

## PERIANNAN KUPPUSAMY, PhD

Last Updated: January 15, 2003

### CURRENT APPOINTMENT

UNIVERSITY Associate Professor of Internal Medicine  
Dorothy M. Davis Heart & lung Research Institute  
Ohio State University, Columbus, OH

Director, Biomedical EPR Imaging Center  
Dorothy M. Davis Heart & lung Research Institute  
Ohio State University, Columbus, OH

HOSPITAL -

### PERSONAL DATA

BUSINESS ADDRESS Biomedical EPR Imaging Center  
Dorothy M. Davis Heart & lung Research Institute  
420 West 12<sup>th</sup> Avenue, TMRF-114  
Columbus, OH 43210

PHONE 614-292-8998  
FAX 614-292-8454  
E-MAIL Kuppusamy-1@medctr.osu.edu

### CITIZENSHIP

USA

### EDUCATION & TRAINING

DEGREE	YEARS	INSTITUTION	DISCIPLINE
B. Sc.	1972 - 75	University of Madras	Chemistry
M. Sc.	1975 - 77	University of Madras	Chemistry
Ph. D.	1980 - 85	Indian Inst. Technology, Madras	Spectroscopy
Fogarty Fellowship	1986 - 87	NIH/NIA, GRC, Baltimore	Cell. Mol. Biol.
Research Fellowship	1987 - 90	Johns Hopkins University School of Med., Baltimore, MD	Cardiology

### PROFESSIONAL EXPERIENCE

POSITION	INSTITUTION	DATES
Director	Biomedical EPR Imaging Center Dorothy M. Davis Heart & Lung Research Institute Ohio State University, Columbus, Ohio	2002 -
Associate Professor	Department of Internal Medicine Ohio State University, Columbus, Ohio	2002 -
Associate Professor	Department of Medicine, Johns Hopkins University	

	School of Medicine, Baltimore, MD	2001 - 02
Assistant Professor	Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD	1992 - 00
Instructor	Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD	1990 - 92
Instructor	Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD	1990 - 92
Assistant Professor	Department of Chemistry, Pachaiyappa's College, Chennai	1985 - 86
Lecturer	Pachaiyappa's College, Chennai, India	1978 - 80

## RESEARCH ACTIVITIES

### • PUBLICATIONS

Peer-reviewed publication : 120  
Invited articles/Book-Chapters : 12  
(See attached List)

### • GRANTS, CONTRACTS & OTHERS

#### GRANTS - ACTIVE

TITLE : "EPR imaging of tumor heterogeneity and oxygenation"  
DATES : 08/15/1998 - 06/30/2004  
SPONSOR : National Cancer Institute/NIH  
IDENTIFICATION NUMBER : 2 RO1 CA78886  
TOTAL DIRECT COST : \$ 965,101  
CURRENT YR DIRECT COST : \$ 207,000  
ROLE : Principal Investigator  
PRINCIPAL INVESTIGATOR : Periannan Kuppusamy

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TITLE : "Center for biomedical EPR spectroscopy and imaging"  
DATES : 06/01/1998 - 05/31/2003  
SPONSOR : NIH-Division of Research Resources  
IDENTIFICATION NUMBER : 1R01 RR 12190-01A1  
TOTAL DIRECT COST : \$ 1,196,617  
CURRENT YR DIRECT COST : \$ 275,950  
ROLE : Co-Investigator  
PRINCIPAL INVESTIGATOR : Jay L. Zweier

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TITLE : "In vivo EPR imaging of free radicals at 300 MHz"

DATES : 04/01/1999 - 03/31/2004  
SPONSOR : NIH-NIGMS  
IDENTIFICATION NUMBER : 1R01 GM58582  
TOTAL DIRECT COST : \$ 1,467,711  
CURRENT YR DIRECT COST : \$ 313,784  
ROLE : Co-Investigator  
PRINCIPAL INVESTIGATOR : Jay L. Zweier

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TITLE : "Oxygen radicals and nitric oxide in postischemic injury"  
DATES : 02/01/2000 - 01/31/2005  
SPONSOR : NIH-NHLBI  
IDENTIFICATION NUMBER : 1R01 HL63744  
TOTAL DIRECT COST : \$ 1,028,817  
CURRENT YR DIRECT COST : \$ 205,763  
ROLE : Co-Investigator  
PRINCIPAL INVESTIGATOR : Jay L. Zweier

