoepigenetics of complex disorders.
Invited Presentation, SFB Childhood disorders, Tutzling 2008

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- **A. Schumacher**
Approaches to study epigenetic drift in colon cancer.
Invited Presentation, Cancer research Unit, Klinikum rechts der Isar, Munich 2007
- **A. Schumacher**
Epigenetics in late-onset Alzheimer's disease.
Invited Presentation, University of Guelph, Guelph 2007
- M. Riemenschneider, **A. Schumacher** et al.
New susceptibility gene conferring risk to AD and FTD.
Poster, Int. Alzheimer Meeting, Madrid 2006
- **A. Schumacher** et al.
Epigenetic variation in schizophrenia and bipolar disorder.
TU-Seminars in Psychiatry, Munich 2006
- Z. Kaminsky, **A. Schumacher** et al.
Epigenetic discordance in monozygotic and dizygotic twins.
Harvey Stancer Research Day, Toronto 2006
- **A. Schumacher** et al.
Epigenetic variation in late-onset Alzheimer's disease.
Invited Presentation, Transregio, LMU-Munich, Munich 2007
- M. Hofner, A. Weinhäusl, **A. Schumacher**, K. Vierlinger & C. Noehammer
Investigation of DNA methylation testing using microarrays.
Chiptechnologies Meeting, Frankfurt 2006
- **A. Schumacher**
DNA methylation profiling in complex diseases.
Invited Presentation, RWTH Aachen, Aachen 2006
- **A. Schumacher**
'Epigenetic' microarray in the study of complex genomes.
Invited Presentation, 2nd Weißenburg Symposium, Weißenburg 2005

(Several other publications, including potentially high impact papers are in preparation or already submitted).