

last revision 10/7/2011

Ralph J. Jensen, Ph.D.

The Center for Innovative Visual Rehabilitation
VA Boston Healthcare System
150 S. Huntington Ave., MS 151E
Boston, MA 02130

(857) 364-6013 (Office)
(857) 364-6645 (Fax)
(617) 538-4010 (Cell)
e-mail: ralph.jensen@va.gov

EDUCATION

B.S., 1976	University of Southern California (Biology)
Ph.D., 1982	Johns Hopkins University School of Medicine (Physiology)
1981-1985	Postdoctoral Fellow, Department of Physiology and Biophysics, Washington University School of Medicine, St. Louis, MO (with Dr. Nigel Daw)
1985-1986	Research Fellow, Department of Neurosurgery, Massachusetts General Hospital, Boston, MA (with Dr. Richard Masland)

POSITIONS

1986-1992	Assistant Professor, Biomedical Sciences Department, Southern College of Optometry, Memphis, TN
1991-2002	Adjunct Assistant Professor, Department of Anatomy and Neurobiology, Neurobiology, University of Tennessee College of Medicine, Memphis, TN
1992-2001	Associate Professor, Biomedical Sciences Department, Southern College of Optometry, Memphis, TN
2001-2002	Professor, Biomedical Sciences Department, Southern College of Optometry, Memphis, TN
2002-present	Associate Director, The Center for Innovative Visual Rehabilitation, VA Boston Healthcare System, Boston, MA

PROFESSIONAL ORGANIZATIONS

1983-2008	Member of Society for Neuroscience
1988-present	Member of the Association for Research in Vision and Ophthalmology
1990-2002	Member of the Center for Neuroscience, University of Tennessee

College of Medicine, Memphis, TN

HONORS & AWARDS

1976	Magna Cum Laude, University of Southern California
1976	Phi Beta Kappa, University of Southern California
1981	Travel Fellowship to attend The Association for Research in Vision and Ophthalmology (ARVO) annual meeting in Sarasota, FL
1981	Travel Fellowship to attend the Symposium on Nutrition, Pharmacology, and Vision in Washington, D.C.
1987-1992	National Institutes of Health (NIH) research project grant (R-29) [Award (direct costs) - \$ 238,668]
1992-1997	National Institutes of Health (NIH) research project grant (R01) [Award (direct costs) - \$ 239,598]
2003-2006	VA Merit Review [Award (direct costs) - \$ 689,200]
2007-2010	VA Merit Review [Award (direct costs) - \$ 686,344]
2010-2013	VA Merit Review [Award (direct costs) - \$ 826,743]

TEACHING

1980	Physiology: Lab Instructor, Johns Hopkins University Medical School
1983-1984	Neuroanatomy: Lab Instructor, Washington University Medical School
1986-2002	Human Nervous System: Course Director and Instructor Human Physiology I: Course Director and Instructor Human Physiology II: Course Director and Instructor Southern College of Optometry
1996-2002	General Biochemistry: Course Director and Co-instructor, Southern College of Optometry

ABSTRACTS

- 1- **Jensen, R.J.** and DeVoe, R.D. (1980) Intracellular recordings from amacrine and directional ganglion cells. *Investigative Ophthalmology & Visual Science*, 19 (Suppl.): 5.
- 2- **Jensen, R.J.** and DeVoe, R.D. (1981) Identification of specific ganglion cell types in the turtle retina. *Investigative Ophthalmology & Visual Science*, 20 (Suppl.): 184.
- 3- **Jensen, R.J.** and Daw, N.W. (1983) Effect of dopamine antagonists on rabbit retinal ganglion cells. *Investigative Ophthalmology & Visual Science*, 24 (Suppl.): 221.

