Ram Kannan, PhD

# Curriculum Vitae

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***ACADEMIC APPOINTMENTS*** June 2014- present Senior Scientist, Arnold and Mabel Beckman Macular Research Center, Doheny Eye Institute, Los Angeles, CA 90033

June 2017- present Adjunct Professor of Ophthalmology, Jules Stein Eye Institute, David Geffen School of Medicine, University of California, Los Angeles

# EDUCATION

***UNDERGRADUATE/ GRADUATE/DOCTORAL***

Osmania University, Hyderabad, India; Chemistry, B.S. 1962

Osmania University, Hyderabad, India; Organic Chemistry, M.S. 1964

Osmania University, Hyderabad, India; Organic Chemistry, Ph.D. 1970

# HONORS AND SPECIAL AWARDS

Govt. of India Merit Scholarship 1960-1962; Invited postdoctoral fellowship with Nobel Laureate Bengt Samuelsson (Sweden) 1970-1971

Heinrich Hertz Fellowship (Germany) 1973-1974

AHA Investigative Group Fellowship Award 1985-­1986, 1986-­1987

Visiting Professor, Zhengzhou Eye Institute (China) 1998-2003

Reviewer National Science Foundation 2004-2005

Board of Scientific Counselors, Intramural NEI 1999-2003, 2007

Ad hoc member of NEI BDPI Study Section 2007, 2008

Fellow of the Association for Research in Vision and Ophthalmology (FARVO), 2018

# PROFESSIONAL ACTIVITIES

**APPOINTMENTS – CHRONOLOGY**

June 2017- present Adjunct Professor of Ophthalmology, Jules Stein Eye Institute, David Geffen School of Medicine, University of California, Los Angeles

June 2014- present Senior Scientist, Arnold and Mabel Beckman Macular Research Center, Doheny Eye Institute, Los Angeles, CA 90033

2002-May 2014 Professor, Division of Ophthalmology, Keck USC School of Medicine Doheny Eye Institute, Los Angeles, CA 90033

1990-2002 Professor, Dept. of Medicine & Dept. of Neurosurgery, USC School of Medicine, Los Angeles, CA 90033

1990-1995 Res. Chemist, Dept. of Veterans Affairs, LAOPC, Los Angeles, CA 90012; Professor of Research Medicine, USC School of Medicine, Los Angeles, CA 90033

1988-1990 Research Chemist, Liver Research Lab, VA Wadsworth Medical Center, Los Angeles, CA 90073

1983-1990 Adjunct Associate Professor, UCLA School of Medicine, Los Angeles and Department of Cardiology, VA Wadsworth Medical Center, Los Angeles, CA 90073

1987-1988 Associate Research Scientist, Department of Cardiology, City of Hope National Medical Center, Duarte, CA 91010

1980-1983 Adjunct Assistant Professor, UCLA School of Medicine, Los Angeles, CA 90024 and Department of Cardiology, VA Wadsworth Medical Center, Los Angeles, CA 90073

1987 (summer) Visiting Scientist, Oregon Regional Primate Research Center, Beaverton, Oregon

1974-1980 Assistant Research Biochemist, Department of Medicine, UCLA School of Medicine, Los Angeles, CA 90024, and Tumor-Lipid Research Laboratory, VA Wadsworth Medical Center, Los Angeles, CA 90073

1972-1974 Heinrich-Hertz Fellow, Department of Physiological Chemistry, University of Cologne, West Germany

1970-1972 Postdoctoral Fellow, Royal Veterinary College, Stockholm, Sweden

1969-1970 Assistant Research Officer, National Institute of Nutrition, Hyderabad, India

1967-1969 Senior Research Fellow, Regional Research Laboratory, Hyderabad, India

**GRANTS & RESEARCH SUPPORT**

Principal Investigator, W.M. Keck Foundation Grant. Mitochondria Research & Pilot study. (Co-Investigators: Dr. A. Sadun, Dr. S. Barnes) 01/08/21 - 01/07/22

Principal Investigator, NEI NIH. Novel Mechanisms of Subretinal Fibrosis in Age-related Macular Degeneration, 05/01/2020 - 04/30/2024.

