

BIOGRAPHICAL SKETCH

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NAME: Wong, Weng Kee

eRA COMMONS USER NAME (credential, e.g., agency login): wongw2

POSITION TITLE: Professor of Biostatistics

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
National University of Singapore	B.S. (Hons)	06/83	Mathematics
University of Wisconsin	MS	06/85	Mathematics
University of Minnesota	MS	06/89	Statistics
University of Minnesota	PhD	06/90	Statistics

A. Personal Statement

Over the last 25 years, I have worked on projects supported by NIH, FDA, CDC and National Cancer Institute, Robert Wood Foundation, Scleroderma Foundation and Lupus Foundation of America. The projects include research in dentistry, environmental health science, nutrition study for breast cancer patients, cancer control and prevention, in particular in colon, prostate, liver cancer, and melanoma. Some of the recent NIH-funded projects have focus on health disparities issues and intervention programs to fight obesity in African American, Asian American and Latino communities in Southern California. My main collaborative work with the School of Medicine is in rheumatology with a particular emphasis on rheumatoid arthritis, scleroderma and lupus. In particular, I was principal investigator of a 5-year Multi-purpose Arthritis Management Data Core funded by The National Institute of Arthritis and Musculoskeletal and Skin Diseases. My follow up work on this arthritis-themed project earned me a 5-year FIRST award from the same institute to develop more efficient study designs for rheumatic diseases. I also served as lead statistician on two federally funded multi-center two-arm randomized control trials in scleroderma; again follow up work on the second trial led me to apply for and receive a 2-year senior investigator award from the National Scleroderma Foundation. Some of my recent publications in medical journals are:

1. Khanna, D., Berrocal, V. J., Giannini, E. H., Seibold, J. R, Merkel, P. A., Mayes, M. D, Baron, M., Clements, J. P., Steen, V., Shervin Assassi, S., Schiopu, E., Phillips, K., Simms, R. W., Allanore, Y., Denton, C. P., Distler, O., Sindhu R. Johnson, S. R., Matucci-Cerinic, M., Pope, J., Proudman, S. M., Siegel, J., Wong, W. K., Wells, A. U., and Furst, D. E. (2014). Development and initial validation of a composite response index for clinical trials in early diffuse cutaneous systemic sclerosis. *Arthritis & Rheumatology*, 66, S1311-S1312.
2. Kao, M. H., Temkit, M. and Wong, W. K. (2014). Recent Developments in Optimal Experimental Designs for functional MRI. *World Journal of Radiology*, Vol. 6, #7, 437-445.
3. McMahon, M., Skaggs, B. J., Grossman, J., Sahakian, L., Wong, W. K., FitzGerald, J., Lourenco, E., Ragavendra, N., Charles-Schoeman, C., Gorn, A., Karpouzas, G., Taylor, M., Watosn, K., Weissman, M., Wallace, D. J. and Hahn, B. H. (2014). A Panel of Biomarkers Is Associated With Increased Risk of the Presence and Progression of Atherosclerosis in Women With Systemic Lupus Erythematosus. *Arthritis and Rheumatism*, Vol. 16, #1, 130-139.
4. Bastani, R., Glenn, B. A., Maxwell, A. E., Jo, A. M., Hermann, A. K., Crespi, C. M., Wong, W. K., Chang, L. C., Stewart, S. L., Nguyen, T. T., Chen M. S, Taylor, V. M. (2014). Cluster-

- Randomized Trial to Increase Hepatitis B Testing among Koreans in Los Angeles. *Cancer Epidemiology, Biomarkers & Prevention*, Vol. 24, # 9,1341-1349.
5. Friedlander, A. H., Chang, T. I., Hazboun, R., Saden, S. M., Harada, N. D., Wong, W. K. and Garrett, N. R. (2015). Detection of Carotid Artery Calcification on the Panoramic Images of Postmenopausal Women is Significantly Associated with Severe Abdominal Aortic Calcification - a Risk Indicator of Future Adverse Vascular Events. *Dentomaxillofacial Radiology*, Vol. 44, #7, DOI: <http://dx.doi.org/10.1259/dmfr.20150094>.
 6. Glenn, B. A., Lin, T., Chang, L. C., Okada, A., Wong, W. K., Glanz, K. and Bastani, R. (2015). Sun Protection Practices and Sun Exposure among Children with a Parental History of Melanoma. *Cancer Epidemiology, Biomarkers & Prevention*, Vol. 24, #1, 169-177. doi: 10.1158/1055-9965.EPI-14-0650