- 4- **Jensen, R.J.** and Daw, N.W. (1983) Changes in the receptive field properties of ganglion cells in the rabbit retina with dopamine antagonists. Society for Neuroscience Abstracts, 9: 806.
- 5- Brunken, W. J., **Jensen, R.J.**, and Daw, N.W. (1984) The effects of serotonergic drugs on the responses of rabbit ganglion cells. Society for Neuroscience Abstracts, 10: 836.
- 6- **Jensen, R.J.** (1984) Effects of dopamine on rabbit retinal ganglion cells. Society for Neuroscience Abstracts, 10: 19.
- 7- **Jensen, R.J.** and Daw, N. W. (1985) Effects of selective dopamine D-1 and D-2 antagonists on the responses of rabbit retinal ganglion cells. Investigative Ophthalmology & Visual Science, 26 (Suppl.): 263.
- 8- **Jensen, R.J.** (1988) Vasoactive intestinal peptide reverses effects of dopamine D-1 antagonist SCH 23390 on ganglion cell activity in the rabbit retina. Investigative Ophthalmology & Visual Science, 29 (Suppl.):104
- 9- **Jensen, R.J.** (1989) Mechanism of action of dopamine D-1 antagonists on Off-center ganglion cells in rabbit retina. Investigative Ophthalmology & Visual Science, 30 (Suppl.): 18.
- 10- **Jensen, R.J.** (1989) Kynurenic acid reverses the effects of a dopamine D1 antagonist on On-center ganglion cells in the rabbit retina. Society for Neuroscience Abstracts, 15: 969.
- 11- **Jensen, R.J.** (1990) Strychnine brings out the surround response in dark-adapted OFF-center ganglion cells. Investigative Ophthalmology & Visual Science, 31: 210.
- 12- **Jensen, R.J.** (1991) Intracellular recordings from fluorescently labeled ganglion cells in the intact retina. Investigative Ophthalmology & Visual Science, 32: 1131.
- 13- **Jensen, R.J.** (1992) Effects of vasoactive intestinal peptide on ganglion cells in the rabbit retina. Society for Neuroscience Abstracts, 18: 1029.
- 14- **Jensen, R.J.** (1993) Extracellular recordings from displaced cholinergic amacrine cells in rabbit retina. Investigative Ophthalmology & Visual Science, 34: 1153.
- 15- Wyatt, J.L., Rizzo, J.F., Grumet, A., Edell, D., **Jensen, R.J.** (1994) Development of a silicon retinal implant: Epiretinal stimulation of retinal ganglion cells in the rabbit. Investigative Ophthalmology & Visual Science, 35: 1380.
- 16- **Jensen, R.J.** (1994) Extracellular recordings from displaced starburst amacrine cells in normal, unlesioned rabbit retinas. Investigative Ophthalmology & Visual Science, 35: 2057.
- 17- **Jensen, R.J.** (1994) Ganglion cell death may affect the receptive field properties of pre-ganglionic neurons. Optometry and Vision Science 71: S146.
- 18- **Jensen, R.J.** (1995) The calcium channel blocker ω -conotoxin MVIIC abolishes directional selectivity in retinal ganglion cells. Investigative Ophthalmology & Visual Science, 36: S864.
- 19- **Jensen, R.J.** (1995) Directional selectivity in retinal ganglion cells is abolished by neomycin. Society for Neuroscience Abstracts, 21: 1643.
- 20- **Jensen, R.J.** (1996) Focal applications of K⁺ ions to the vitreal surface of the rabbit retina elicit directionally selective responses from ganglion cells. Investigative Ophthalmology & Visual Science, 37: S1056.
- 21- **Jensen, R.J.** (1997) Glutamate receptor agonists affect directional selectivity of rabbit retinal ganglion cells. Investigative Ophthalmology & Visual Science, 38: S949.
- 22- Rizzo, J.F., Grumet, A.E., Edell, D.J., Wyatt, J.L. and **Jensen, R.J.** (1997) Single-unit recordings following extracellular stimulation of retinal ganglion cell