Principal Investigator, Ryan Initiative for Macular Research. The elucidation of molecular mechanisms of AMD and identification of potential therapeutic agents. Ongoing.

Co-investigator, NEI NIH. An experimental Approach to Maculopathy (PI: Dr. D.R. Hinton). 4/1/2012 - 3/31/2019.

Co-investigator. LAB-CTSI Grant. Nanoparticle encapsulated alphaB crystallin minipeptide as a therapeutic agent for atrophic age-related macular degeneration (AMD). (PI: Dr. D.R. Hinton). 11/01/2010 - 03/31/2011

Principal Investigator, NIGMS NIH. Molecular characterization of brain GSH transporters, 07/01/97-06/30/2001

Principal Investigator, NEI NIH. Lens glutathione transporters. 07/01/1996 - 06/30/2002

Co-Principal Investigator, NIH. Blood to Lens Transfer of Glutathione in the Lens. 7/1/93 -6/30/96.

Principal Investigator, VA Merit Review. Glutathione Transport across the Blood-Brain Barrier in the Rat. 10/1/91 - 9/30/94.

Co-Principal Investigator, NIH. Lipid transport and metabolism in cancer - host systems. 1987-1990.

Principal Investigator, Grants-in-Aid, American Heart Association, Greater Los Angeles Affiliate. 1982-1984, 1986-1987.

# MEMBERSHIPS: Professional Associations & Scholarly Societies

1982 – present American Heart Association, Greater Los Angeles Affiliate

1985 – 1994 American Society for Biochemistry and Molecular Biology (ASBMB)

1985 – 2000 American Society for Pharmacology and Experimental Therapeutics (ASPET)

1987 – 1992 American College of Clinical Pharmacology (ACCP)

1969 – present Oil Technologists' Association of India (OTAI)

1981 – present Association of Scientists of Indian Origin in America (ASIOA)

1991 – present Association for Research in Vision and Ophthalmology (ARVO)

Life member The Neuroscience Society of India

1992 – present Society for Neuroscience (USA)

1997 – present International Society for Eye Research

1998 – present International Society for Neurochemistry

2016 – present European Association for Vision and Eye Research (EVER)

# LECTURES

Chairman, Minisymposium on Antioxidants and Cataract, XII Intl. Congress for Eye Research, Paris, France, July 1998

Organizing Committee, Zhengzhou Intl. Ophthalmic Research Conference, Zhengzhou, China, October 1998

Invited Speaker, European Association for Vision and Eye Research (EVER) Meeting, Nice, France, October 5-8, 2016.

# EDITORIAL BOARD and REVIEWER ACTIVITIES

## EDITORIAL SERVICE

2020 – present Editorial Board Member: Antioxidants, MDPI

1998 – present Editorial Board Member: Chinese Ophthalmic Research

### REVIEWER

Ophthalmology Journals

1993 – present Investigative Ophthalmology and Visual Science (IOVS)