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TITLE : "Oxidants and nitric oxide in post-ischemic heart injury"  
DATES : 07/01/2000 - 06/30/2005  
SPONSOR : NIH-NHLBI  
IDENTIFICATION NUMBER : 1P01 HL656608  
TOTAL DIRECT COST : \$ 1,022,956 (sub only)  
CURRENT YR DIRECT COST : \$ 204,591  
ROLE : Co-Investigator  
PRINCIPAL INVESTIGATOR : Lewis C. Becker (P.D.), Jay L. Zweier (P.I., component)

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TITLE : "MRI/EPRI - Coimaging of biological samples"  
DATES : 07/01/2002 - 05/31/2007  
SPONSOR : NIH-Division of Research Resources  
IDENTIFICATION NUMBER :  
TOTAL DIRECT COST : \$ 1,996,617  
CURRENT YR DIRECT COST : -  
ROLE : Co-Investigator  
PRINCIPAL INVESTIGATOR : Jay L. Zweier

#### GRANTS - PREVIOUS

TITLE : Established Investigator Award - "Measurement of oxygen concentration and distribution in the heart"  
DATES : 07/01/1996 - 06/30/2001  
SPONSOR : American Heart Association (National Center)  
IDENTIFICATION NUMBER : 96003210  
TOTAL DIRECT COST : \$ 291,750  
CURRENT YR DIRECT COST : \$ 59,000  
ROLE : Principal Investigator  
PRINCIPAL INVESTIGATOR : Periannan Kuppusamy

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TITLE : Grant-in-Aid - "Measurement of oxygen concentration in the heart using electron paramagnetic resonance spectroscopy/imaging"  
DATES : 07/01/1995 - 06/30/1998  
SPONSOR : American Heart Association (National Center)  
IDENTIFICATION NUMBER : 95012010  
TOTAL DIRECT COST : \$ 132,000  
CURRENT YR DIRECT COST : \$ 44,000  
ROLE : Principal Investigator  
PRINCIPAL INVESTIGATOR : Periannan Kuppasamy

## EDUCATIONAL ACTIVITIES

• TEACHING None

• MENTORING

Ravi A. Shankar, MD	1996-1999	Post-doctoral fellow <i>Currently doing Residency in Radiation Oncology at Howard University, Wash., DC.</i>
Bhagyajyoti Katkooi, MD	2000 - 2001	Post-doctoral trainee <i>Currently doing Residency in Albany, NY</i>
Haiquan Li, M.D.	1998 - 2002	Post-doctoral fellow <i>Currently Scientific Officer, Otsuka America Pharmaceuticals, Inc., Rockville, MD</i>
G. Ilangovan, PhD	1999 - 2002	Post-doctoral fellow <i>Currently Assistant Professor, Ohio State University, Columbus, OH</i>
Arani Raguraj, MS	2001 - 2002	Technician <i>Currently Technician, Pulmonary &amp; Critical Care Division, Johns Hopkins Medical Institutions, Baltimore, MD</i>
Ramasamy P. Pandian, PhD.	2001 -	Post-doctoral fellow
Sathesh P. Evalappan, MD	2001 -	Research Fellow

• EDITORIAL ACTIVITIES

EDITORIAL BOARD APPOINTMENTS None

JOURNAL PEER REVIEW ACTIVITIES

Proceedings of the National Academy of Sciences, USA  
Free Radical Biology and Medicine  
Magnetic Resonance in Medicine  
Archives of Biochemistry and Biophysics  
Biochimica et Biophysica Acta

American Journal of Physiology  
Journal of Physical Chemistry  
Journal of Medicinal Chemistry  
Journal of Lipids Research  
Journal of Pharm. and Experi. Therapeutics  
European Journal of Biochemistry  
Experimental Eye Research  
Experimental Biology  
Shock  
Stroke

- **CLINICAL ACTIVITIES** None

## **ORGANIZATIONAL ACTIVITIES**

- **INSTITUTIONAL ADMINISTRATIVE APPOINTMENTS**

Director	2002 -	Biomedical EPR Imaging Center, Ohio State University, OH
Associate Director	1992 - 02	The EPR Center, Johns Hopkins University, Baltimore, MD
Assistant Director	1990 - 92	The EPR Center, Johns Hopkins University, Baltimore, MD