- axons in rabbits. *Investigative Ophthalmology & Visual Science*, 38: S40.
- 23- **Jensen, R.J.** (1998) Effects of group II metabotropic glutamate receptor ligands on directional selectivity in rabbit retinal ganglion cells. *Investigative Ophthalmology & Visual Science*, 39: S985.
 - 24- **Jensen, R.J.** (1999) Mild mechanical forces stimulate ATP release from the retina. *Investigative Ophthalmology & Visual Science*, 40:S234.
 - 25- **Jensen, R.J.** (1999) ATP release from the cornea following mild mechanical stimulation. *Optometry and Vision Science*, 76: S242.
 - 26- **Jensen, R.J.** (2000) Rabbit cornea releases ATP following mild mechanical stimulation or exposure to a hypo-osmotic solution. *Investigative Ophthalmology & Visual Science*, 41:S901.
 - 27- **Jensen, R.J.** (2001) Activation of protein kinase C blocks DCG-IV-induced elimination of directional selectivity in retinal ganglion cells. *Investigative Ophthalmology & Visual Science*, 42:S677.
 - 28- **Jensen, R.J.**, Ziv, O.R. and Rizzo, J.F. (2002) Stimulation of ganglion cells in rabbit retina with a microelectrode placed on the inner retinal surface. *Proceedings of the Rehabilitation Research and Development 3rd National Meeting*, Arlington, VA.
 - 29- **Jensen, R.J.**, O.R. Ziv, and Rizzo, J.F. (2002) Effect of epiretinal vs. transretinal in vitro electrical stimulation of rabbit retinal ganglion cells. ARVO meeting.
 - 30- Ziv, O.R., **Jensen, R.J.**, and Rizzo, J.F. (2002) In vitro activation of ganglion cells in rabbit retina: effects of glutamate receptor agents. ARVO meeting
 - 31- Rizzo, J.F., **Jensen, R.**, Loewenstein, J. and Wyatt, J. (2003) Unexpectedly small percepts evoked by epi-retinal electrical stimulation in blind humans. ARVO meeting.
 - 32- **Jensen, R.J.**, Ziv, O.R., and Rizzo, J.F. (2003) Thresholds for direct and indirect activation of ganglion cells with an epiretinal electrode: effect of stimulus duration and electrode size. ARVO meeting.
 - 33- **Jensen, R.J.**, Ziv, O.R., and Rizzo, J.F. (2004) Activation of rabbit retinal ganglion cells with large diameter electrodes: effects of pulse duration. ARVO meeting.
 - 34- Ziv, O.R., **Jensen, R.J.**, and Rizzo, J.F. (2004) In vitro activation of retinal cells: Estimating location of stimulated cell by using a mathematical model. ARVO meeting.
 - 35- Theogarajan, L.S., **Jensen, R.J.**, and Rizzo, J.F. (2004) Stimulation of rabbit retinal ganglion cells by altering K⁺ ion gradients: Dose-response curve ARVO meeting.
 - 36- Rizzo, J and **Jensen, R.** (2004) Correlation of human psychophysical results with in vitro physiological experimentation. *The Eye and The Chip 2004*, Detroit, MI.
 - 37- **Jensen, R.J.**, Ziv, O.R., and Rizzo, J.F. (2004) Electrical activation of rabbit retinal ganglion cells with an extracellular microelectrode. Society for Neuroscience meeting.
 - 38- **Jensen, R.J.**, and Rizzo, J.F. (2005) Responses of rabbit retinal ganglion cells to electrical stimulation with a subretinal electrode. ARVO meeting.
 - 39- **Jensen, R.J.** (2006) Epiretinal vs. subretinal stimulation: An electrophysiologist's viewpoint. ARVO meeting.
 - 40- Johnson, L.J., Scribner, D., Skeath, P., **Jensen, R.**, Rizzo, J., lig, D., Klein, R., and Perkins, F.K. (2007). Pre-clinical testing, voltage recording and retinal contact imaging with a 3200 electrode retinal stimulation array. ARVO meeting.
 - 41- Shire, D.B., Ziv, O.R., Gingerich, M.D., **Jensen, R.**, Rizzo, J.F., Cogan, S.F., and Wyatt, J.L. (2007). Progress toward a platform for studying neural coding of vision:

- Recordings from a flexible, transparent multielectrode array. ARVO meeting.
- 42- Ziv, O.R., **Jensen, R.J.**, and Rizzo, J.F. (2007). Multielectrode recording of burst responses from retinal ganglion cells to photic stimuli of variable duration and intensity. ARVO meeting.
- 43- **Jensen, R.J.** and Rizzo, J.F. (2007). Responses of rabbit retinal ganglion cells to repetitive electrical stimulation. ARVO meeting.
- 44- **Jensen, R.J.** and Rizzo, J.F. (2008). Thresholds and responses properties of retinal ganglion cells in wild-type and *rd1* mice to electrical stimulation of the retinal neural network. ARVO meeting.
- 45- Kim, S., **Jensen, R.**, and Rizzo, J.F. (2008). Cortical responses to the patterned versus natural visual stimuli on rats. ARVO meeting.
- 46- **Jensen, R.J.**, Rizzo, J.F., and Johnson, L. (2009). Responses of retinal ganglion cells to stimulation with a 3200 microelectrode array. ARVO meeting.
- 47- **Jensen, R.J.** and Rizzo, J.F. (2010). Lowering electrical stimulation thresholds of retinal ganglion cells in degenerate retina pharmacologically. ARVO meeting.