1997 – present Experimental Eye Research

2000 – present Molecular Vision

2001 – present Current Eye Research

2000 – present Ophthalmology

2012 – present Graefe’s Archive for Ophthalmology

2019 – present Progress in Retinal Eye Research

Other Journals

2005 – present Free Radical Biology and Medicine

2010 – present American Journal of Physiology

2014 – present Scientific Reports

2016 – present American Journal of Pathology

2019 – present Redox Biology

2018 – present International Journal of Molecular Sciences

2016 – present Biochimica Biophysica Acta

2015 – present Journal of Pharmaceutical Sciences

2019 – present Chemical Biological Interactions

2020 – present Journal of Clinical Investigation

2020 – present Communications Biology

# RESEARCH PAPERS

### *RESEARCH PAPERS (PEER-REVIEWED JOURNALS)*

1. **Kannan R**, Subbaram MR, Achaya KT: Separation of mercaptoacetic acid adducts of long-chain monounsaturated fatty compounds by TLC. J Chromatog 24:433, 1966.
2. **Kannan R**, Roomi MW, Subbaram MR, Achaya KT: Desulphurisation and reduction studies of epithio fatty acids and alcohols. Fette Seifen Anstrichmittel 69:336, 1967.
3. **Kannan R**, Roomi MW, Subbaram MR, Achaya KT: Hydration of acetylenic fatty acids. Fette Seifen Anstrichmittel 69:644, 1967.
4. **Kannan R**, Subbaram MR, Achaya KT: Reduction of alpha-diketones by sodium borohydride. Indian J Chem 5:84, 1967.
5. **Kannan R**, Pantulu AJ, Subbaram MR, Achaya KT: Trans fatty acids of an Indian aster (calistephus chinensis) seed oil. J Oil Tech Assn of India 1:2, 1969.
6. **Kannan R**: Synthesis, structure and reactions of fatty materials. J. Sci. Ind. Res. 12: 53, 1969.
7. **Kannan R**, Rajiah A, Subbaram MR, Achaya KT: Analysis of some alpha hydroxy fatty compounds as their trimethylsilyl ethers by GLC. J Chromatog 55:402, 1971.
8. **Kannan R**, Subbaram MR, Achaya K: Stereochemical relationships between epoxy, epithio, halomercapto and hydroxymercapto derivatives of C18 and C22 olefinic acids. Indian J Chem 9:730, 1971.
9. **Kannan R**, Subbaram MR, Achaya KT: Formoxylation of an alpha, beta-unsaturated fatty acid. Indian J Chem 9:730, 1971.
10. **Kannan R**, Seng PN, Debuch H: Evaluation of a gas chromatographic method for the quantitative estimation of hexoses from neutral glycolipids. J Chromatog 92:95, 1974.
11. **Kannan R**, Tjiong HB, Debuch H, Wiedemann HR: Unusual glycolipids in lipidosis (Niemann-Pick Disease ?). Hoppe Seyler's Z Physiol Chem 355:551, 1974.
12. Kerenyi L, **Kannan R**, Gielen W, Debuch H: A sphingholipidosis with the accumulation of neutral glycosphingolipids A O2(GM3) and A1(GM2)-gangliosides. A Klin Klin Biochem 12:487, 1974.
13. **Kannan R**, Subbaram MR, Achaya KT: NMR studies of some oxygenated, halogenated and sulphur containing fatty acids and their derivatives. Fette Seifen Anstrichmittel 76:344, 1974.
14. **Kannan R**, Baker N: Tumor extracellular triglycerides in mice during the growth of Ehrlich ascites carcinoma. Lipids 10:770, 1975.
15. **Kannan R**, Palmquist DL, Baker N: Contribution of intermuscular fat to lipogenesis from glucose carbon in mice. Biochim Biophys Acta 431:225, 1976.
16. **Kannan R**, Baker N: Net changes in intermuscular fat before and during rapid lipogenic activation in mice. Biochim Biophys Acta 431:233, 1976.
17. **Kannan R**, Baker N: Hypertriglyceridemia in Ehrlich ascites carcinomatous mice. Tumor and mouse strain differences. Lipids 12:153, 1977.
