

Prof. Dr. med. Dr. med. h.c. mult. Eberhart Zrenner

Ophthalmology



Born Oct. 18, 1945
Married, 3 children

Distinguished Professor of

**Centre for Ophthalmology
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Qualifications:

University of Erlangen and Munich	Student	1966-72	Medicine (Approbation as physician 1973) and in parallel 4 Semesters of Electronic Engineering
Technical University of Munich	MD	1973	Medicine (Information transfer in the eye) (summa cum laude)
Max-Planck-Institute for Physiol. and Clin. Research	Post Doc	1973-74	Sensory physiology
National Inst. of Health, USA	Fogarty fellowship	1977-78	Neurophysiology
University of Giessen	Habilitation (PD)	1981	Cell physiology
University of Munich	Ophthalmol. board exam	1985	Ophthalmology

Positions:

1973	Internship in Surgery and Internal Medicine, Munich
1974-1976	Research fellow at the Max-Planck-Institute for Physiological and Clinical Research, Bad Nauheim, Dept. of Experimental Ophthalmology, and Eye Hospital in Frankfurt and Munich
1977-1978	Fogarty International Fellow, NIH, Laboratory of Vision Research
1979-1984	Experimental Ophthalmology at the Max-Planck-Institute for Physiological and Clinical Research, Bad Nauheim,
1985-1989	Associate Professor and Head of a Research Unit of the Max-Planck-Society at the University Eye Hospital, Munich (Prof. Lund) ; Hon.Prof. Univ. of Giessen
1989	Full professor of Ophthalmology, University of Tuebingen, Germany
since 1989	Head of "Pathophysiology of Vision and Neuro-Ophthalmology"
1991- 2007	Executive Director of the University Eye Hospital Tübingen
1992	Offer of Full Prof. at Aston-University, Birmingham, England (declined)
1993	Offer of Head of Dept. Ophthal., McGill Univ. Montreal Canada (declined)
1994 - 1995	Dean of the Medical Faculty of the University of Tuebingen
Since 1995	Coordination of a Consortium "Subretinal Implants"
1998 – 2000	Dean of the Medical Faculty of the University of Tuebingen
Since 2005	Chairman of the European Vision Institute
2007-2011	Head of the strategy committee of the Medical Faculty, Tuebingen

2007 - 2011	Director of the Centre for Ophthalmology, together with Prof. K.U. Bartz-Schmidt
2007-	Professor at the Institute for Ophthalmic Research, and Head of Pathophysiology of Vision, University of Tuebingen
2011-	Chairman of the Center for Neurosensory Systems (ZfN), University of Tuebingen
2013-	Distinguished Professor at the Center for Integrative Neuroscience (CIN center of Excellence), University of Tuebingen

Honors and Awards:

1973	Dissertation award for an experimental study on the optic qualities of the eye
1976	Fogarty fellowship award
1979	Franceschetti-Liebrecht-Award of the German Ophthalmological Society
1984	NATO travel award, cooperation with the University of Cambridge, UK
1995	Alcon Research Award (100.000\$)
1998	Memorial Medal of Charles University, Prague
1998	Election as Member of the "Heidelberger Akademie der Wissenschaften"
1999	Election as Member of the „German Academy of Sciences, Leopoldina"
1999	MacKenzie Memorial Award
2000	von Graefe-Award of the German Ophthalmological Society
2002	Order of the Federal Republic of Germany, "Bundesverdienstkreuz am Bande"
2006	"Bartimaeus Award" of the Detroit Institute of Ophthalmology awarded at the World Congress of Artificial Vision 2006
2007	Emiko Adachi-Award of the International Society for Clinical Electrophysiology of Vision (ISCEV)
2009	Karl Heinz Beckurts Award
2009	Claire Jung Preis
2010	Pfizer-Award for Visiting Professorship an der State University New York
2010	Retina International: Special Recognition Award
2011	Edridge Green Award
2011	EURETINA Innovation Award
2011	Honorary doctorate, Naresuan University, Thailand
2012	Honorary doctorate Medical University of Lublin, Poland
2013	Hong Leong Visiting Professorship National University of Singapore
2013	Hector Award, Hector Foundation, Weinheim

Other Scientific Functions:

1985	Secretary General of the Internat. Soc. for Clinical Electrophysiology of Vision
1986	Co-Founder and Editor of "Clinical Vision Sciences", Pergamon Press, Oxford,
1991 - 2000	President of the International Society for Clinical Electrophysiology of Vision
1991 - 1998	Speaker to the DFG core program "Hereditary Retinal Degeneration"
1993 - 2001	Section Editor of „Vision Research“ and „Neuro-Ophthalmology“
1997-2004	Speaker of a center core grant „SFB 430
2001-2007	Editorial Board member for „Investigative Ophthalmology and Visual Science“
1999-2005	Senator of the Max-Planck-Society, Germany
2000 -2008	Editor in Chief of „Neuro-Ophthalmology“
2000-2003	President of the International Society for Ocular Toxicology
since 2002	Editorial Board Member of the ISCEV Documenta Ophthalmologica
since 2005	Speaker of the DFG Clinical Research Group "Hered. Retinal Degenerations"
since 2004	Advisor ("Fachkollegiat") of the German Research Council ("Neurosciences")