PUBLICATIONS

- 1- **Jensen, R.J.** and DeVoe, R.D. (1982) Ganglion cells and (dye-coupled) amacrine cells in the turtle retina that have possible synaptic connections. *Brain Research*, 240: 146-150.
- 2- **Jensen, R.J.** and DeVoe, R.D. (1983) Comparisons of directionally selective with other ganglion cells of the turtle retina: Intracellular recording and staining. *Journal of Comparative Neurology*, 217: 271-287.
- 3- **Jensen, R.J.** and Daw, N.W. (1983) Towards an understanding of the role of dopamine in the mammalian retina. *Vision Research*, 23: 1293-1298.
- 4- **Jensen, R.J.** and Daw, N.W. (1984) Effects of dopamine antagonists on receptive fields of brisk cells and directionally selective cells in the rabbit retina. *Journal of Neuroscience*, 4: 2972-2985.
- 5- **Jensen, R.J.** and Daw, N.W. (1986) Effects of dopamine and its agonists and antagonists on the receptive field properties of ganglion cells in the rabbit retina. *Neuroscience*, 17: 837-855.
- 6- **Jensen, R.J.** and Daw, N.W. (1988) Effects of dopaminergic agents on the activity of ganglion cells in the rabbit retina. In *Dopaminergic Mechanisms in Vision*, edited by Bodis-Wollner and Piccolino, Alan R. Liss, Inc. pp. 163-177.
- 7- Daw, N.W., Brunken, W.J., and **Jensen, R.J.** (1989) The function of monoamines in the rabbit retina. In *The Neurobiology of the Inner Retina*, edited by N. Osborne and R. Weiler, Springer-Verlag, Berlin, pp. 363-374.
- 8- **Jensen, R.J.** (1989) Mechanism and site of action of a dopamine D1 antagonist in the rabbit retina. *Visual Neuroscience*, 3: 573-585.
- 9- Daw, N.W., **Jensen, R.J.**, and Brunken, W.J. (1990) Rod pathways in mammalian retinae. *Trends in Neurosciences*, 13: 110-115.
- 10- **Jensen, R.J.** (1991) Involvement of glycinergic neurons in the diminished surround activity of ganglion cells in the dark-adapted rabbit retina. *Visual Neuroscience*, 6: 43-53.
- 11- **Jensen, R.J.** (1991) Intracellular recording of light responses from visually identified ganglion cells in the rabbit retina. *Journal of Neuroscience Methods*, 40: 101-112.
- 12- **Jensen, R.J.** (1992) Effects of the dopamine antagonist (+)-SCH 23390 on intracellularly recorded responses of ganglion cells in the rabbit

- retina. *Visual Neuroscience*, 8: 463-467.
- 13- **Jensen, R.J.** (1993) Effects of vasoactive intestinal peptide on ganglion cells in the rabbit retina. *Visual Neuroscience*, 10: 181-189.
 - 14- **Jensen, R.J.** (1995) Receptive field properties of displaced starburst amacrine cells change following axotomy-induced degeneration of ganglion cells. *Visual Neuroscience*, 12: 177-184.
 - 15- **Jensen, R.J.** (1995) Effects of Ca²⁺ channel blockers on directional selectivity of rabbit retinal ganglion cells. *Journal of Neurophysiology*, 74: 12-23.
 - 16- **Jensen, R.J.** (1996) Potassium-evoked directionally selective responses from rabbit retinal ganglion cells. *Visual Neuroscience*, 13: 705-719.
 - 17- **Jensen, R.J.** (1996) Neomycin abolishes directional selectivity in rabbit retinal ganglion cells. *General Pharmacology*, 27: 1405-1407.
 - 18- **Jensen, R.**, Rizzo, J.F., Grumet, A., Edell, D., and Wyatt, J. (1996) Single-unit recording following extracellular electrical stimulation of rabbit retinal ganglion cell bodies. Technical Report 600, MIT Research Laboratory of Electronics.
 - 19- **Jensen, R.J.** (1999) Responses of directionally selective retinal ganglion cells to activation of AMPA glutamate receptors. *Visual Neuroscience*, 16: 205-219.
 - 20- **Jensen, R.J.**, Rizzo, J.F., Ziv, O.R., Grumet, A., and Wyatt J. (2003) Thresholds for activation of rabbit retinal ganglion cells with an ultra-fine, extracellular microelectrode. *Investigative Ophthalmology & Visual Science*, 44: 3533-3543.
 - 21- **Jensen, R.J.**, Ziv, O.R., and Rizzo, J.F. (2005) Thresholds for activation of rabbit retinal ganglion cells with large, extracellular microelectrodes. *Investigative Ophthalmology & Visual Science*, 46:1486-1496.
 - 22- Ziv, O.R., Rizzo, J.F., and **Jensen, R.J.** (2005) In vitro activation of retinal cells: estimating location of stimulated cell by using a mathematical model. *Journal of Neural Engineering*, 2:S5-S15.
 - 23- **Jensen, R.J.**, Ziv, O.R., and Rizzo, J.F. (2005) Responses of rabbit retinal ganglion cells to electrical stimulation with an epiretinal electrode. *Journal of Neural Engineering*, 2:S16-S21.
 - 24- **Jensen, R.J.**, and Rizzo, J.F. (2006) Thresholds for activation of rabbit retina ganglion cells with a subretinal electrode. *Exp. Eye Res.*, 83: 367-373.
 - 25- **Jensen, R.J.** (2006) Activation of group II metabotropic glutamate receptors reduces directional selectivity in retinal ganglion cells. *Brain Res.*, 1122: 86-92.
 - 26- Theogarajan, L., Scholz, C., Desai, S., **Jensen, R.**, Baldo, M., Rizzo, J.F. (2006) Self-assembling amphiphilic triblock polymers with side-chain mesogens in the hydrophobic core for neural prosthetic devices. *Polymer Preprints*, 47: 145-146.
 - 27- **Jensen, R.J.**, and Rizzo, J.F. (2007) Responses of ganglion cells to repetitive electrical stimulation of the retina. *Journal of Neural Engineering*, 4:S1-S6.
 - 28- Winter, J.O., Gokhale, M., **Jensen, R.J.**, Cogan, S.F., and Rizzo, J.F. (2008) Tissue engineering applied to the retinal prosthesis: Neurotrophin-eluting polymeric hydrogel coatings. *Materials Science and Engineering C*, 28: 448-453.
 - 29- **Jensen, R.J.**, Rizzo, J.F. (2008) Electrical activation of ganglion cells in wild-type and rd1 mice: Analysis of thresholds and response properties to retinal network stimulation. *Vision Research*, 48: 1562-1568.
 - 30- **Jensen, R.J.**, Rizzo, J.F. (2009) Activation of ganglion cells in wild-type and rd1 mouse retinas with monophasic and biphasic current pulses. *Journal of Neural Engineering*, 6: 1-7.
 - 31- Winter, J.O., Han, N., **Jensen, R.J.**, Cogan, S.F., and Rizzo, J.F. (2009) Adhesion molecules promote chronic neural interfaces following neurotrophin withdrawal. *Proceedings of EMBS Annual Meeting*, 7151-7154 [Peer reviewed].
 - 32- **Jensen, R.J.**, Ziv, O.R., Rizzo, J.F., Scribner D., and Johnson, L. (2009) Spatiotemporal aspects of pulsed electrical stimuli on the responses of rabbit retinal ganglion cells.