18. **Kannan R**, Wilson L, Baker N: The role of dietary fat and hepatic triglyceride secretion in cancer-induced hypertriglyceridemia. Lipids 13:887, 1978.
19. Portman OW, Alexander M, **Kannan R**: The transport of control and hyperlipidemic low density lipoproteins from plasma to liver of rabbits. Atherosclerosis 32:33, 1979.
20. **Kannan R**, Ookhtens M, Baker N: Compartmental analysis of linoleate and palmitate turnover in a murine carcinoma. Cancer Res 40:2447, 1980.
21. **Kannan R**, Lyon I, Baker N: Dietary control of lipogenesis in vivo in host tissues and tumor of mice bearing Ehrlich ascites carcinoma. Cancer Res 40:4606, 1980.
22. **Kannan R**, Elovson J, Learn DB, Baker N: Fatty acid synthesis in vivo and hepatic contribution to whole body lipogenesis in obese Zucker rats. Lipids 15:993, 1980.
23. Elovson J, Huang YO, Baker N, **Kannan R**: Apolipoprotein B is structurally and metabolically heterogeneous in the rat. Proc Natl Acad Sci USA 78:157, 1981.
24. **Kannan R**, Baker N: Lipogenic responses to dietary glucose in selected rat adipose tissues. Indian J Biochem Biophys 18:47, 1981.
25. **Kannan R**, Bruckdorfer KR, Baker N: Secretion and turnover of very low density lipoprotein triacylglycerols in rats chronically fed diets rich in glucose and fructose. J Nutr 111:82, 1981.
26. Elovson J, Baker N, **Kannan R**, Ookhtens M: Molecular and kinetic non-identity of apoB peptides in two classes of rat plasma VLDL, IDL and LDL. In: Lipoprotein kinetics and modeling. Academic Press Inc., N.Y. 145-156, 1982.
27. Baker N, Learn DB, **Kannan R**, Bruckdorfer KR: Comparison of lipogenic responses to dietary glucose in selected mouse adipose tissues. Nutr and Metab 25:245, 1981.
28. Baker N, Mead J, Jr, **Kannan R**: Hepatic contribution to newly synthesized fatty acids in adipose tissue in rats and inhibition of hepatic and extrahepatic lipogenesis from glucose by dietary corn oil. Lipids 16:568, 1981.
29. Lyon I, **Kannan R**, Baker N: Turnover and transport of very low density lipoprotein triglycerides in mice bearing Ehrlich ascites carcinoma. Cancer Res 42:132, 1982.
30. Nadamanee K, Hendrickson JA, **Kannan R**, Singh BN: Antiarrhythmic efficacy and electrophysiologic actions of amiodarone in patients with life threatening ventricular arrhythmias. Potent suppression of spontaneously occurring tachyarrhythmias versus inconsistent abolition of induced ventricular tachycardia. Amer Heart J 103:950, 1982.
31. **Kannan R**, Nademanee K, Hendrickson JA, Rostami H, Singh BN: Amiodarone kinetics after oral doses. Clin Pharmacol Ther 31:438, 1982.
32. **Kannan R**, Pollak A, Singh BN: Effect of chronic administration of amiodarone on plasma lipids in rabbits. Atherosclerosis 4:19, 1982.
33. Chew CY, Collett JT, Campbell C, **Kannan R**, Singh BN: Beneficial effects of amiodarone pretreatment on early ischemic, ventricular arrhythmias relative to infarct size and regional myocardial blood flow in the conscious dog. J Cardiovasc Pharmacol 4:1028, 1982.
34. **Kannan R**, Ikeda N, Drachenberg M, Wagner R, Ookhtens M, Singh BN: Serum and myocardial kinetics of amiodarone and its major metabolite desethylamiodarone in rabbits. J Pharm Sci 73:1208-1211, 1984.
35. **Kannan R**, Tidwell D, Singh BN: An HPLC procedure for the quantitation of propafenone in serum and tissues. J Chromatog 272:428, 1983.
