

P.V. Rao

EDUCATION

B.A. University of Madras, 1954

M.A. University of Bombay, 1956

Ph.D. University of Georgia, 1963

Honors

Georgia Rotary Student Fellow, 1960-61

Elected Member, Phi Kappa Phi, 1963

Elected Member, International Statistical Institute, 1985

Experience (teaching and research)

Lecturer in Statistics, College of Science, Nagpur, India, 1956-60

Assistant Statistician, Ag. Experiment Station, University of Georgia, 1962-64.

Assistant Professor, Department of Mathematics, University of Georgia, 1963-64

Assistant Professor, Department of Statistics, University of Florida, 1964-67

Associate Professor, Department of Statistics, University of Florida, 1967-72

Professor, Department of Statistics, University of Florida, 1972-Jan 1998

Visiting Fellow, Australian National University, Jan 1985-Jun 1985

Professor Emeritus, Department of Statistics, Jan 1998—

Experience (consulting)

As a member of the Division of Biostatistics, Department of Statistics, University of Florida, P.V. Rao has consulted extensively with researchers in the University of Florida Health Sciences Center.

As the statistician responsible for all neuroblastoma studies of the Pediatric Oncology Group (POG), P. V. Rao has consulted with cancer researchers in the POG institutions across U.S. and Canada.

Research Projects (Partial List)

1. Assessment of natural radiation of lands and associated structures in central Florida. (Project funded by Florida Phosphate Council)
2. Retention and transportation of phosphorus and other selected pesticides in soils and sediments. (Project funded by E.P.A.)
3. Engineering planning and design criteria for small craft recreational marinas in Florida: Data base survey. (Project funded by Florida Sea Grant Agency).
4. Survey on fatigue and work practices of anesthesia practitioners. (Project funded by Anesthesia Patient Safety Foundation)
5. Evaluation of models for predicting fate of pesticides. (Project funded by DER, Florida)
6. Joint Retirement of co-worker couples. (Project funded by NIH)
7. Director of the Biostatistics Core for the Center for Specialized Materials Sciences Research. (Project funded by NIDR)
8. Director of Data Analysis and Coordinating Center for two BMT Clinical Trials. (Project funded by pharmaceuticals)
9. Statistician for Neuroblastoma Studies of Pediatric Oncology Group (POG). (Projects funded by NCI)
10. Consultant statistician to the Institute for Child Health Policy, UF (05/00 - 05/01).
11. Consultant statistician to Regeneration Technologies Inc. Alachua, FL. (07/01 -)
12. Consultant statistician to USBiomaterials, Alachua, FL. (06/02 -)
13. Member, Safety Monitoring Committee for a clinical trial of Remicaid in Ankylosing Spondylitis by Centocor Inc., Philadelphia, PA.(09/02 -)
14. Statistical consultant to University of Florida Maternal Child Health and Education Research Data Center (MCHERDC), Gainesville, FL. (05/03 -)

Publications

1. Rao, P.V. (1960): "On the construction of some partially balanced incomplete block designs with more than three associate classes". *Calcutta Statist. Assoc. Bull.* 9, 87-92.
2. Rao, P.V. (1960): "The dual of a balanced incomplete block design". *Ann. Math. Statist.* 31, 779-785.
3. Rao, P.V. (1961): "Analysis of a class of P.B.I.B. designs with more than two associate classes". *Ann. Math. Statist.* 32, 800-808.