Position on Advisory Boards:

- Seit 1980 Advisor for the German Research Council in several projects (SFB 73, SFB 325, SFB 200, SFB 307, 539)
- Seit 1988 Chairman of the Scientific Advisory Board of the German Retinitis Pigmentosa Foundation
- Since 1995 co-chairman of Retina International
- Member of the Quality Management Committee for Sensory Functioning Testing of the German Ophthalmological Society
- 1996-1997 Member of the Research Council of Baden-Wuerttemberg ("Landesforschungsbeirat"), appointed by the Minister of Research and Technology

- 2000-2008 Member of a council on Health ("Gesundheitsforschungsrat"), appointed by the Federal Minister of Research
- 2001-2008 Member of the Neuroscience Board of the Research Center („Beirat des Neurowissenschaftlichen Forschungszentrums, Berlin“)
- 2002-2004 Head of a Senate Commission „Medical Engineering“ of the Helmholtz-Gemeinschaft
- Since 2005 Chairman of the European Vision Institute, Brüssel
- Member of a Federal Research Council (“Wissenschaftsrat”) 2003 – 2006. Reappointed by the president of the Federal Republic of Germany for a second term in 2006-2009
- Member of the Scientific Advisory Committee of Alcon Research Institute 2003-2009
- 2003-2005 appointed Member of “Expert group for structure of the Medical Schools” of the Federal Ministry of Education and Research
- Since 2003 Chairman of the Board of Retina Implant AG
- 2005-2013 Senator of the University of Tübingen (3 times re-elected by the University – Professors)
- Since 2004 appointed as Member of the Academia Ophthalmologica Europae
- 2006-2009 Full member of the German Federal “Gesundheitsforschungsrat” and member of the Working group “Roadmap”
- 2007-2011 Member of the Hochschulrat of the University of Erlangen
- 2011- 2012 Chairman of the Founding Committee of the Medical Faculty of the University of Oldenburg (Faculty has started on Oct 15, 2012)
- 2012- Member of the Kuratorium of the Max-Planck Institute for Intelligent Systems, Tübingen-Stuttgart

Scientific interests:

Physiology and pathophysiology of the visual system; neuro-ophthalmology, functional and neuropharmacological studies *in vivo*; single cell recording from the mammalian retina for studies on structure and function of the retina, psychophysics, clinical electrophysiology, colour vision, hereditary retinal degeneration, non-invasive techniques of functional diagnostics in ophthalmology; ocular toxicology; subretinal implants.

Publications:

461 original papers in refereed neurobiological, physiological and ophthalmological journals
 h-Index: 53 (Source: quadsearch.csd.auth.gr)
 Total citations: 8729
 Total Impact Factor: 704
 98 contributions to ophthalmological and neurobiological monograph series and handbooks
 35 monographs or chapters in monographs
 >400 quotable abstracts and short contributions to journals

Selected Publications on Retinal Implant Research

- Zrenner E, Stett A, Weiss S, Aramant RB, Guenther E, Kohler K, Miliczek K-D, Seiler MJ, Haemmerle H: Can subretinal microphotodiodes successfully replace degenerated photoreceptors? **Vision Research** **39**, 2555-2567 (1999)
- Guenther E, Troeger B, Schlosshauer B, Zrenner E: Long-term survival of retinal cell cultures on retinal implant materials. **Vision Res** **39**, 3988-3994 (1999)
- Zrenner E: Will Retinal Implants Restore Vision? **Science** **295**, 1022-1025 (2002)
- Gekeler F, Szurman P, Grisanti S, Weiler U, Claus R, Greiner TO, Völker M, Kohler K, Zrenner E, Bartz-Schmidt KU : Compound subretinal prostheses with extra-ocular parts designed for human trials: successful long-term implantation in pigs. **Graef Arch Clin Exp** **245**, 230-241 (2007)
- Zrenner E, Wilke R, Sachs H, Bartz-Schmidt K, Gekeler F, Besch D, Greppmaier U, Harscher A, Peters T, Wrobel G, Wilhelm B, Bruckmann A, Stett A, SUBRETStudy Group: Visual Sensations Mediated By Subretinal Microelectrode Arrays Implanted Into Blind Retinitis Pigmentosa Patients. **Biomed Tech** **53**, 218-220 (2009)

