

CURRICULUM VITAE

Volker Enzmann, Ph.D.

1. Personal Information:

Work Address: Dept. of Ophthalmology
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Present Position: Research Director at the Dept. of Ophthalmology,
Inselspital, University of Bern, Switzerland

2. Academic Degrees:

1991	M.Sc. in Biology	University of Leipzig, Germany
1995	Ph.D. in Immunology / Cell Biology	University of Leipzig, Germany
2010	Venia Docendi	University of Bern, Switzerland

3. Academic and Professional Experiences:

10/86 - 07/90	Study of biology at the University of Leipzig
09/90 - 09/91	Master thesis in immunology <u>Subject:</u> "Histological and immunohistochemical investigations at peripheral lymphatic organs"
10/91 - 09/94	Ph.D. thesis at the faculty of Biological Sciences, Institute of Zoology <u>Subject:</u> "Investigations at the influence of stress on the immunological reactivity of rats and the influence of the neurotransmitter vasopressin and oxytocin on different parameter of immunocompetent cells in vitro"
10/94 - 03/95	Fellow at the Institute of Virology (Leipzig University, Germany)
04/95 - 12/97	Postdoc Fellow at the research laboratories of the Dept. of Ophthalmology of the Leipzig University, Germany
01/98 - 12/00	Lab Supervisor at these laboratories
01/01 - 01/02	Research Assistant at the Dept. of Ophthalmology and Visual Sciences, School of Medicine, University of Louisville (UofL), KY
02/02 - 10/05	Instructor and Junior Faculty at the Dept. of Ophthalmology and Visual Sciences, School of Medicine, UofL, KY
07/04 - 07/06	Associated Faculty, Department of Microbiology and Immunology, School of Medicine, UofL, KY
01/05 - 07/06	Member of the Stem Cell Program, James Graham Brown Cancer Center, UofL, KY
01/05 - 07/06	Assistant Professor at the Dept. of Ophthalmology and Visual Sciences, School of Medicine, UofL, KY
Since 08/06	Research Director at the Dept. of Ophthalmology, Inselspital, University of Bern, Switzerland
Since 03/10	Lecturer at the Dept. of Ophthalmology, Inselspital, University of Bern, Switzerland

4. Teaching:

Lectures:

2002, 2005	OPTH-909	Ophthalmologic Research (UofL)
2004 - 06	MBIO-658	Cellular and Molecular Immunology Course (UofL)
2006	OPTH-826	Stem Cells in Retinal Research (UofL)
2007 - 09	PBL	Medicine 1 st year (UniBe)

Mentor:

2003, 2004	Summer Research Scholar's Program, UofL
2005	High School Summer research Internship Program, UofL
2005	EPSCoR Summer Research Program, UofL

Trainees:

- Yasuyuki Yamauchi, MD (10/02 – 03/05): Retina Fellow from Tokyo University, Tokyo, Japan. Awarded with the Charles D. Kelman Scholar Award in 2003.
- Pelin A. Sonmez, MD (10/03 – 02/05): Research Fellow from Dr. Sami Ulus Children's Hospital, Ankara, Turkey. Awarded with a TUBITAK grant in 2004.
- Yoshiaki Katagiri, MD (04/05 – 07/06): Retina Fellow from Tokyo University, Tokyo, Japan.
- Katrin Spitzer (07/07 – 12/07): M.Sci. Student from IMC Fachhochschule Krems, Austria.

Mentor Ph.D. Thesis:

- Yang Li (University of Louisville, Louisville, KY, USA) 2004-2006
- Rahel Zulliger (University of Bern, Bern, Switzerland) 2007-2010
- Jasmin Balmer (University of Bern, Bern, Switzerland) since 2011

Mentor of several MD Thesis (University of Bern, Bern, Switzerland) since 2008

5. Professional Societies:

- Association for Research in Vision and Ophthalmology (ARVO)
- International Society for Eye Research (ISER)
- International Society for Stem Cell Research (ISSCR)
- Schweizerische Ophthalmologische Gesellschaft (SOG)