4. Rao, P.V. (1964): "The F-test in the intrablock analysis of a class of P.B.I.B. designs". *Ann. Statist. Math.* 15, 25-35.
5. Supran, M.K., Rao, P.V. et al (1966): "Comparison of different organic acids for acidification of pimentos". *Food Technology.* 20.
6. Rao, P.V. (1967): "The effect of truncation on the F-test for a class of P.B.I.B. designs". *Ann. Statist. Math.* 19, 349-354.
7. Rao, P.V., and Kupper, L.L. (1967): "Ties in paired comparison experiments: A generalization of Bradley-Terry model". *J. Amer. Statist. Assoc.* 62, 194-204.
8. Rao, P.V. (1968): "On a k-sample model of Conover". *Ann. Statist. Math.* 20, 483-487.
9. Rao, P.V., and Thornby, J.I. (1969): "A robust point estimator in a generalized regression model". *Ann. Math. Statist.* 40, 1784-1790.
10. Rao, P.V. (1972): "Robust estimation for a simple exponential model". *Austr. J. of Statist.* 14, 54-62.
11. Beaver, R.J., and Rao, P.V. (1972): "The use of limit theorems in paired and triple comparison model building". *J. Math. Psychology.* 9, 92-103.
12. Beaver, R.J., and Rao, P.V. (1973): "On ties in triple comparisons". *Estadistica.* XXIV, 77-92.
13. Allen, F.M., Braswell, R.N., and Rao, P.V. (1974): "Distribution-free approximations for chance-constraints". *Operations Research.* 22, 610-621.
14. Blight, B.J.N., and Rao, P.V. (1974): "The convergence of Bhattacharyya bounds". *Biometrika.* 60, 137-142.
15. Rao, P.V., Schuster, E.F. and Littell, R.C. (1975): "Estimation of shift and center of symmetry based on Kolmogorov-Smirnov statistics". *Ann. Statist.* 3, 862-873.
16. Rao, P.V., and Littell, R.C. (1976): "An estimator of relative potency". *Commun. Statist.-Theor. Meth.* A5, 183-189.
17. Rao, P.S.C., Rao, P.V., and Davidson, J.M. (1977): "Estimation of spatial variability of soil water flux". *Soil Science Society of America Journal.* 41, 1208-1209.
18. Hill, D.L., and Rao, P.V. (1977): "Tests of symmetry based on Cramer von-Mises statistics". *Biometrika.* 64, 489-94.
19. Littell, R.C., and Rao, P.V. (1978): "Confidence regions for location and scale parameters based on the Kolmogorov-Smirnov goodness of fit statistic". *Technometrics.* 20, 23-27.
20. Marks, R.G., and Rao, P.V. (1978): "A modified Tiao Gutmann rule for multiple outliers". *Commun. Statist.-Theor. Meth.* A7, 113-126.

21. Wackerly, D.D., McClave, J.T. and Rao, P.V. (1978): "Measuring nominal scale agreement between a rater and a known standard". *Psychometrika*. 213-223.
22. Rao, P.V., Rao, P.S.C., Davidson, J.M. and Hammond, L.C. (1979): "Use of goodness of fit tests for characterizing the spatial variability of soil properties". *Soil Science Society of America Journal*. 43, 274-278.
23. Marks, R.G., and Rao, P.V. (1979): "An estimation procedure for data containing outliers with a one directional shift in the mean". *J. Amer. Statist. Assoc.* 74, 614-620.
24. Haghi, M.A., Savani, N.K., Rao, P.V., and Wethington, J.A. (1979): "Statistical analysis of radon flux measurements. *Natural Radiation Environment*". 3, 124-136.
25. Rao, P.V., Einerson, J.J., Einerson, J.A. and Mehta, A.J. (1980): "A survey of small-craft recreational marinas in Florida". *Technical Paper No. 18*, Florida Sea-Grant College, Gainesville, FL.
26. Hour, S.S., Ahmed, E.M., Cornell, J.A. and Rao, P.V. (1980): "Formulation and sensory evaluation of a fruit punch containing watermelon juice". *J. of Food Science*, 45, 809-813.
27. Rao, P.V. and Wackerly, D.D. (1980): "A large deviation result for the difference in sample medians". *Statistica Neerlandica*. 34, 107-115.
28. Hill, D.L. and Rao, P.V. (1981), "Tests of Symmetry Based on Watson statistics". *Commun. Statist.-Theor. Meth.* 10, 1111-1125.
29. Rao, P.V., Portier, K.M. and Rao, P.S.C. (1981): "A stochastic approach for describing convective-dispersive transport in saturated porous media". *Water Resources Research*. 17, 963-968.
30. Rao, P.V., Portier, K.M. and Ondrasik, J.A. (1981): "Density estimation using line transect sampling". *Studies in Avian Biology*. 6, 441-444.
31. Rao, P.V. (1981): "Remarks on comparison methods". *Studies in Avian Biology*. 6, 110-111.
32. Rao, P.V., and Portier, K.M. (1981): "Line transect sampling of clustered populations". *Proceedings of ASA Section on Survey Research Methods*. 41-44.
33. Mollins, C., Rao, P.V. and Wethington, J.A. (1982): "Radon flux and soil surface conditions". *Trans. Amer. Nuclear Soc.* 61, 54-56.
34. Littell, R.C., and Rao, P.V. (1982): "On minimum distance estimation of location based on the Kolmogorov statistic". *Commun. Statist.-Theor. Meth.* 11, 1793-1807.
35. Rao, P.V. (1984): "Density estimation based on line transect samples". *Statistics and Probability Letters*. 2, 51-57.