- Wilke R., Gabel VP., Sachs H., Bartz Schmidt KU., Gekeler F., Besch D., Szurman P., Stett A., Wilhelm B., Peters T., Harscher A., Greppmaier U., Kibbel S., Benav H., Bruckmann A., Stingl K., Kusnyerik A., Zrenner E Spatial Resolution and Perception of Patterns Mediated by a Subretinal 16-Electrode Array in Patients Blinded by Hereditary Retinal Dystrophies. **INVEST OPHTH VIS SCI** **52**, 5995-6003 (2011)
- Bosse B., Zrenner E., Wilke R Standard ERG equipment can be used to monitor functionality of retinal implants. **Conf Proc IEEE Eng Med Biol Soc.** 1089-1092 (2011)
- Zrenner E., Bartz-Schmidt KU., Benav H., Besch D., Bruckmann A., Gabel V-P., Gekeler F., Greppmaier U., Harscher A., Kibbel S., Koch J., Kusnyerik A., Peters T., Stingl K., Sachs H., Stett A., Szurman P., Wilhelm B., Wilke R.: Subretinal electronic chips allow blind patients to read letters and combine them to words. **Proc Roy Soc B - BIOL SCI** **278**, pp. 1489-1497 (2011), IF = 5.06
- Stingl K, Bach M, Bartz-Schmidt KU, Braun A, Bruckmann A, Gekeler F, Greppmaier U, Hörtdörfer G, Kusnyerik A, Peters T, Wilhelm B, Wilke R, Zrenner E. Safety and efficacy of subretinal visual implants in humans: methodological aspects. **Clin Exp Optom.** 96: 4-13 (2013)
- Stingl K., Bartz-Schmidt K.U., Besch D., Braun A., Bruckmann A., Gekeler F., Greppmaier U., Hipp S., Hörtdörfer G., Kernstock C., Koitschev A., Kusnyerik A., Sachs H., Schatz A., Stingl K.T., Peters T., Wilhelm B. and Zrenner E.: Artificial vision with wirelessly powered subretinal electronic implant alpha-IMS. **Proc. R. Soc. B.- Biol. Sci** **280**, 20130077, published online 20 February 2013, IF 5.06

Selected other Publications

- Zrenner E., Artificial vision: Solar cells for the blind. **Nature Photonics** 6, 344–345 (2012)
- Rejdak R., Junemann A., Grieb P., Thaler S., Schuettauf F., Choragiewicz T., Zarnowski T., Turski W A., Zrenner E Kynurenic acid and kynurenine aminotransferases in retinal aging and neurodegeneration. **PHARMACOL REP** **63**, pp. 1324-1334 (2011)
- Seeliger M, Grimm C, Stählberg F, Friedburg F, Jaissle G, Zrenner E, Guo H, Remé CE, Humphries P, Hofmann F, Biel M, Fariss RN, Redmond TM, Wenzel A: New views on RPE65 deficiency: the rod system is the source of vision in a mouse model of Leber congenital amaurosis. **Nature Genetics** 29, 70-74 (2001)
- Kohl S, Marx T, Giddings I, Jägle H, Jacobson SG, Apfelstedt-Sylla E, Zrenner E, Sharpe LT, Wissinger B: Total colourblindness is caused by mutations in the gene encoding the (-subunit of the cone photoreceptor cGMP-gated cation channel. **Nature Genetics** 19, 257-259 (1998)
- Strom TM., Nyakatura G., Apfelstedt-Sylla E., Hellebrand H., Lorenz B., Weber BHF., Wutz K., Gutwillinger N., Rütger K., Drescher B., Sauer C., Zrenner E., Meitinger T., Rosenthal A., Meindl A An L-type calcium-channel gene mutated in incomplete x-linked congenital stationary night blindness. **Nature Genetics** **19**, pp. 260-263 (1998)
- Reitner A, Sharpe LT, Zrenner E: Is colour vision possible with only rods and blue-sensitive cones? **Nature** 352, 798-800 (1991)

- Gouras P, Zrenner E: Enhancement of luminance flicker by color-opponent Mechanisms. **Science** 205, 587-589 (1979)