- **PROFESSIONAL SOCIETIES**

### MEMBERSHIP

New York Academy of Sciences	since 1994
American Association for the Advancement of Science (AAAS)	since 1997
American Chemical Society	since 1995
American Heart Association (AHA)	since 1995
International Society for Magnetic Resonance in Medicine (ISMRM)	since 1996
International EPR Society (IES)	since 1993
American Society for Biochemistry and Molecular Biology (ASBMB)	since 1999
Biophysical Society	since 1998
Oxygen Society	since 1997

- **CONFERENCE ORGANIZER**

Organized a special one-day symposium on "In vivo EPR Spectroscopy and Imaging" as part of the 23<sup>rd</sup> International EPR Symposium & 42<sup>nd</sup> annual Rocky Mountain Conference, Broomfield, Colorado, July 30- Aug 3, 2000.

- **SESSION CHAIR**

"International Conference on In Vivo ESR and ESR Imaging", L' Aquila, Italy, September 10-14, 1995.

"International Workshop on Nitric Oxide and Immune Response to Allografts and Tumors", Krakow, Poland, December 2-7, 1995.

"International EPR Symposium and Workshop on In Vivo EPR and Related Studies", Dartmouth College, Hanover, NH, September 12-17, 1998.

"International Workshop on Techniques and Bio-Medical Applications of In Vivo EPR and PEDRI", Aberdeen, Scotland, September 12-17, 1999.

"SPIN-2001 Conference", Kaiserslautern, Germany, September 22-27, 2001.

"International *In Vivo* Electron Paramagnetic Resonance Workshop", Krakow, Poland, Sept. 29-Oct 03, 2001.

"Oxygen/Nitrogen Radicals: Cells Injury & Disease", Morgantown, WV, June 01-06, 2002

• **ADVISORY COMMITTEES, REVIEW GROUPS**

Division of Research Resources, NIH, Special Study Section

National Cancer Institute, NIH, Special Study Section

**RECOGNITION**

• **AWARDS & HONORS**

Sir William Wedder Burn Prize	For FIRST RANK in M.Sc., University of Madras	(1977)
B.B.Day Commemoration Award	For FIRST RANK in M.Sc., University of Madras	(1977)
Teacher Fellowship	University Grants Commission, Govt. of India.	(1980-84)
Fogarty Fellowship	National Institutes of Health, Bethesda	(1986-87)
Research Award	Chesapeake Edu. & Res. Trust, Baltimore	(1990)
Established Investigator Award	American Heart Association, National Center	(1996-2001)

• **INVITED TALKS & PANELS**

Invited Symposium Speaker: "3D and 4D electron paramagnetic resonance imaging of rat heart", International Conference on Bioradicals Detected by ESR Spectroscopy", Yamagata, Japan, June 13-16 1994.

Symposium Presentation: "Oximetry Studies using 3D/4D Spectral-spatial EPR Imaging of Biological Organs and Tissues at L-band", 17th International EPR Symposium & 36th Rocky Mountain Conference on Analytical Chemistry, Denver, CO, July 31 - August 5, 1994.

Invited Symposium Speaker: "Gated EPR Imaging of Cardiac Contractile Cycle", International Conference on In Vivo ESR and ESR Imaging, L' Aquila, Italy, September 10-14, 1995.

Keynote Speaker: "Measurement and Imaging of Nitric Oxide in Biological Systems using EPR Imaging", International Workshop on Nitric Oxide and Immune Response to Allografts and Tumors, Krakow, Poland, December 2-7, 1995.

Symposium Presentation: "Gated EPR Imaging of Cardiac Contractile Cycle", 19th International EPR Symposium & 36th Rocky Mountain Conference on Analytical Chemistry, Denver, CO, July 25-29, 1996.

Invited Symposium Speaker: "Pharmacokinetic and Pharmacodynamics Studies on Free and Macromolecule-bound Nitroxides by EPR Spectroscopy and Imaging", VI International Symposium on Blood Substitutes, Montreal, Quebec, Canada, August 5-7, 1996.

Symposium Presentation: "EPR imaging of tumor heterogeneity and oxygenation in a Murine Tumor Model", 20th International EPR Symposium & 39th Rocky Mountain Conference on Analytical Chemistry, Denver, CO, August 3-7, 1997.