36. Rao, P.V., and Portier, K.M. (1985): "A model for line transect sampling of clustered populations". *Statistics and Probability Letters*. 3, 89-93.
37. Ireson, M.J. and Rao, P.V. (1985): "Interval estimation of slope with right-censored data". *Biometrika*. 72, 601-608.
38. Mehta, A.J., and Rao, P.V. (1985): "Angle of repose of selected bivalve shell beds". *Journal of Coastal Research*. 1, 365-374.
39. Popovich, E.A., and Rao, P.V. (1985): "Conditional tests for censored matched pairs". *Commun. Statist.-Theor. Meth.* 14, 2041-2056.
40. Rao, P.V. and Lees, J.D. (1986): "Weighted median estimates for response surface models". *Austr. J. of Statist.* 28, 72-78.
41. Sawka, G.J., Collins, M.A. and Rao, P.V. (1988): "Evaluation of selected Florida soils for on-site sewage disposal systems". *Proceedings of the Fifth National Symposium on Individual and Small Community Sewage Systems*. Amer. Soc. Agri. Engineers.
42. Rao, P.V. and Daley, R.R. (1988): "On the use of Scholz-Sievers method for distribution-free inference about the difference in slopes of two regression lines". *Commun. Statist.-Theor. Meth.*, A17, 1437-1448.
43. Groggel, G.J., Wackerly, D.D. and Rao, P.V. (1988): "Nonparametric estimation in one-way random effects models". *Commun. Statist.-Simula.* 17, 887-903.
44. Echevarria, M.G., Henry, P.R., Ammerman, C.B., and Rao, P.V. (1988): "Effects of time and dietary selenium concentration as sodium selenite on tissue selenium uptake by sheep". *J. Anim. Sci.* 66, 2299-2305.
45. Henry, P.R., Echevarria, M.G., Ammerman, C.B., and Rao, P.V. (1988): "Estimation of the relative biological availability of inorganic selenium sources for ruminants using tissue uptake of selenium". *J. Anim. Sci.* 66, 2306-2312.
46. Echevarria, M.G., Henry, P.R., Ammerman, C.B., Rao, P.V. and Miles, R.D. (1988): "Estimation of relative bioavailability of inorganic selenium sources for poultry. 1. Effect of time and high dietary selenium on tissue selenium uptake". *Poultry Science*. 67, 1295-1301.
47. Chang, Myron N. and Rao, P.V. (1989): "Berry-Esseen Bound for the Kaplan-Meier Estimator". *Commun. in Statist.-Theory and Meth.* 18, 4647-4664.
48. F.N. Tarla, Henry, P.R., Ammerman, C.B. and Rao, P.V. (1989): "Effect of Time on Tissue Deposition of Selenium in Sheep Fed Calcium Selenite or Sodium Selenite". *Nutritional Reports International*, 39, 943-948.
49. E.R. Ellis, Mendenhall, W.M., Rao, P.V., Parsons, J.T., Spangler, A.E., and Million, R.R.. (1989), "Does Node Location Affect the Incidence of Distant Metastases in Head and Neck Squamous Cell Carcinoma?". *Int. J. Radiat. Oncol. Biol. Phys.* 17, 293-297.