36. Ikeda N, Nademanee K, **Kannan R**, Singh BN: Electrophysiologic effects of amiodarone. Experimental and clinical observations relative to serum and tissue drug concentration. Am Heart J 108:890, 1984.
37. Ookhtens M, **Kannan R**, Lyon I, Baker N: Liver and adipose tissue contributions to newly formed fatty acids in an ascites tumor. Amer J Physiol 247:R146, 1984.
38. Nademanee K, **Kannan R**, Hendrickson JA, Ookhtens M, Kay I, Singh BN: Amiodarone digoxin interaction. Clinical significance, time course of development, potential pharmacokinetic mechanisms and therapeutic implications. J Am Coll Cardiol 4:111, 1984.
39. **Kannan R**, Ookhtens M, Chopra IJ, Singh BN: Effects of chronic administration of amiodarone on kinetics of metabolism of iodothyronines. Endocrinology 115:1710, 1984.
40. Singh BN, Nademanee K, Josephson MA, Ikeda N, Venkatesh N, **Kannan R**: The clinical results of amiodarone in cardiac arrhythmias: Optimal dosing. Pace 7:109, 1984.
41. Singh BN, Nademanee K, Josephson MA, Ikeda N, Venkatesh N, **Kannan R**: The electrophysiology and pharmacology of verapamil, flecainide, and amiodarone. Correlations with clinical effects and antiarrhythmic actions. Ann NY Acad Sci 432:210, 1984.
42. Venkatesh N, Al-Sarraf L, **Kannan R**, Singh BN: Tissue serum-correlate of digoxin-amiodarone pharmacokinetic interaction in rats: Evidence for selective tissue accumulation and reduced tissue binding. J Pharm Sci 74:1067, 1985.
43. Kato R, Ikeda N, Yabek SM, **Kannan R**, Singh BN: Electrophysiologic effects of the levo and dextrorotatory isomers of sotalol in isolated cardiac muscle and their in vivo pharmacokinetics. J Amer Coll Cardiol 7:116, 1986.
44. Venkatesh N, Singh BN, Al-Sarraf L, **Kannan R**: Digoxin-desethylamiodarone interaction in the rat. Comparison to the effects of amiodarone. J Cardiovasc Pharmacol 8:309-313, 1986.
45. Pekary AE, Hershman JM, Reed AW, **Kannan R**, Wang YS: Amiodarone inhibits T4 and T3 conversion and alpha-glycerophosphate dehydrogenase and malic enzyme levels in rat liver. Horm Metabol Res 18:114-118, 1986.
46. **Kannan R**, Yabek SM, Garson A Jr, Miller S, McVey P, Singh BN: Amiodarone efficacy in a young population: Relationship to serum amiodarone and desethylamiodarone levels. Amer Heart J 114:283-287, 1987.
47. **Kannan R**, Miller S, Perez V, Singh BN: A sensitive method for the measurement of amiodarone and desethylamiodarone in serum and tissues and its application to disposition studies. J Chromatog 385:225-232, 1987.
48. **Kannan R**, Matin-Asgari A: Dose dependent tissue uptake of flecainide during chronic administration in rabbits. Drug Metab Disp 16:228-231, 1988.
49. Kamiya K, **Kannan R**, Matin-Asgari A, Singh BN: Electrophysiologic effects of flecainide and their relation to serum and tissue drug concentrations in rabbits. J Cardiovasc Pharmacol 14:25-30,1989.
50. Kato R, Venkatesh N, Kamiya K, Yabek SM, **Kannan R**, Singh BN: Electrophysiologic effects of desethylamiodarone, an active metabolite of amiodarone: Comparison with amiodarone during chronic administration in rabbits. Amer Heart J 115:351-359, 1988.
51. **Kannan R**, Kato R, Takikawa R, Huang TS, Chopra IJ, Singh BN: Lack of effect of 3,3'5'-triiodothyronine (reverse T3) on cardiac function in the rabbit. Endocr Res 14:227-242, 1988.
52. Sambhi MP, **Kannan R**, Thananopavarn C, Ookhtens M, Gudenzi M: Therapeutic tolerance, hemodynamic effects and oral dose of kinetics of dilazep dihydrochloride in hypertensive patients. J Pharm Sci 78:218-284, 1989.