I have and continue to teach a variety of Biostatistics classes at the graduate level at UCLA; many have a focus in clinical trials and in topics that address design issues for biomedical studies. I have supervised 10 and co-supervised 3 doctoral theses to date, and served as member of a doctoral committee 23 times, including supervisor of 33 Master's reports from students at UCLA. In addition, I am currently associate editors of several scientific journals and have also served as an external examiner for 11 doctoral students in their dissertation committees worldwide. I have given 181 invited talks worldwide at department seminars and international conferences and organize or co-organize several workshops. For example, in June 2017, I will co-organize a 1-month workshop on precision medicine at the Institute of Mathematical Sciences at the National University of Singapore and in August, co-organize a workshop on the latest advances in experimental design and analysis at the Banff International Research Station in Banff, Alberta. Later in October 2017, I will also co-organize a 3-day Design and Analysis of Experiment conference at UCLA.

B. Positions and Honors

Positions and Employment

- | | |
|-----------|--|
| 1990-1996 | Assistant professor, Department of Biostatistics, UCLA |
| 1996-1999 | Associate Professor, Department of Biostatistics, UCLA |
| 1999- | Professor, Department of Biostatistics, UCLA |

Other Experience and Professional Memberships (since 2000)

- | | |
|-----------|--|
| 2000-2010 | Associate Editor, <i>Biometrics</i> |
| 2000-2002 | Associate Editor, <i>Statistica Sinica</i> |
| 2003- | Associate Editor, <i>Communications in Statistics, Simulation and Computation</i> |
| 2003- | Associate Editor, <i>Communications in Statistics, Theory and Methods</i> |
| 2009 | Guest Editor, Special Issue in "Recent Advances in Statistical Methods for Analyzing Rheumatic Diseases", <i>Communications in Statistics-Theory and Methods</i> |
| 2008- | Associate Editor, <i>Advances and Applications in Statistical Sciences</i> |
| 2009- | Associate Editor, <i>Biostatistics, Bioinformatics and Biomathematics</i> |
| 2010- | Associate Editor, <i>Biometrics and Biostatistics</i> |
| 2010-2013 | Associate Editor, <i>Journal of Data Science</i> |
| 2010-2014 | Associate Editor, <i>ISRN Rheumatology</i> |
| 2012- | Associate Editor, <i>Journal of Statistical Planning and Inference</i> |
| 2012- | Associate Editor, <i>Statistical Methods in Medical Research</i> |
| 2014-2016 | Chair, Faculty Executive Committee, Fielding School of Public Health, UCLA |
| 2017- | Associate Editor, <i>Test</i> |
| 2017- | Associate Editor, <i>Annals of Public Health and Research</i> |

Diversity Efforts

- 1 Acting Director, Health Career Opportunities Program: Summer Prologue Program 1994
- 2 Member, Advisory Task Force for HCOP, Fall 1994-1995
- 3 Member, Faculty Career Development Award Committee. Spring, 1998, Spring 2000
- 4 Member, Undergraduate Fulbright Fellowship Award Committee. Spring, 2003
- 4 Member, UCLA Senate Committee on Diversity and Equal Opportunity, 2010-2013.
- 5 Chair, UCLA Senate Committee on Diversity and Equal Opportunity (COEDO), 2013-2014.
- 6 Member, University Committee on Affirmative Action and Diversity, University of California, 2013-2014
- 7 Member, UCLA Council on Diversity and Inclusion, 2014-2015