50. Wong-Valle, J. Ammerman, C.B., Henry, P.R., Rao, P.V. and Miles, R.D. (1989): "Bioavailability of Manganese from Feed Grade Manganese Oxides for Broiler Chicks". *Poultry Science*, 68, 1368-1373.
51. Parsons, J.T., McCarty, P.J., Rao, P.V., Mendenhall, W.M. and Million, R.R. (1990): "On the Definition of Local Control". *Int. J. Radiat. Oncol. Biol. Phys.* 18, 705-706.
52. Ellis, E.R., Mendenhall, W.M., Rao, P.V., McCarty, Patricia J., Parsons, J.T., Stringer, S.P., Cassisi, N.J., and Million, R.R. (1991): "Incisional or Excisional Neck-Node Biopsy Before Definitive Radiotherapy, Alone or Followed by Neck Dissection". *Head and Neck*, 13, 177-183.
53. Rao, P.V. and Ghosh, Malay (1991): "Comments on the paper-Nonparametrics: Retrospectives and Perspectives by P.K. Sen". *Nonparametric Statistics*, 1, 43-46.
54. Ledoux, D.R., Henry, P.R., Ammerman, C.B., Rao, P.V. and Miles, R.D. (1991): "Estimation of the Relative Bioavailability of the Inorganic Copper Sources for Chicks Using Tissue Uptake of Copper." *J. of Anim. Science*, 69, 215.
55. Tarla, F.N., Henry, P.R., Ammerman, C.B., Rao, P.V. and Miles, R.D. (1991): "Effect of Time and Sex on Tissue Selenium Concentrations in Chicks Fed Practical Diets Supplemented with Sodium selenite or Calcium Selenite." *Biological Trace Elements Research*, 31, 11-20.
56. Seyfried, M.S., Hornsby, A. and Rao, P.V. (1992): "Partitioning Variability of Soil Properties Affecting Pesticide Movement with Soil Taxonomy". *Soil Science Soc. of Amer. Jour.*, 56, 207-214.
57. Chang, M.N. and Rao, P.V. (1992): "On the Estimation of a Survival Function When New is Better than Used of a Specified Age". *Nonparametric Statistics*, 2, 45-58.
58. Chang, M.N. and Rao, P.V. (1993): "Improved Estimation of Survival Functions in the New-Better-Than-Used Class". *Technometrics*, 35, 192-203.
59. Yang, Mark C.K. and Rao, P.V. (1993): "Testing Concomitancy Between Two Physiological Pulse Series". *Statistics in Medicine*, 12, 2043-2055.
60. Shen, Chiayi, Rao, P.V., Batich, Christopher D., Moorhead, Jacquelin and Yan, Jun (1994): "Stochastic Modeling of Controlled release from poly-styrene-co-4 Vinylpyridine Microspheres". *Journal of Controlled Release*, 32, 139-146.
61. Pikounis, V.B. and Rao, P.V. (1994): "Linear rank tests for the nonresponders problem with censored data". *Biometrika*, 81, 691-699.
62. Moorhead, J., Rao, P. V., Anusavice, K. J. (1994): "Guidelines for Experimental Studies". *Dental Materials*, 10, 45-41.
63. Cohn, S.L., A.T.Look, V.V.Joshi, T.Holbrook, H.Salwen, D.Chagnovich, L.Chesler, S.T.Rowe, M.B.Valintine, H.Komuro, R.P.Castleberry, L.C.Bowman, P.V.Rao, R.C.Seeger,