6. Service:

- Judge for the Intel International Science & Engineering Fair (2002)
- Special Award Judge for the Louisville Regional Science Fairs (2004 - 06)
- Scientific Reviewer for several Scientific Journals and Grant Agencies

7. Awards:

1991-94	Research Scholarship, Government of Saxony, Germany
2002	Travel Fellowship, ISER, San Francisco, CA
2002	Award for Scientific Importance, Research! Louisville, KY
2005	PepsiAmericas Young Faculty Investigator Award, Research! Louisville, KY

8. Research Funding:

Germany

Scholarship from the state government of Saxony	1991-1994	Ph.D. thesis
DFG Graduate program "INTERCELL"	1999-2000	Co-PI

Grant from the German Retinitis Pigmentosa-Foundation	1998-1999	PI
<i>USA</i>		
Transplantation of bone marrow stem cells into a rd mouse model of retinal degeneration		
Research Initiation Grant (UofL)	\$3.300	07/01/02-09/30/03 PI
Endogenous bone-marrow derived stem cells as a possible therapy in AMD.		
UofL	\$15.000	03/01/04- 02/28/05 PI
Retinal Prosthesis (Contract)		
VA Hospital Boston	\$381.000	01/10/03-09/30/06 Co-PI
Stem cells to restore damaged retinal pigment epithelium.		
STTR Phase1 NIH/NEI	\$488.529	09/01/05-08/30/06 Co-PI
<i>Switzerland</i>		
Retinal differentiation of bone-marrow derived stem cells	2008	PI
Hochschulstiftung University of Bern	CHF 10.000	
Retinal differentiation of bone marrow-derived stem cells.	04/01/08-03/31/11	PI
Swiss National Science Foundation (SNF 310000_119894)	CHF 243.000	
Retinal differentiation of BMSC in a model of RPE degeneration.	08/01/08-07/31/11	PI
Velux-Stiftung	CHF 186.311	
Experimental stem cell-based therapy for dry AMD	01/01/09 – 12/31/10	PI
Fritz Tobler-Foundation	CHF 81.600	
In vitro pre-differentiation of human BMSC	05/01/10 – 04/30/12	PI
Fritz Tobler-Foundation	CHF 81.600	

Publication list Volker Enzmann, Ph.D.:

Articles:

1. Zulliger R, Lecaude S, Eigeldinger-Berthou S, Wolf-Schnurrbusch UEK, Enzmann V: Caspase-3-independent photoreceptor degeneration by N-methyl-N-nitrosourea (MNU) induces morphological and functional changes in the mouse retina. *Graefes Arch Clin Exp Ophthalmol*. DOI 10.1007/s00417-010-1584-6, 2011.
2. Wolf-Schnurrbusch UE, Ghanem R, Rothenbuehler SP, Enzmann V, Framme C, Wolf S: Predictors for Short Term Visual Outcome after Anti-VEGF Therapy of Macular Edema due to Central Retinal Vein Occlusion. *Invest Ophthalmol Vis Sci*. Nov 18, 2010 [Epub ahead of print].
3. Huang Y, Enzmann V, Ildstad ST: Stem Cell-Based Therapeutic Applications in Retinal Degenerative Diseases. *Stem Cell Rev*. Sep 22, 2010 [Epub ahead of print].
4. Wolf-Schnurrbusch UE, Stuck AK, Hess R, Wolf S, Enzmann V: Complement factor P in neovascular membranes of patients with AMD. *Retina*. 29:966-973, 2009.
5. Franco LM, Zulliger R, Wolf-Schnurrbusch UE, Yoshiaki Katagari Y, Kaplan HJ, Wolf S, Enzmann V: Low dose sodium iodate induces patchy loss of retinal pigment epithelium and decreases visual function in a mouse model. *Invest Ophthalmol Vis Sci*. 50:400-4010, 2009.
6. Liu Y, Gao L, Zuba-Surma EK, Peng X, Kucia M, Ratajczak MZ, Wang W, Enzmann V, Kaplan HJ, Dean DC: Identification of small Sca-1(+), Lin(-), CD45(-) multipotential cells in the neonatal murine retina. *Exp Hematol*. 37(9):1096-107, 2009.
7. Wolf-Schnurrbusch UE, Ceklic L, Brinkmann CK, Iliev M, Frey M, Rothenbuehler SP, Enzmann V, Wolf S: Macular Thickness Measurements in Healthy Eyes Using Six Different Optical Coherence Tomography Instruments. *Invest Ophthalmol Vis Sci*. 50:3432-3437, 2009.
8. Enzmann V, Yolcu E, Kaplan HJ, Ildstad ST: Stem cells as tools in regenerative therapy for retinal degeneration. *Arch. Ophthalmol*. 127(4):563-571, 2009.
9. Wolf-Schnurrbusch UE, Enzmann V, Brinkmann CK, Wolf S: Morphologic changes in patients with geographic atrophy assessed with a novel spectral OCT-SLO combination. *Invest Ophthalmol Vis Sci*. 49(7):3095-9, 2008.
10. Liang L, Katagiri Y, Franco LM, Yamauchi Y, Enzmann V, Kaplan HJ, Sandell JH.: Long-term cellular and regional specificity of the photoreceptor toxin, iodoacetic acid (IAA), in the rabbit retina. *Vis Neurosci*. 25(2):167-77, 2008.
11. DeMarco PJ Jr, Katagiri Y, Enzmann V, Kaplan HJ, McCall MA: An adaptive ERG technique to measure normal and altered dark adaptation in the mouse. *Doc Ophthalmol*. 115(3):155-63, 2007.
12. Li Y, Atmaca-Sonmez P, Schanie CL, Ildstad ST, Kaplan HJ, Enzmann V: Endogenous bone marrow derived cells express retinal pigment epithelium cell markers and migrate to focal areas of RPE damage. *Invest Ophthalmol Vis Sci*. 48(9):4321-7, 2007.
13. Atmaca-Sonmez P, Li Y, Yamauchi Y, Schanie CL, Ildstad ST, Kaplan HJ, Enzmann V: Systemically transferred hematopoietic stem cells home to the subretinal space and express RPE-65 in a mouse model of retinal pigment epithelium damage. *Exp Eye Res*. 83(5):1295-302, 2006.
14. Li Y, Reza RG, Atmaca-Sonmez P, Ratajczak MZ, Ildstad ST, Kaplan HJ, Enzmann V: Retinal pigment epithelium damage enhances expression of chemoattractants and migration of bone marrow-derived stem cells. *Invest Ophthalmol Vis Sci*. 47(4):1646-52, 2006.
15. Enzmann V, Row BW, Yamauchi Y, Kheirandish L, Gozal D, Kaplan HJ, McCall MA. Behavioral and anatomical abnormalities in a sodium iodate-induced model of retinal pigment epithelium degeneration. *Exp Eye Res*. 82(3):441-8, 2006.
16. Yamauchi Y, Franco LM, Jackson DJ, Naber JF, Ziv RO, Rizzo JF, Kaplan HJ, Enzmann V: Comparison of electrically evoked cortical potential thresholds generated with subretinal or