- 8 Member, UCLA Climate Survey Task Force Response Team (for faculty only), 2013-2015
9 Member, Fielding School of Public Health, Diversity Committee, 2014-2016

Honors

- 1992 Elected Member, Delta Omega Public Health Honor Society
2007 Elected Fellow, American Statistician Association
2007 Elected Member, International Statistical Institute
2008 Nominated Distinguished Speaker, Pacific Institute of Mathematical Sciences, University of Victoria, British Columbia, Canada, November, 20th.
2009 Plenary Speaker at the International Conference on Experimental Designs, Guangzhou University, Guangzhou, China, July, 17-19th.
2009 Nominated Invited Signature Series Speaker, Duke University-National University of Singapore, Graduate Medical School, 2nd November.
2010-2011 Member of Scientific Advisory Committee for a 6-month Design and Analysis of Experiments Workshop and Visiting Fellow at the Isaac Newton Institute for Mathematical Sciences, Cambridge, England, 18th July-21st December 21st.
2011 Invited Speaker for the Academy Colloquium at the Royal Netherlands Academy of Arts and Sciences, Amsterdam, April, 26-28th.
2011 Elected Fellow, Institute of Mathematical Statistics
2012 Elected Fellow, The American Association for the Advancement of Science (AAAS)
2014-2016 Elected Chair, Faculty Executive Committee, Fielding School of Public Health, UCLA
2016 Featured Speaker, China Heart Congress, Beijing, China, August, 11-14th.

C. Contributions to Science

My contributions to science is in optimal experimental design with applications to biomedical problems. They are broad and can be broken down in 5 main areas.

1. **Minimax or maxim types of designs:** In my early years, I attempted to find optimal designs under a non-differentiable criterion for polynomial models. These are much harder problems to solve and there was little work in the literature. Over the years, I have developed increasingly effective methods for tackling such problems. Applications include finding optimal designs for comparing response patterns for two or more drugs over a range of dose levels, more efficient designs for cancer control and prevention trials and standardized maximin optimal designs for estimating parameters in nonlinear models in a more meaningful manner for the clinicians.
 - a. Duarte, B. P. M. and Wong, W. K. (2014). A Semi-Infinite Programming Based Algorithm for Finding Minimax D-Optimal Designs for Nonlinear Models. *Statistics and Computing*, Vol. 24, issue 6, 1063-1080. DOI: 10.1007/s11222-013-9420-6.
 - b. Chen, R. B., Wang, W.C., Chang, S. P. and Wong, W. K. (2015). Minimax Optimal Designs via Particle Swarm Optimization Methods. *Statistics and Computing*, Vol. 25, 975-988.
 - c. Wu, S., Wong, W. K. and Crespi, C. M. (2016). Maximin Optimal Designs for Cluster Randomized Trials with Binary Outcomes. *Biometrics*. In press.
 - d. Wong, W. K., Yin, Y. and Zhou, J. (2017). Using SeDuMi to Find Various Optimal Designs for Regression Models. *Statistical Papers*. In press.
 - e. Standardized Maximim D-optimal Designs for Enzyme Kinetic Inhibition Models. *Chemometrics and Intelligent Laboratory Systems*. In press.
2. **Novel applications of optimal design ideas:** I continue to develop general methodology to find efficient designs with applications to the biomedical sciences. A constant research focus is in the construction of multiple-objective optimal designs to reflect reality. Such designs are more realistic are appealing to practitioners because they incorporate several objectives at the onset and are able to deliver user-specified efficiencies for the various objectives according to their importance.
 - a. Shen, G., Hyun, S. W. and Wong, W. K. (2016). Optimal Designs Based on the Maximum Quasi-Likelihood Estimator. *Journal of Statistical Planning and Inference*, Vol. 178, 128-139.
 - b. Hyun, S. W., Wong, W. K. and Yang, Y. (2016). VNM: A R Package for Multiple-objective Optimal Design for the 4-parameter Logistic Model. *Journal of Statistical Software*. In press.