- and G.M.Brodeur (1994): “Lack of correlation of N-*myc* gene amplification with prognosis in localized neuroblastoma: a Pediatric Oncology Group study”. *Cancer Research*, 55, 712-726.
64. Raychaudhuri, A. and Rao, P.V. (1996): “Efficiencies of some rank tests for censored bivariate data”, *Journal of Nonparametric Statistics*, 6, 1-12.
 65. Joshi, V. V., Rao, P.V., Cantor, A.B., Altshuler, G., Shuster, J.J. and Castleberry, R.P. (1996): “Modified Histologic Grading of Neuroblastomas with Replacement of Mitotic Rate by Mitosis Karyorrhexis Index: A Clinicopathologic Study of 223 Cases From the Pediatric Oncology Group”: *Cancer*, April Issue.
 66. Strother, D. V. van Hoff, J., Rao, P.V., Halperin, E., Murray, K., Smith, E.I., Shamberger, R., Castleberry, R. P., (1996), “Outcome of Therapy for N-myc non-amplified INSS stages 2B and 3 Neuroblastoma (NB): The Pediatric Oncology Group Experience. *Advances in Neuroblastoma Research* May 22 – 25, Philadelphia, PA.
 67. Kumar M., Saleh, A., Rao, P.V., Ochoa, S., Meyers, L., Millar, A., and Graham-Pole J. (1997) “Toxicity associated with high-dose cytosine arabinoside and total body irradiation as conditioning for allogeneic bone marrow transplantation”, *Bone Marrow Transplantation*, 19, 1061-1064.
 68. Rao, P.V. (1998), *Statistical Research Methods in the Life Sciences*, Brooks/Cole, Pacific Grove, CA
 69. Shamberger, R.C., Smith, E.I., Joshi, V.V., Rao, P.V., Hayes, F.A., Bowman, L.C. and Castleberry, R.P. (1998) “ The Risk of Nephrectomy During Local Control in Abdominal Neuroblastoma”, *Journal of Pediatric Surgery*, 33, 161–164.
 70. Strother, D.V. van Hoff, J., Rao, P.V., Smith, E.I., Shamberger, R. C., Halperin, E.C., Murray, K.J., Castleberry, R.P., (1998), “Event-free Survival of Children with Biologically Favourable Neuroblastoma Based on the Degree of Initial Tumour Resection: Results From The Pediatric Oncology Group”, *European Journal of Cancer*, 33, 2121–2125.
 71. Gieser, P., Chang, M.N., Rao, P.V., Shuster, J.J. (1998) “ Modeling Cure Rates Using the Gompertz Model with Covariate Information”. *Statistics in Medicine*, 17, 831–839.
 72. Katzenstein, H.M., Bowman L.C., Brodeur G.M., Thorner P.S., Joshi V.V., Smith E.I., Look A.T., Rowe S.T., Nash M.B., Holbrook T., Alvarado C., Rao, P.V., Castleberry, R.P. and Cohn S.L. (1998) ”The prognostic significance of age, MYCN oncogene amplification, tumor cell ploidy and histology in 110 infants with stage D(S) neuroblastoma.” *Journal of Clinical Oncology*, 16, 2007–2017.
 73. Pott, E.B., Henry, P.R., Zanetti, M.A., Rao, P.V., Hinderberger Jr, E.J., Ammerman, C.B. (1999) “Effects of High Dietary Molybdenum Concentration and Duration of Feeding Time on Molybdenum and Copper Metabolism in Sheep”. *Animal Feed Science and Technology*, 79, 93–105.

74. Pott, E.B., Henry, P.R., Rao, P.V., Hinderberger Jr, E.J., Ammerman, C.B. (1999) "Estimated Relative Bioavailability of Supplemental Inorganic Molybdenum Sources and Their Effect on Tissue Molybdenum and Copper Concentrations in Lambs", *Animal Feed Science and Technology*, 79, 107–117.
75. Cushing B, Giller R, Ablin A, Cohen L, Cullen J, Hawkins E, Heifetz SA, Krailo M, Lauer SJ, Marina N, Rao PV, Rescorla F, Vinocur CD, Weetman RM, Castleberry RP, (1999) "Surgical Resection Alone is Effective Treatment for Ovarian Immature Teratoma in Children and Adolescents: A Report of the Pediatric Oncology Group and Children's Cancer Group" *American Journal of Obstetrics and Gynecology*, 181, 353-358.
76. Marina NM, Cushing B, Giller R, Cohen L, Lauer SJ, Ablin A, Weetman R, Cullen J, Rogers R, Vinocur C, Stolar C, Rescorla F, Hawkins E, Heifetz S, Rao PV, Krailo M and Castleberry RP (1999) "Complete Surgical Excision is Effective Treatment for Children with Immature Teratomas With or Without Malignant Elements:A Pediatric Oncology Group/Children's Cancer Group Intergroup Study", *Journal of Clinical Oncology*, 17, 2137.
77. Dallas M. J. and Rao P.V. (2000), "Testing equality of survival functions based on both paired and unpaired survival data", *Biometrics* , 56, 154-159.
78. Dallas M. J. and Rao P.V. (2003), "Computing P-values for a class of permutation tests of equal survival functions", *Computer Methods and Programs in Biomed* 71, 149-153.
79. Rao P.V. (2004), "Testing Equality of Survival Functions with Bivariate Censored Data:A Review", *Handbook of Statistics* 23, 263-275, Elsevier.
80. Tanaka Yoko and Rao P.V. (2005), "A Proportional Hazards Model for Informatively Censored Survival Times", *Journal of Statistical Planning and Research* 129, 253-262, Elsevier.
81. Cui, W., Ma, C., Tang, Y., Chang, V., Rao, P.V., Ariet, M., Resnick, M. and Roth, J. (2005) "Sex Differences in Birth Defects: a study of opposite-sex twins." *Birth Defects Research (Part A): Clinical and Molecular Teratology* 73, 876-880.
82. Bagatell R, Rumcheva P, London WB, Cohn SL, Look AT, Brodeur GM, Frantz C, Joshi V, Thorner PS, Rao PV, Castleberry RP, Bowman LC. (2005) "Outcomes of children with intermediate-risk neuroblastoma after treatment stratified by MYCN status and tumor cell ploidy", *Journal of Clinical Oncology* 34, 8819-27
83. Kim, Bong-Rae, Carter, R. L., Rao, P.V., Ariet, M., and Resnick, M. B. (2006) "Standardized Risk and Description of Results from Multivariable Modeling of a Binary Response", *Biometrical Journal* 48, 54-66.