Patents

- Patent-group 4451P001, Retina Implant with energy coupling ET 20.08.2003 Pat.# DE 97 05 988.0-09
6 Patents: DE, FR, GB, IT, JP, USCIP 6,298,270
- Patent-group 4451P002, Lateral Retina access ET 31.08.2000.. Pat.# DE 197 41 487.7-09
13 Patents: DE, AT, CH, DK,ES, FR, GB, IT, JP, NL, SE, USCIP, USCON 6,761,724
- Patent-group 4451P003, Retina Implant with subtractive circuit ET 17.11.2010 Pat# CH EP 1 177 011
6 Patents: CH, DE, FR, GB, JP, USCIP 6,804,560
- Patent-group 4451P004, Retina Implant with external ring antenna,ET 10.12.2008. Pat.# CH EP178 763
5 Patents: CH, FR, GB, JP, USCIP 6,847,847
- Patent-group 4451P005, Neuro-Implant security circuit, ET 09.05.2007, Pat# DE 101 51 650.9-54
5 Patents: DE, CH, FR, JP, USCON 7,272,447
- Patent-group 4451P006, Stray light suppression in IR-coupling ET 20.09.2006, Pat.DE 103 04 831.6-55
8 Patents: DE, AT, CH, FR, GB, IT, JP, USCON 11/194,017
- Patent-group 4451P007, Logarithmic Cell, ET 23.06.2003 Pat.# DE 03 29 615.8-55
9 Patents: DE, CH, EPWOT1, FR, GB, JP, KR, USCON 7,751,896, INT PCT/EP2004/005975
- Patent-group 4451P010, Retina Implant with Nanocontacts, ET 09.09.1999, Pat.# DE 97 05 987.2-09
4 Patents: DE, CH, FR, GB
- Patent-group 4451P011, Retina Implant with holes, ET 15.12.2005, Pat. # DE 197 05 304.1-09
1 Patent: DE
- Patent-group 4451P103, Stimulation Parameters, AT: 24.04.2007, Pat.# DE 10 2006 021 258.4-55
4 Patent appl.: DE, EP(WO), JP, US(WO) 12/298,713
- Patent-group 4451P108, Rhodopsin Chip AT: 20.03.2009, Pat# DE 10 2009 015 389.6-55
4 Patents appl.: DE, EPWO, JPWO,USCONW 13/236,569
- Patent Group 5402P135, Refractometric Surfaces/Fundus –imaging, Pat.# DE 196 39 809.6-52
2 Patents appl.: DE, INT PCT/EP97/05270
- Patent Group 5402P144, Assessing refractive errors, ET 19.08.1999 Pat.# DE 197 19 694.2-09
2 Patents: DE, INT PCT/EP 98/02742
- Patent Group 5402P146, Adaptometer Spectacles, ET 25.04.2002 Pat.# 197 29 102.3-09
1 Patent DE
- Patent Group 5402P346, Artificial Synapse, AT 19.04.2007, Pat.# DE 10 2007 020 305.7
2 Patents appl.: DE, INT PCT/EP2008/003141
- Patent Group 5402P393, Transtympanal Signal Transduction, AT 28.11.2007 Pat.# DE 0 2007 058
826.9-35
1 Patent appl; DE
- Patent Group 5402P479, Marble Electrode, AT 01.02.2013, Pat.# DE 10 2012 101 337.3
2 Patents appl.: DE, INT PCT/EP2013/052098

Recent and current research grants in related areas (selection)

EVI-GENORET 01/04/2005 - EU-FP6 (Integrated Project (IP))31/03/2009; 1.084.673 Euro
 BioChancePLUS-3: Retina Implantat: 2005 – 2007 BMBF 1.263.793,00 €
 KFG-EN 10/2005-10/2008 - 09/2011 DFG (Klinische Forschergruppe) 3.486.000,00 €
 POLEXGENE 01/06/2006 - 31/05/2009 EU-FP 6 (Specific Targeted Project (STREP)
 202.500,00 €
 Autonomes Neurochemisches Implantat – ANI“ 2008 – 2010 BMBF 110.000,00 €
 Schwarz-Foundation - personal grant, 2008 - 2018, 1 Mio € p.a
 EuroVisionNet 01/03/2008 - 28/02/2012 EU-FP7 (Collaborative Project) 192.959,00 €
 HOPE 01/04/2009 - 31/03/2012 BMBF 799.500,00 €, renewed for 3 years in 2012
 TREATRUSH 01/02/2010 - 31/01/2014 EU-FP7 (Collaborative Project) 625.492,80 €
 RdCVF 01/03/2010 - 28/02/2013 EU-FP7 (Collaborative Project) 505.600,00 €
 POLEXGENE 2011-2014 EU-FP 7 ~ 400.000.- €
 RHORCOD 2010- 2013 EU FP-7 ~ 500.000.- €

Present Collaborators on Running Projects (Selection of major projects)

Prof. Jose Sahel, Paris; Prof Robert MacLaren, Oxford; Prof. Richard Weleber; Oregon;
Prof. Albrecht Rothermel, Ulm; Prof. Berger Zurich; Prof. Weber, Regensburg; Prof.
Martin Biehl, Munich; Prof. Peter Humphries, Dublin; Prof. Rejdak, Lublin; Prof. Shomi
Bhattacharya, London; Dr. Caroline Chee, Singapore; Dr. Shi-Chi YEN, Singapore; Prof.
Nemeth, Budapest; and many others