53. **Kannan R**, Sarma JSR, Guha M, Venkataraman K: Tissue accumulation and hepatic and pulmonary ultrastructural changes during chronic amiodarone administration to rats. Fund and Appl Toxicol 13:793-801, 1989.
54. **Kannan R**, Gan-Elepano M, Baker N: Reduced suppression of plasma saturated fatty acid mobilization and oxidation by feeding in lymphoma-bearing mice. Cancer Res, 50:2221-2227, 1990.
55. **Kannan R**, Chopra IJ, Ookhtens M, Singh BN: Effect of amiodarone on non-deiodinative pathway of thyroid hormone metabolism. Acta Endocrinologica 122:249-254,1990.
56. **Kannan R**, Kuhlenkamp J, Jeandidier E, Trinh H, Ookhtens M, Kaplowitz N: Evidence for carrier-mediated transport of glutathione across the blood-brain barrier. J Clin Invest 85:2009-2013,1990.
57. **Kannan R**, Sarma JSM, Guha M, Venkataraman K. Amiodarone toxicity: II. Desethylamiodarone-induced phospholipidosis and ultrastructural changes during chronic administration in rats. Fundam Appl Toxicol 16:103-109, 1991.
58. Zlokovic BV, Mackic JB, McComb JG, **Kannan R**, Weiss MH. An in situ perfused guinea-pig eye model for blood-ocular transport studies: application to amino acids. Exp Eye Res 54:471-477,1992.
59. **Kannan R**, Gan-Elepano M, Baker N. Anorexic contribution to increased linoleic acid mobilization and oxidation in lymphoma-bearing mice. Lipids 27:117-123, 1992.
60. **Kannan R**, Kuhlenkamp JF, Ookhtens M, Kaplowitz, N. Transport of GSH at blood-brain barrier of the rat: Inhibition and age dependence. J Pharmacol Exp Ther 263:964-970,1992.
61. **Kannan R**, Tang D, Mackic JB, Zlokovic BV, Fernandez-Checa JC. A simple technique to determine glutathione (GSH) levels and synthesis in ocular tissues as GSH-bimane adduct: application to normal and galactosemic guinea-pigs. Exp Eye Res 56:45-50,1993.
62. Mackic JB, Ross-Cisneros F, McComb JG, Bekhor I, Weiss MH, **Kannan R**, Zlokovic BV. Galactose-induced cataract formation in guinea-pigs: Morphological changes and accumulation of galactitol. Invest Opthalmol Vis Sci.35:804-810, 1994.
63. Zlokovic BV, Mackic JM, McComb JG, Weiss MH, Kaplowitz N, **Kannan R**. Evidence for transcapillary transport of reduced glutathione in vascular perfused guinea-pig brain. Biochem Biophys Res Commun 201: 402-408, 1994.
64. Zlokovic BV, Mackic JM, McComb JG, Kaplowitz N, Weiss M, **Kannan R**. Blood to lens transport of reduced glutathione in guinea-pigs: studies using vascular eye perfusion model. Exp Eye Res 59: 487-496, 1994.
65. **Kannan R**, Yi J, Zlokovic BV, Kaplowitz N. Molecular characterization of a reduced glutathione transporter in the lens. Invest Ophthalmol Vis Sci 36: 1785-1792, 1995.
66. Lu S, Sun W-M, Nagineni C, Hooks J, **Kannan R**. Bidirectional transport of intact glutathione in cultured human retinal pigment epithelial cells. Invest Ophthalmol Vis Sci 36: 2523-2530, 1995.
67. Mackic JB, Jinagouda S, McComb JG, Weiss MH, **Kannan R**, Kaplowitz N, Zlokovic BV. Transport of circulating reduced glutathione at the basolateral side of the anterior lens epithelium: Physiologic importance and manipulations. Exp Eye Res 62: 29-37, 1996.
68. **Kannan R**, Yi J-R, Li Y, Tang D, Zlokovic BV, Kaplowitz N. Evidence for the existence of a sodium-dependent GSH transporter: Expression of bovine brain capillary mRNA in Xenopus laevis oocytes and dissociation frm gamma glutamyltranspeptidase and facilitative GSH transporters. J Biol Chem 271: 9754-9758, 1996.