- suprachoroidal placement of a microelectrode array in the rabbit. *J Neural Eng.* 2(1):S48-56, 2005.
17. Malgorzata Goczalik I, Raap M, Weick M, Milenkovic I, Heidmann J, Enzmann V, Wiedemann P, Reichenbach A, Francke M: The activation of IL-8 receptors in cultured guinea pig Müller glial cells is modified by signals from retinal pigment epithelium. *J Neuroimmunol.* 161(1-2):49-60, 2005
 18. Enzmann V, Howard RM, Yamauchi Y, Whittemore SR, Kaplan HJ: Enhanced induction of RPE lineage markers in pluripotent neural stem cells engrafted into the adult rat subretinal space. *Invest Ophthalmol Vis Sci.* 44(12):5417-22, 2003.
 19. Sun D, Enzmann V, Lei S, Sun SL, Kaplan HJ, Shao H: Retinal pigment epithelial cells activate uveitogenic T cells when they express high levels of MHC class II molecules, but inhibit T cell activation when they express restricted levels. *J Neuroimmunol.* 144(1-2):1-8, 2003.
 20. Mack AF, Uhlmann D, Germer A, Szél A, Enzmann V, Reichenbach A: Differentiation of cones in cultured rabbit retina: effects of retinal pigment epithelial cell-conditioned medium. *Neurosci Lett.* 24;341(1):53-6, 2003.
 21. Enzmann V, Hollborn M, Kühnhoff S, Wiedemann P, Kohen L: Influence of interleukin 10 and transforming growth factor-beta on T cell stimulation through allogeneic retinal pigment epithelium cells in vitro. *Ophthalmic Res.* 34(4):232-40, 2002.
 22. Bringmann A, Pannicke T, Moll V, Milenkovic I, Faude F, Enzmann V, Wolf S, Reichenbach A. Upregulation of P2X(7) receptor currents in Müller glial cells during proliferative vitreoretinopathy. *Invest Ophthalmol Vis Sci.* 2001;42(3):860-7.
 23. Enzmann V, Hollborn M, Wiedemann P, Kohen L: Molecular and cellular evidence for T-cell stimulation by allogeneic retinal pigment epithelium cells in vitro. *Graefes Arch Clin Exp Ophthalmol.* 239(6):445-51, 2001.
 24. Enzmann V, Hollborn M, Wiedemann P, Kohen L: Minor influence of the immunosuppressive cytokines IL-10 and TGF-beta on the proliferation and apoptosis of human retinal pigment epithelial (RPE) cells in vitro. *Ocul Immunol Inflamm.* 9(4):259-66, 2001.
 25. Enzmann V, Hollborn M, Poschinger K, Wiedemann P, Kohen L: Immunosuppression by IL-10-transfected human retinal pigment epithelial cells in vitro. *Curr Eye Res.* 23(2):98-105, 2001.
 26. Hollborn M, Kohen L, Wiedemann P, Enzmann V: The influence of pro-inflammatory cytokines on human retinal pigment epithelium cell receptors. *Graefes Arch Clin Exp Ophthalmol.* 239(4):294-301, 2001.
 27. Enzmann V, Faude F, Wiedemann P, Kohen L. The local and systemic secretion of the pro-inflammatory cytokine interleukin-6 after transplantation of retinal pigment epithelium cells in a rabbit model. *Curr Eye Res.* 21(1):530-4, 2000.
 28. Enzmann V, Germer A, Francke M, Kohen L, Wiedemann P, Reichenbach A: Alterations of sensory retinal explants exposed to choroidal melanoma cells ex vivo. *Graefes Arch Clin Exp Ophthalmol.* 238(12):985-92, 2000.
 29. Bringmann A, Biedermann B, Schnurbusch U, Enzmann V, Faude F, Reichenbach A.: Age- and disease-related changes of calcium channel-mediated currents in human Müller glial cells. *Invest Ophthalmol Vis Sci.* 41(9):2791-6, 2000.
 30. Bringmann A, Biedermann B, Faude F, Enzmann V, Reichenbach A.: Na(+) currents through Ca(2+) channels in human retinal glial (Müller) cells. *Curr Eye Res.* 20(5):420-9, 2000.
 31. Bringmann A, Skatchkov SN, Faude F, Enzmann V, Reichenbach A.: Farnesol modulates membrane currents in human retinal glial cells. *J Neurosci Res.* 62(3):396-402, 2000.
 32. Hollborn M, Enzmann V, Barth W, Wiedemann P, Kohen L: Changes in the mRNA expression of cytokines and chemokines by stimulated RPE cells in vitro. *Curr Eye Res.* 20(6):488-95, 2000.