Experimental Eye Research, 89: 972-979.

- 33- Fried, S., and **Jensen, R.J.** (2011) The Response of Retinal Neurons to Electrical Stimulation: A Summary of in-vitro and in-vivo Animal Studies, In: Dagnelie, G. (Ed.), Visual Prosthetics: Physiology, Bioengineering, Rehabilitation. Springer.
- 34- **Jensen, R.J.** and Rizzo, J.F. (2011) Effects of GABA receptor antagonists on thresholds of P23H rat retinal ganglion cells to electrical stimulation of the retina. J. Neural Eng. 8, 35002

COMMITTEES

1987-1992, 2000-2001	IRB / Research (Southern College of Optometry)
1993-1999	Curriculum (Southern College of Optometry)
1997	Vice-President for Academic Affairs Search (Southern College of Optometry)
1998	Faculty Promotion (Southern College of Optometry)
1996-1998	NBEO Human Biology-Systemic Conditions
1999-2001	Self-Study Director of SACS College Accreditation (Southern College of Optometry)
2005-2006	Research & Development Committee (VA Boston Healthcare System)
2002-2009	Animal Studies Subcommittee (VA Boston Healthcare System)
2003-present	Veterans Affairs RR&D Service Scientific Merit Review Board (Sensory Systems)
2008-present	NIH Special Emphasis Scientific Review Panel (Retinopathy Studies)

JOURNAL REFEREE

Journal of Neurophysiology, Visual Neuroscience, Investigative Ophthalmology & Visual Science, Optometry, IEEE, Journal of Neural Engineering, Journal of Rehabilitation Research & Development, Brain Research Bulletin
Experimental Eye Research, Documenta Ophthalmologica, Brain Research

RESEARCH CONSULTANT

1990-2001	Department of Ophthalmology, Harvard Medical School. Physiological studies on the responses of retinal ganglion cells to electrical stimuli
-----------	---

INVITED SPEAKER

The Eye and The Chip 2004, Detroit, MI
University of Alabama at Huntsville, Fall 2004
Tufts University School of Medicine, Spring 2005
Neuronal Stimulation for Visual Prosthesis: The Tissue Interface, Fort Lauderdale, FL 2006
The Eye and The Chip, Detroit, MI, 2006, 2008, and 2010

PATENTS

US Patent Application 20060009805 - Neural stimulation device employing renewable chemical stimulation (published January 12, 2006; since abandoned)