- c. Huang, S. H., Huang, M. L., Shedden, K. and Wong, W. K. (2016). Optimal Group-Testing Designs with Testing Errors. *Journal of Royal Statistical Society, Series. B.* In press.
- d. Jaynes, J., Xu, H. and Wong, W. K. (2017). Using Minimum Aberration Blocked Fractional Factorial Designs for Constructing Discrete Choice Experiments. *Journal of Statistical Theory and Practice.* In press.
- e. Dette, H., Kettelhake, K., Schorning, K., Wong, W.K. Wong and Bretz, F. (2017). Optimal designs for Active Controlled Dose Finding Trials with Efficacy-Toxicity Outcomes. *Biometrika.* In press.
- f. Dette, H., Kettelhake, Guchenko, R, Melas Viatcheslav and Wong, W.K. Wong (2017). Optimal discrimination designs for semi-parametric models. *Biometrika.* In press.

3 **Adaptive designs:** Another area of my research is in constructing adaptive designs for clinical trials. This is a new area for me and is an increasingly hot topic in biostatistics. Adaptive designs can offer many benefits to standard two arm trials and improved methods for finding such designs are needed. Much of the ongoing work are ad-hoc but few use optimal design theory to construct an adaptive design. Some sample of my recent work in this area are

- a. Sverdlov, O., Tymofyeyev, Y. and Wong, W. K. (2011). Optimal Response-Adaptive Randomized Designs for Multi-Armed Survival Trials. *Statistics in Medicine*, Vol. 30, 2890-2910. PMID: 21823146.
- b. Sverdlov, O., Ryznik, Y., and Wong, W. K. (2012). Doubly Adaptive Biased Coin designs for Balancing Competing Objectives in Time-to-Event trials. *Statistics and Its Interface*, Vol. 5, 401-413.
- c. Sverdlov, O., Ryznik, Y., and Wong, W. K. (2014). Efficient and Ethical Response-Adaptive Randomization Designs for Multi-Arm Clinical Trials with Weibull Time-to-Event Outcomes. *Journal of Biopharmaceutical Statistics*, Vol. 24, #4, 732-754.
- d. Ryznik, Y., Sverdlov, O. and Wong, W. K. (2014). RARtool – a Software Package for Designing Randomized Response-Adaptive Clinical Trials with Time-to-Event Outcomes. *Journal of Statistical Software*. Aug 1;66(1). pii: <https://www.jstatsoft.org/article/view/v066i01>.
- e. Kim, S. and Wong, W. K. (2017). Extended Two-stage Adaptive Designs for Phase II Clinical Trials. *Statistical Methods in Medical Research.* In press.

4 **Mathematical Programming Tools:** An important and recent research focus is in solving optimal design problems with high dimensions for more complex models using state-of-the-art inter-disciplinary mathematical programming tools. While these tools are used in engineering, they are rarely used in statistics.

- a. Duarte, B. P. M. and Wong, W. K. (2014). A Semi-Infinite Programming Based Algorithm for Finding Minimax D-Optimal Designs for Nonlinear Models. *Statistics and Computing*, Vol. 24, issue 6, 1063-1080. DOI: 10.1007/s11222-013-9420-6.
- b. Duarte, B. P. M. and Wong, W. K. and Atkinson, A. C. (2015). A Semi-Infinite Programming Based Algorithm for Determining T-optimum Designs for Model Discrimination. *Journal of Multivariate Analysis*, Vol. 135, 11-24.
- c. Duarte, B. P. M. and Wong, W. K. (2015). Finding Bayesian Optimal designs for nonlinear models: A Semidefinite Programming-Based Approach. *International Statistical Review*, vol. 83, #2, 239-262. DOI:10.1111/insr.12073.
- d. Duarte, P.M. B., Wong, W. K. and Oliveira, N. M. C. (2015). Mode-Based Optimal Design of Experiments – Semidefinite and Nonlinear Programming Formulations. *Chemometrics and Intelligent Laboratory Systems*, Vol. 151, 153-163.
- e. Duarte, D. P. M., Wong, W. K. and Dette, H. (2017). An Adaptive Grid Semidefinite Programming Algorithm for Finding Optimal Designs of Experiments for Linear Problems: A SIP Based Algorithm for Minimax D-optimal Designs. *Statistics and Computing.* In press.