69. **Kannan R**, Yi J-R, Tang D, Zlokovic BV, Kaplowitz N. Identification of a novel, sodium-dependent, reduced glutathione transporter in the rat lens epithelium. Invest Ophthalmol Vis Sci 37: 2269-2275, 1996.
70. **Kannan R**, Mackic JB, Fernandez-Checa JF, Zlokovic BV. Lens and hepatic glutathione and cysteine regulation in galactose-fed guinea-pigs. Curr Eye Res 16:365-371, 1997.
71. Mackic JB, **Kannan R**, Kaplowitz N, Zlokovic BV. Low de novo glutathione synthesis from circulating sulfur amino acids in the lens epithelium. Exp Eye Res. 64: 615-626, 1997.
72. **Kannan R**, Bao Y, Mittur A, Andley UP, Kaplowitz N. GSH transport in immortalized human lens epithelial cells and expression of transport in human lens epithelial cell mRNA-injected Xenopus oocytes. Invest. Ophthalmol. Vis.Sci. 39: 1379-1386, 1998.
73. **Kannan R**, Mackic JB, Zlokovic BV. Corneal transport of circulating glutathione in normal and galactosemic guinea-pigs. Cornea 18: 321-327, 1998.
74. **Kannan R**, Mittur A, Bao Y, Tsuruo T, Kaplowitz N. GSH transport in immortalized mouse brain endothelial cells: Evidence for apical localization of a sodium-dependent GSH transporter. J. Neurochem 73: 390-399, 1999.
75. **Kannan R**, Bao Y, Sarthy VP, Kaplowitz N. Protection of oxidant injury by sodium-dependent GSH uptake in retinal Müller cells. Exp Eye Res 68: 609-616, 1999.
76. **Kannan R**, Bao Y, Sarthy VP, Lu S. Regulation of gamma glutamylcysteine synthetase subunit gene expression in retinal Müller cells by oxidative stress. Invest Ophthalmol Vis Sci 40: 1776-1782, 1999.
77. **Kannan R**, Chakrabarti R, Tang D, Kim K-J, Kaplowitz N. GSH transport in human cerebrovascular endothelial cells and human astrocytes: evidence for luminal localization of Na+-dependent GSH transport in HCEC. Brain Res 852: 374-382, 2000.
78. **Kannan R**, Wawrousek E, Kaplowitz N, Andley UP. Regulation of GSH in alphaA-expressing human lens epithelial cell lines and in alphaA-knockout mouse lenses. Invest Ophthalmol Vis Sci. 42: 409-416, 2001.
79. **Kannan R**, Tang D, Hu J, Bok D. GSH transport in human retinal pigment epithelial (HRPE) cells: Apical localization of sodium-dependent GSH transport. Exp Eye Res.72: 661-666,2001.
80. **Kannan R**, Stolz A, Ji Q, Prasad PD, Ganapathy V. Vitamin C transport in human lens epithelial cells: evidence for the presence of SVCT2. Exp Eye Res. 73: 159-166, 2001.
81. Gukasyan HJ, Lee VHL, Kim K-J, **Kannan R**. Net glutathione secretion in primary cultured rabbit conjunctival epithelial cell layers. Invest Ophthalmol Vis Sci. 43: 1154-1161, 2002.
82. Gukasyan HJ, Kim K-J, **Kannan R**, Farley RA, Lee VHL. Glutathione metabolism in conjunctiva. III. Mucosal GSH protects from H2O2 induced decrease in short circuit current across pigmented rabbit conjunctiva. Invest Ophthalmol Vis Sci. 44:4427-4438, 2003.
83. **Kannan R**, Jin ML, Gamulescu A, Hinton DR. Ceramide-induced apoptosis: Role of catalase and protection by hepatocyte growth factor. Free Radic Biol Med. 37: 166-175, 2004.
84. **Kannan R**, Gukasyan HJ, Zhang W, Trousdale MD, Kim K-J, Lee VHL. Impairment of conjunctival glutathione secretion and ion transport by oxidative stress in an adenovirus type 5 ocular infection model of pigmented rabbits. Free Radic Biol Med. 37: 229-238, 2004.
85. Jin ML, Yaung J He S, **Kannan R**, Hinton DR. Hepatocyte growth factor protects RPE cells against GSH depletion-induced apoptosis. Invest Ophthalmol Vis Sci. 46: 4311-4319, 2005.