- Oral Presentation: "A new technique for measuring and imaging free radical metabolism and oxygenation in the heart", 70<sup>th</sup> Scientific Sessions, American Heart Association, Orlando, FL, November, 9-12, 1997.
- Symposium Lecture: "Principles of EPR imaging and its application to biological samples", International EPR Symposium and Workshop on In Vivo EPR and Related Studies, Dartmouth College, Hanover, NH, September, 1998.
- Invited lecture: "cw EPR Imaging: Principle and Application", National Cancer Institute, NIH, Bethesda, March 1999.
- Invited Lecture: "*In Vivo* EPR Spectroscopy and Imaging", National Institute for Occupational Safety and Health (NIOSH), Center for Disease Control, Morgantown, WV, May 1999.
- Invited Lecture: "EPR imaging of oxygen in tissues", International Society for Oxygen Transport in Tissues, Dartmouth College, Hanover, NH, September, 1999.
- Symposium Presentation: "Function EPR imaging of biological samples" in "Functional imaging and tissue oxygen determination using electron paramagnetic resonance", 47th Annual meeting of the Radiation Research Society of North America, Albuquerque, NM, April 29- May 03, 2000.
- Plenary Lecture: "Nitroxide probes for functional electron paramagnetic resonance imaging of biological systems", 6<sup>th</sup> International Symposium on Spin Trapping, Marseille, France, August 27-31, 2000.
- Inaugural Address: "EPR imaging of biological systems", as inaugural address of the Chemical Society at Pachaiyappa's College, University of Madras, Chennai, India, Feb. 16, 2001.
- Invited Lecture: "Functional EPR imaging of biological tissues", Department of Chemistry, Indian Institute of Technology, Chennai, India, Feb. 26, 2001.
- Invited Lecture: "Nitroxides as Functional EPR imaging probes", SPIN-2001 Conference, Kaiserslautern, Germany, September 22-27, 2001.
- Invited Lecture: "Measurement of Oxygenation and Redox imaging of tumors", International In Vivo EPR Workshop, Krakow, Poland, Sept. 29-Oct 03, 2001.

## PUBLICATIONS

### PEER-REVIEWED

#### 1983

1. **Kuppusamy, P.**, and Manoharan, P. T. Spin correlation functions in the weak exchange Heisenberg linear chain [(NMP)<sub>2</sub>][Cu(mnt)<sub>2</sub>]. *Bull. Mag. Res.*, 5, 207 (1983).
2. Ramakrishna, B. L., **Kuppusamy, P.**, Manoharan, P. T., and Hunziker, M. Structural and magnetic investigations on the charge transfer ion radical salt, [TMPD][Ni(mnt)<sub>2</sub>]. *J. Phys. Colloq.*, 44, 1409-1412 (1983).
3. Mahadevan, C., **Kuppusamy, P.**, Murthy, B. V. R., Seshasayee, M., and Manoharan, P. T. Structure of trimethylammonium bis(maleonitriledithiolato)nickelate(III). *Acta Cryst.*, C39, 1335-1343 (1983).

#### 1984

4. **Kuppusamy, P.**, Ramakrishna, B. L., and Manoharan, P. T. EPR, magnetic and structural investigations on the weak exchange Heisenberg linear chain [(NMP)<sub>2</sub>][Cu(mnt)<sub>2</sub>]. *Inorg. Chem.*, 23, 3886-3892 (1984).
5. **Kuppusamy, P.**, Ramakrishna, B. L., and Manoharan, P. T. Exchange interactions in some low dimensional metal dithiolene complexes. *Proc. Ind. Acad. Scien.*, 93, 977-1001 (1984).
6. Mahadevan, C., **Kuppusamy, P.**, Seshasayee, M., and Manoharan, P. T. Crystal and molecular structure of tetra-n-butylammonium bis(stilbene-1,2-dithiolato)nickelate(III). *J. Cryst. Spec. Res.*, 4, 177-190 (1984).