5. **Nature-inspired Metaheuristic algorithms:** With big data, optimal design problems are increasingly high dimensional with many covariates. For example, in precision medicine, trials deliver targeted-therapy to patients with certain biomarkers or combinations of biomarkers. This means there is a need to construct optimal designs for models with many covariates plus interactions. My contributions in this area is particularly significant because I have recently worked to solve such optimization problems using nature-inspired metaheuristic algorithms. This is uncommon in my field but I am glad that my recent work and papers have clearly resulted in a lot more colleagues using such algorithms to find all types of optimal designs.

- a. Qiu, J. H., Chen, R. B., Wang, W.C. and Wong, W. K. (2014). Using Animal Instincts to Design Efficient Biomedical Studies. *Swarm and Evolutionary Computation Journal*, Vol. 18, 1-10.
- b. Wong, W. K, Chen, R. B., Huang, C. C. and Wang, W.C. (2015). A Modified Particle Swarm Optimization Technique for Finding Optimal Designs for Mixture Models. *PLoS ONE* 10(6): e0124720. doi:10.1371/journal.pone.0124720.
- c. Phoa, K. H. F., Chen, R. B., Wang, W. C. and Wong, W. K. (2016). Optimizing Two-level Supersaturated Designs using Swarm Intelligence Techniques. *Technometrics*, Vol.58, #1, 43-49.
- d. Masoudi, E., Holling, H. and Wong, W. K. (2016). Application of Imperialist Competitive Algorithm to Find Minimax Optimal Designs. *Computational Statistics and Data Analysis*. In press.
- e. Yu, S., Wang, W. C., Chen, R. B. and Wong, W. K. (2017). A web-based particle swarm optimization tool for finding optimal experimental designs for practitioners. *Journal of Biometrics and Biostatistics*. In press.

Complete List of Published Work in MyBibliography:

<https://www.ncbi.nlm.nih.gov/sites/myncbi/weng.wong.1/bibliography/42017755/public/?sort=date&direction=ascending>

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

NIH PI: Wong, W. K. (UCLA) 05/15/2014-05/14/2018

Title: Designing efficient designs under model uncertainty for biological studies.

This project develops new methods for discriminating among several biological models, including semi-parametric models and state-of-the-art metaheuristic algorithms.

NIH PI: McMahon, Maureen (UCLA) 09/05/2014-08/31/2019

Title: The PREDICTS risk score for increased atherosclerosis and disease activity in SLE

The project recruits a cohort of lupus patients and identify risk factors for lupus patients using clinical and omics data.

Ministry of Education, Singapore co-PI: Wong, W. K. (UCLA) 06/19/2017-07/14/2017

(with W. Y. Loh, U. of Wisconsin)

Title: Quantitative Methods for Drug Discovery and Development

This 5-week workshop will be held at the Institute of Mathematical Sciences at the National University of Singapore.

NSERC, Canada co-PI: Wong, W. K. (UCLA) 08/6/2017-08/11/2017

(with Douglas Wiens, Alberta, and Holger Dette, Germany)

Title: Latest Advances in the Theory and Applications of Design and Analysis of Experiments

This 1-week workshop will be held at the Banff International Research Station in Alberta. 42 eminent researchers in the area have been invited to present their latest research work, including selected students.

Spanish Research Agency PI: Lopez-Fidalgo, J. and Raúl Martín-Martín 12/31/2016-12/29/2020

(University of Castilla-La Mancha)

Title: Experimental designs for nonlinear models of health sciences

The goal is to develop innovative experimental designs for nonlinear models of health sciences.

Role: co-Investigator