Partial list of invited presentations

- Institute of Mathematical Statistics, Eastern Regional Meeting, Rochester, NY: Estimation based on Kolmogorov-Smirnov statistics (with R.C. Littell), 1975.
- American Mathematical Society - Special Session on Mathematical Psychology, Toronto, Canada: Asymptotic distribution theory in paired comparison experiments, 1976.
- Department of Statistics, Florida State University, Tallahassee, FL: Tests of symmetry based on Watson statistics, 1980.
- Symposium on Estimating the Number of Terrestrial Birds, Asilomar National Park, CA: Population density estimation using line transect methods (with K.M. Portier), 1980.
- Joint Statistical Meetings, Detroit, MI: Line transect sampling of clustered populations (with K.M. Portier), 1981.
- Dalhousi University, Halifax, Canada: Estimation of slope with right-censored data, 1983.
- ENAR Meeting of the Biometric Society, Raleigh, NC: Robustness of perpendicular distance density estimators for clustered populations (with K.M. Portier), 1985.
- Australian National University, Canberra, Australia: Regression analysis of randomly right censored data, 1985.
- LeTrobe University, Bandoora, Victoria, Australia: Censored data analysis, 1985.
- The University of Auckland, New Zealand: Estimation of slope with randomly right-censored data, 1985.
- 1987 Soil Science Institute, University of Florida: Invited to give 4 lectures on Statistical Methods in Soil Science Research, (1987)
- 1990 Soil Science Institute, University of Florida: Invited to give 10 lectures on Statistical Methods in Soil Science Research, (1990).
- IISA 1998 Conference at McMaster University: Testing Equality of Survival Functions Based on paired Censored Data with Missing Observations. (With M.J.Dallas), October 10–11, 1998.
- Symposium on Selected Topics in Nonparametric Statistics: Permutation Tests for Comparing Survival Functions Based on Paired Censored Data with Missing Observations. (with M.J.Dallas), January 22-23, 1999.
- Department of Statistics, University of Akron: Proportional Hazards Models in Survival Analysis: A Review. May 4, 1999.
- Cleveland Chapter of ASA: A Proportional Hazards Model with Informative Censoring. May 5, 1999.
- Department of Statistics, University of Florida: A Proportional Hazards Model with Informative Censoring. June 3, 1999.

IISA 2002 Conference at Northern Illinois University: A Proportional Hazards Model with Informative Censoring (with Y. Tanaka), June 14-16, 2002.

Buffalo-Niagara Chapter of ASA: Testing Equality of Survival Functions with Bivariate Survival Data. August 30, 2004.

Short Courses

Survival Analysis (1993,94,95,96,97,98,99,00,01,02,03), in “A Week of Short Courses” by University of Florida Department of Statistics, Orlando, FL.

Survival Analysis (1999), A short course presented to Quintiles, Inc., Kansas City, KS.

Survival Analysis (2002), A short course presented to Purdue Pharma Inc., Stamford, CT.