#### 1985

7. **Kuppusamy, P.**, Mahadevan, C., Seshasayee, M., and Manoharan, P. T. Crystal and molecular structure of N-methylphenazinium bis(maleonitriledithiolato) nickelate(III). *J. Cryst. Spect. Res.*, 15, 359-376 (1985).
8. **Kuppusamy, P.**, and Manoharan, P. T. Exchange interactions in [NMe<sub>4</sub>]<sub>2</sub>[Cu(mnt)<sub>2</sub>]: A quasi 1-d weak exchange system. *Inorg. Chem.*, 24, 3053-3057 (1985).
9. **Kuppusamy, P.**, Venkatalakshmi, N., and Manoharan, P. T. Structure of N-methylphenazinium bis(maleonitriledithiolato) gold(III). *J. Cryst. Spect. Res.*, 15, 629-641 (1985).
10. **Kuppusamy, P.**, and Manoharan, P. T. Anisotropic exchange interaction in tetra-n-butylammonium bis(stilbene-1,2-dithiolato)nickelate(III). *Chem. Phys. Lett.*, 188, 159-163 (1985).
11. **Kuppusamy, P.**, and Manoharan, P. T. Hyperfine and exchange interactions in tetraethylammonium bis(maleonitriledithiolato)cuprate(II). *J. Ind. Chem. Soc.*, 63, 95101 (1985).
12. Mahadevan, C., **Kuppusamy, P.**, Seshasayee, M., and Manoharan, P. T. Crystal and molecular structure of N-methylphenazinium bis(benzene-1,2-dithiolato)nickel(III). *J. Cryst. Spec. Res.*, 15, 305-316 (1985).

#### 1987

13. **Kuppusamy, P.**, and Manoharan, P. T. Magnetic properties of some exchanged coupled [Ni(mnt)<sub>2</sub>]<sup>-</sup> dimers. *Proc. Ind. Acad. Sci.*, 98, 115-129 (1987).

## **1988**

14. Zweier, J. L., **Kuppusamy, P.**, and Luty, G. A. Measurement of endothelial cell free radical generation: Evidence for a central mechanism of free radical injury in post ischemic tissues. Proc. Nat. Acad. Sci. USA, 85, 4046-4050 (1988).
15. Zweier, J. L., and **Kuppusamy, P.** Electron paramagnetic resonance measurements of free radicals in the intact beating heart: A technique for detection and characterization of free radicals in whole biological tissues. Proc. Nat. Acad. Sci. USA, 85, 5703-5707 (1988).

## **1989**

16. **Kuppusamy, P.**, and Zweier, J. L. Characterization of free radical generation by xanthine oxidase: Evidence for hydroxyl radical generation. J. Biolog. Chem., 264, 9880-9884 (1989).  
<http://www.jbc.org/cgi/content/abstract/264/17/9880>
17. Zweier, J. L., **Kuppusamy, P.**, Williams, R., Rayburn, B. K., Smith, D., Weisfeldt, M. L., and Flaherty, J. T. Measurement and characterization of postischemic free radical generation in the isolated perfused heart. J. Biolog. Chem., 264, 18890-18895 (1989).  
<http://www.jbc.org/cgi/content/abstract/264/32/18890>
18. Zweier, J. L., and **Kuppusamy, P.** Electron paramagnetic resonance studies of free radicals in the perfused heart. Phys. Med., 5, 289-296 (1989).
19. Zweier, J. L., Duke, S. S., **Kuppusamy, P.**, Sylvester, J. T., and Gabrielson, E. Electron paramagnetic resonance evidence that cellular oxygen toxicity is caused by the generation of superoxide and hydroxyl free radicals. FEBS Lett., 252, 12-16 (1989).

## **1990**

20. Levy, A., **Kuppusamy, P.**, and Rifkind, J. M. Multiple heme pocket subconformations of methemoglobin associated with distal histidine interactions. Biochem., 29, 9311 (1990).
21. Zweier, J. L., and **Kuppusamy, P.** Study of free radicals in the intact beating heart using low frequency EPR spectroscopy. Phys. Med., 7, 1-9 (1990).

## **1991**

22. Guyton, K. Z., Bhan, P., **Kuppusamy, P.**, Zweier, J. L., Trush, M. A., and Kensler, T. W. Free radical derived quinone methide mediates skin tumor promotion by butylated hydroxytoluene hydroperoxide: Expanded role for electrophiles in multistage carcinogenesis. Proc. Nat. Acad. Sci. USA, 88, 946-950 (1991).
23. Swauger, J. E., Dolan, P. M., Zweier, J. L., **Kuppusamy, P.**, Kensler, T. W. Role of benzoyloxyl radical in DNA damage mediated by benzoyl peroxide. Chemical Research in Toxicology, 4, 228-233 (1991).
24. Kukreja, R. C., Kearns, A. A., Zweier, J. L., **Kuppusamy, P.**, Hess, M. L. Singlet oxygen interaction with Ca<sup>2+</sup>-ATPase of cardiac sarcoplasmic reticulum. Circulation Research. 69, 1003-1014 (1991).
25. Zweier, J. L., Thompson-Gorman, S., and **Kuppusamy, P.** Measurement of oxygen concentrations in the intact heart using electron paramagnetic resonance spectroscopy: A technique for measuring oxygen concentrations in situ. J. Bioenerg., and Biomem., 23, 855-871 (1991).