86. Sreekumar PG, **Kannan R**, Yaung J, Spee C, Ryan SJ, Hinton DR. Protection from oxidative stress by methionine sulfoxide reductases in RPE cells. Biochem Biophys Res Commun. 334: 245-253, 2005.
87. Zhang N, **Kannan R**, Okamoto CT, Ryan SJ, Lee VHL, Hinton DR. Characterization of brimonidine transport in retinal pigmented epithelium. Invest Ophthalmol Vis Sci. 47: 287-294, 2006.
88. Sreekumar PG, **Kannan R**, de Silva AT, Burton R, Ryan SJ, Hinton DR. Thiol regulation of vascular endothelial factor-A and its receptors in retinal pigmented epithelial cells. Biochem Biophys Res Commun. 346: 1200-1206, 2006.
89. **Kannan R**, Zhang N, Sreekumar PG, Spee C, Rodriguez A, Barron E, Hinton DR. Stimulation of apical and basolateral VEGF-A and VEGF-C secretion by oxidative stress in polarized retinal pigmen epithelial cells. Mol Vis 22: 1649-1659, 2006.
90. Gukasyan HJ, Lee VHL, Simityan H, Kim K-J, **Kannan R**. Thermodynamic stoichiometry of a Na+- coupled glutathione transport. Can J Physiol Pharmacol. 84: 1223-1227, 2006.
91. [Yaung J, Jin M, Barron E, Spee C, Wawrousek EF, **Kannan R**, Hinton DR.](http://www.ncbi.nlm.nih.gov/pubmed/17438522?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum) alpha-Crystallin distribution in retinal pigment epithelium and effect of gene knockouts on sensitivity to oxidative stress. Mol Vis. 13:566-77, 2007.
92. Gukasyan HJ, Kim KJ, Lee VHL, **Kannan R**.Glutathione and its transporters in ocular surface defense. Ocul Surf. 5: 269-279, 2007.
93. Yang JJ, Ann DK, **Kannan R**, Lee VHL. Multidrug resistant protein 1 (MRP1) in rabbit conjunctival epithelial cells: Its effect on drug efflux and its regulation by adenoviral infection. Pharm Res. 24: 1490-1500, 2007.
94. Sreekumar PG, Zhou J, Sohn J, Spee C, Ryan SJ, Maurer BJ, **Kannan R**, Hinton DR. N-(4-hydroxyphenyl) retinamide augments laser-induced choroidal neovascularization in mice. Invest Ophthalmol Vis Sci. 2008 Mar;49(3):1210-20. doi: 10.1167/iovs.07-0667.  PMID: 18326751.
95. Yaung J, **Kannan R**, Wawrousek EF, Spee C, Sreekumar PG, Hinton DR. Exacerbation of retinal degeneration in the absence of alpha crystallins in an in vivo model of chemically induced hypoxia. Exp Eye Res. 2008 Feb;86(2):355-65. doi: 10.1016/j.exer.2007.11.007. Epub 2007 Nov 17. PMID: 18191123; PMCID: PMC2731668.
96. Sreekumar PG, Ding Y, Ryan SJ, **Kannan R**, Hinton DR. Regulation of thioredoxin by ceramide in retinal pigment epithelial cells. Exp Eye Res. 2009 Mar;88(3):410-7. doi: 10.1016/j.exer.2008.10.009. Epub 2008 Nov 1.  PMID: 18996115; PMCID: PMC2693936.
97. Sreekumar PG, **Kannan R**, Hinton DR. There are three major families of crystallins: misnaming of alphaB crystallin. Acta Physiol (Oxf). 2009 Apr;195(4):503; author reply 503. doi: 10.1111/j.1748-1716.2009.01976\_1.x.  PMID: 19291149.
98. Sonoda S, Spee C, Barron E, Ryan SJ, **Kannan R**, Hinton DR. A protocol for the culture and differentiation of highly polarized human retinal pigment epithelial cells. Nat Protoc. 2009;4(5):662-73. doi: 10.1038/nprot.2009.33.  PMID: 19373231; PMCID: PMC2688697.
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### *RESEARCH PAPERS – TO BE SUBMITTED*

1. Sreekumar PG, Hinton DR, Campisi J, **Kannan R**. αB-crystallin chaperone peptide inhibits senescence in RPE cells by modulating mitochondrial biogenesis and fission proteins.

## *BOOKS & CHAPTERS – Contributions*

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