33. Faude F, Enzmann V, Pöschmann E, Hoffmann S, Wiedemann P: R-(+)-verapamil, S-(-)-verapamil, and racemic verapamil inhibit human retinal
34. pigment epithelial cell contraction. *Graefes Arch Clin Exp Ophthalmol.* 238(6):537-41, 2000.
35. Bringmann A, Francke M, Pannicke T, Biedermann B, Faude F, Enzmann V, Wiedemann P, Reichelt W, Reichenbach A.: Human Müller glial cells: altered potassium channel activity in proliferative vitreoretinopathy. *Invest Ophthalmol Vis Sci.* 40(13):3316-23, 1999.
36. Enzmann V, Stadler M, Wiedemann P, Kohen L.: Down-regulation of MHC class II expression on bovine retinal pigment epithelial cells by cytokines. *Ophthalmic Res.* 31(4):256-66, 1999.
37. Bringmann A, Schopf S, Faude F, Skatchkov SN, Enzmann V, Reichenbach A.: The activity of a transient potassium current in retinal glial (Müller) cells depends on extracellular calcium. *J. Brain Res.* 39(4):539-50, 1999.
38. Enzmann V, Kaufmann A, Hollborn M, Wiedemann P, Gerns D, Kohen L.: Effective chemokines and cytokines in the rejection of human retinal pigment epithelium (RPE) cell grafts. *Transpl. Immunol.* 7(1):9-14, 1999.
39. Enzmann V, Stadler M, Wiedemann P, Kohen L.: In-vitro methods to decrease MHC class II-positive cells in retinal pigment epithelium cell grafts. *Ocul Immunol Inflamm.* 6(3):145-53, 1998.
40. Enzmann V, Faude F, Kohen L, Wiedemann P.: Secretion of cytokines by human choroidal melanoma cells and skin melanoma cell lines in vitro. *Ophthalmic Res.* 30(3):189-94, 1998.
41. Enzmann V, Faude F, Wiedemann P, Kohen L.: Immunological problems of transplantation into the subretinal space. *Acta Anat. (since 1999 Cells Tissues Organs)* 162(2-3):178-83, 1998.
42. Schraermeyer U, Enzmann V, Kohen L, Addicks K, Wiedemann P, Heimann K. Porcine iris pigment epithelial cells can take up retinal outer segments. *Exp Eye Res.* 65(2):277-87, 1997.
43. Reichenbach A, Faude F, Enzmann V, Bringmann A, Pannicke T, Francke M, Biedermann B, Kuhrt H, Stolzenburg JU, Skatchkov SN, Heinemann U, Wiedemann P, Reichelt W. The Müller (glial) cell in normal and diseased retina: a case for single-cell electrophysiology. *Ophthalmic Res.* 29(5):326-40, 1997.
44. Kohen L, Enzmann V, Faude F, Wiedemann P.: Mechanisms of graft rejection in the transplantation of retinal pigment epithelial cells. *Ophthalmic Res.* 29(5):298-304, 1997.
45. Germer A, Jahnke C, Mack A, Enzmann V, Reichenbach A.: Modification of glutamine synthetase expression by mammalian Müller (glial) cells in retinal organ cultures. *Neuroreport.* 8(14):3067-72, 1997.
46. Germer A., Enzmann, V. and Drössler, K.: Oxytocin suppresses the mitogen-induced activation process of murine B and T lymphocytes but augments the interleukin-2 production. *Endocr. Regul.* 31(3):137-144, 1997.
47. Germer A, Enzmann V, Drössler K.: Arginine-vasopressin influences the mitogen- induced development of T and B effector cells. *Endocr. Regul.* 30(1):13-17, 1996.
48. Enzmann V, Drössler K.: Immunohistochemical detection of substance P and vasoactive intestinal peptide fibres in the auricular lymph nodes of sensitized guinea pigs and mice. *Acta Histochem.* 96(1):15-8, 1994.
49. Garn, H., Krause, H., Enzmann, V., Drössler, K.: An improved MTT assay using the electron-coupling agent menadione. *J. Immunol. Meth.* 168, 253-256, 1994.

Book chapters:

1. Enzmann, V., Drössler, K., Landgraf, R., Engelmann, M.: Vasopressin und Immunfunktion. In: Schulz, K.-H., Kugler, H.J., Schedlowski, M. (Eds.), *Psychoneuroimmunologie*, Huber Verlag, Bern, pp. 283-293, 1997.

2. Enzmann, V., Wiedemann P.: Critères et perspectives de la transplantation de l'épithélium pigmentaire. In: Soubrane G. (Ed.), Les DMLAs. Masson, Paris, pp. 557-562, 2007.