## **1992**

26. **Kuppusamy, P.**, and Zweier, J. L. Identification and quantitation of free radicals and paramagnetic centers from complex Multicomponent EPR spectra. Appl. Radiat. Isotopes. 44, 367-372 (1992).
27. Gabrielson, E. W., **Kuppusamy, P.**, Povey, A. C., Zweier, J. L., and Harris, C. C. Measurement of neutrophil activation and epidermal cell toxicity by palytoxin and 12-o-tetradcanoylphorbol-13-acetate. Carcinogenesis, 13, 395-401 (1992).
28. Povey, A. C., Wilson, V. L., Zweier, J. L., **Kuppusamy, P.**, O'Neil, I. K., and Harris, C. C. Detection by <sup>32</sup>P-postlabeling of DNA adducts induced by free radicals and unsaturated aldehydes formed during the aerobic decomposition of fecapentaene-12. Carcinogenesis, 13, 395-401 (1992).
29. Grill, H. P., Zweier, J. L., Flaherty, J. T., **Kuppusamy, P.**, and Weisfeldt, M. L. Direct measurement of myocardial free radical generation in an in-vivo model: Effects of post-ischemic reperfusion and treatment with human recombinant superoxide dismutase. J. Amer. Coll. Cardio. 20, 1604-1611 (1992).

### **1993**

30. Shandelya, S. M. L., **Kuppusamy, P.**, Weisfeldt, M. L., and Zweier, J. L. Evaluation of the role of polymorphonuclear leukocytes on contractile function in myocardial reperfusion injury. Circulation, 87, 536-546 (1993).
31. Shandelya, S. M. L., **Kuppusamy, P.**, Herskowitz, A., and Zweier, J. L. Soluble component receptor type 1 inhibits the complement pathway and prevents contractile failure in the postischemic heart: Evidence that complement activation is required for neutrophil-mediated reperfusion injury. Circulation, 88, 2812-2826 (1993).
32. Sanders, S. P., Zweier, J. L., **Kuppusamy, P.**, Harrison, S. J., Bassett, D. J., Gabrielson, E. W., and Sylvester, J. T. Hperoxic sheep pulmonary endothelial cells generate free radicals via mitochondrial electron transport. J. Clin. Invest. 91, 46-52 (1993).
33. Chzhan, M., Shteynbuk, M., **Kuppusamy, P.**, and Zweier, J. L. An optimized L-band resonator for EPR imaging of biological samples. J. Magn. Reson. A105, 49-53 (1993).  
<http://www.idealibrary.com/links/artid/jmra.1993.1246/production/pdf>
34. Ambrosio, G., Zweier, J. L., Duilio, C., **Kuppusamy, P.**, Santoro, G., Elia, P. P., Tritto, I., Cirillo, P., Condorelli, M., Chiariello, M., and Flaherty, J. T. Evidence that mitochondrial respiration is a source of potentially toxic oxygen Free radicals in intact rabbit hearts subjected to ischemia and reflow. J. Biolog. Chem., 268, 18532-18541 (1993).  
<http://www.jbc.org/cgi/content/abstract/268/25/18532>
35. Lefer, D. J., Shandelya, S. M. L., Becker, L. C., Serrano Jr., C. V., **Kuppusamy, P.**, and Zweier, J. L. Cardioprotective actions of monoclonal antibody against CD-18 in myocardial ischemia-reperfusion injury. Circulation, 88, 1779-1787 (1993).

### **1994**

36. **Kuppusamy, P.**, Chzhan, M., Vij, K., Shteynbuk, M., Gianella, E., Lefer, D. J., and Zweier, J. L. Three dimensional spectral-spatial EPR imaging of free radicals in the heart: A technique for imaging tissue metabolism and oxygenation. Proc. Nat. Acad. Sci. USA , 91, 3388-3392 (1994).  
<http://www.pnas.org/cgi/reprint/91/8/3388>
37. Zweier, J. L., **Kuppusamy, P.**, Thompson-Gorman, S., Klunk, D., and Luty, G. A. Measurement and characterization of free radical generation in reoxygenated human endothelial cells. Amer. J. Physiol. (Cell Physiology) 266, C700-C708 (1994).

38. Zweier, J. L., and **Kuppusamy, P.** In vivo EPR spectroscopy of free radicals in the heart. Environ. Health Perspectives, 102, 45-51(1994).
39. Zweier, J. L., Broderick, R., **Kuppusamy, P.**, Thompson-Gorman, S., and Luty, G. A. Determination of the mechanism of free radical generation in human aortic endothelial cells exposed to anoxia and reoxygenation. J. Biolog. Chem. 269, 24156-24162 (1994).  
<http://www.jbc.org/cgi/content/abstract/269/39/24156>
40. Sanders, S. P., Harrison, S. J., **Kuppusamy, P.**, Sylvester, J. T., and Zweier, J. L. A comparative study of EPR spin trapping and cytochrome c reduction techniques for the measurement of superoxide anions. Free Rad. Biolog. Med. 16, 753-761(1994).
41. Chen, K., Ng, C. E., Zweier, J. L., **Kuppusamy, P.**, Glickson, J. D., and Swartz, H. M. Measurement of the intracellular concentration of oxygen in a cell perfusion system. Magn. Reson. Med. 31, 1-5 (1994).
42. Zweier, J. L., Chzhan, M., Ewert, U., Schneider, G., and **Kuppusamy, P.** Development of a highly sensitive probe for measuring oxygen in biological tissues. J. Magn. Reson. B 105, 52-57(1994).  
<http://www.idealibrary.com/links/artid/jmrb.1994.1099/production/pdf>

## **1995**

43. **Kuppusamy, P.**, and Zweier, J. L. EPR imaging of free radicals in the perfused heart. Curr. Topics in Biophys. 18, 3-13 (1995).
44. **Kuppusamy, P.**, Chzhan, M., and Zweier, J. L. Development and optimization of three-dimensional spatial EPR imaging for biological organs and tissues. J. Magn. Reson. B106, 122-130 (1995).  
<http://www.idealibrary.com/links/artid/jmrb.1995.1022/production/pdf>
45. **Kuppusamy, P.**, Chzhan, M., Samouilov, A., Wang, P., and Zweier, J. L. Mapping the spin density and lineshape distribution of free radicals in the heart using 4D spectral-spatial EPR imaging. J. Magn. Reson. B107, 116-125 (1995).  
<http://www.idealibrary.com/links/artid/jmrb.1995.1067/production/pdf>
46. **Kuppusamy, P.**, Chzhan, M., and Zweier, J. L. 3D and 4D electron paramagnetic resonance imaging of the rat heart. Magn. Reson. Med. (Japan) 6, 59-61 (1995).
47. **Kuppusamy, P.**, Wang, P., and Zweier, J. L. Three-dimensional spatial EPR imaging of the rat heart. Magn. Reson. Med. 34, 99-105 (1995).
48. **Kuppusamy, P.**, Ohnishi, S. T., Numagami, Y., Ohnishi, T., and Zweier, J. L. Three-dimensional imaging of nitric oxide production in the rat brain subjected to ischemia-hypoxia. J. Cerebr. Blood Flow Metab. 15, 899-903 (1995).
49. **Kuppusamy, P.**, Wang, P., and Zweier, J. L. Evaluation of nitroxides for the study of myocardial metabolism and oxygenation. Magn. Reson. Chem. 33, S123-S128 (1995).
50. Li, Y., **Kuppusamy, P.**, Zweier, J. L., and Trush, M. A. ESR evidence for the generation of reactive oxygen species from the copper mediated oxidation of the benzene metabolite, hydroquinone: Role in DNA damage. Chemico-biological Interactions 94, 101-120 (1995).
51. Chzhan, M., **Kuppusamy, P.**, and Zweier, J. L. Development of an electronically tunable L-band resonator for EPR spectroscopy and imaging of biological samples. J. Magn. Reson. B 108, 67-72 (1995)  
<http://www.idealibrary.com/links/artid/jmrb.1995.1103/production/pdf>

52. Zweier, J. L., and **Kuppusamy, P.** EPR spectroscopy of free radicals in the perfused heart. Curr. Topics in Biophys. 18, 14-25 (1995).
53. Zweier, J. L., Wang, P., and **Kuppusamy, P.** Direct measurement of nitric oxide generation in the ischemic heart using electron paramagnetic resonance spectroscopy. J. Biol. Chem., 270, 304-307 (1995).  
<http://www.jbc.org/cgi/content/full/270/1/304>
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