

The Merck/Temple Partnership: A Mutually Successful Relationship

By Boris Iglewicz¹ and Joseph Heyse²

¹Department of Statistics, Temple University, and ²Merck & Company

Abstract

Taking advantage of the proximity between Temple's Statistics Department and many large pharmaceutical companies, a number of successful professional relationships developed and grew. A special partnership was formed between Temple's Biostatistics Research Center and Merck's Research Laboratories. This led to a number of summer graduate student internships that resulted in the identification of interesting dissertation topics and numerous award winning Ph.D. dissertations, most leading to successful publication in statistics journals. It also led to the creation of the very successful annual Merck-Temple Conferences, the 12th having been run in October 2004. These conferences attracted leading statisticians as speakers and were well attended. We feel that such partnerships will be of increased importance in the future due to the increasing complexity of drug and vaccine development requiring collaboration in development and application of novel experimental designs and methods of analysis. We will provide an overview of this successful partnership and illustrate, with cases, the mutual benefits of this professional relationship.

Keywords: conferences, pharmaceutical industry, summer internships

1. Introduction

The Department of Statistics of Temple University is unusual in it being housed in the business school. It is also surrounded by a number of leading pharmaceutical companies and medical research centers. It thus became natural for relationships to begin forming between the faculty and students of the department and the local companies, with the department graduate students obtaining summer internship positions and employment upon graduation. As a consequence of this growing relationship, an independent Biostatistics Research Center was formed within Temple University in 1992, with Professor Boris Iglewicz serving as the director. This Center was to be fully funded from outside sources, with Temple University providing no funding. During

that period, a special relationship was developing between Merck Research Laboratories and the Biostatistics Research Center, with Merck providing the seed money and opportunity for the Center to get started, with Dr. Joseph Heyse serving as the primary contact person and advisor from Merck. Merck funding has continued until the present with other local pharmaceutical companies also making contributions, including AstraZeneca, Aventis, Bristol-Myers Squibb, Janssen, and Wyeth.

One of the first major activities of the Merck-Temple partnership was the establishment of the Merck-Temple Conference series. The first two Merck-Temple Conferences were held in 1993 with speakers that included Colin Begg, Donald Berry, Lawrence Gould, Joseph Heyse, Stephen Lagakos, Sanat Sarkar, John W. Tukey, and Marvin Zelen. This successful conference series has since become an annual event, with the 12th Merck-Temple Conference held on October 22, 2004. As a consequence of this partnership, increased possibilities became available for Temple Ph.D. students serving as summer interns at Merck, often leading to the identification of interesting dissertation research problems that lead to numerous awards, recognitions, and publications. Temple has also provided excellent opportunities for statisticians at Merck to pursue Ph.D. degrees and to teach graduate level courses with pharmaceutical applications. This cooperative arrangement between Merck Research Laboratories has continued until the present with many beneficial outcomes for both institutions, to Temple graduate students, and to the Greater Philadelphia statistics community.

Since the modest beginning of this undertaking in 1992, the mutually beneficial relationship has converged into a true partnership. The resulting successful Merck-Temple Conference series has had speakers from Merck and Temple from the first conference in 1993, a tradition that continues. These speakers were in addition to the excellent speakers from outside. There has also been a close working relationship regarding summer internships at Merck and Ph.D. dissertation supervision. This relationship has led to many professional awards

and publications in leading statistical journals. This partnership also played a role in starting a number of activities beneficial to the statistics profession. As an example, an excellent short course series sponsored by the Temple Biostatistics Research Center in the 1990s was a forerunner to the excellent short courses offered more recently by the local chapters of the American Statistical Association. Additionally, the early Center sponsored salary survey of biopharmaceutical statisticians, with help from Merck statisticians, helped start interest in obtaining salary information of nonacademic statisticians, which finally resulted in the far more extensive SPAIG surveys, where the Center played a role. Also, the Center's sponsorship of graduate student attendance at statistics meetings to present papers led to a number of presentation awards and professional recognitions. These items are just a few of the many activities that made this a truly effective partnership.

2. Graduate Education

The greatest benefit of this partnership has been to the graduate students of Temple's Statistics Department and to the many local institutions that have hired these well-trained professionals. Many of these students received summer internships or part time positions at Merck and other local pharmaceutical companies and medical research centers. In this fashion the students could learn basic methodology in the department and receive first rate practical training in biostatistics from these internship relationships. Many of these internships developed into full-time positions. These combined educational experiences led to the identification of practical dissertation research topics that resulted in numerous student awards and in many publications. The graduates of this program had great success at finding suitable biostatistics employment and in advancement within their institutions.

As illustrations, let us consider two students who benefited from this partnership and have received a Ph.D. from Temple University. One such example is George Carides who converted his summer internship at Merck into full-time employment. George's Ph.D. dissertation was jointly supervised by Boris Iglewicz from Temple and Joseph Heyse from Merck. A paper based on this dissertation won a best student paper award from the Biopharmaceutical Section of ASA and was subsequently published in *Biostatistics*. As a more recent example, Qi Jiang's 2003 Ph.D. dissertation

was jointly supervised by Boris Iglewicz from Temple and Steven Snapinn from Merck (presently at Amgen). Papers based on that dissertation received best student paper awards from WNAR, International Society for Clinical Trials, and International Chinese Statistical Association. In addition, five papers based on this dissertation have been accepted for publication, with three appearing, including one in *Biometrics*.

These student activities were not all one-sided. The partnership has provided opportunities for Merck statisticians to participate in the various academic activities at Temple, with a number of them earning their Ph.D. degrees in Statistics from that institution. In addition, a fair number of capable students were able to convert their summer internships into full time employment. Also, these early summer internships provided a laboratory for the statistics group at Merck's Research Laboratories regarding successful future administration of summer internships from Temple and also from other universities.

3. Student Awards and Publications

A successful component of this partnership has been the large number of awards won by Temple statistics Ph.D. students. The list below summarizes the achievements of students supervised by the Director of the Biostatistics Research Center during the period of this partnership. These students represent only a small subgroup of Temple's students who benefited from the Merck-Temple cooperative relationship. Note that the Ph.D. dissertations of three of the students listed below were jointly supervised by Boris Iglewicz and a senior statistician from Merck.

- (a) Koon Kwong Shing: Best Student paper Award, Biometrics Section of ASA.
- (b) Frank Shen: Fellow of ASA.
- (c) George Carides: Best Student Paper Award, Biopharmaceutical Section of ASA.
- (d) Charles Tan: Best Student Paper Award, Biopharmaceutical Section of ASA.
- (e) Charles Tan: Co-winner W. J. Youden Award in Interlaboratory Testing, ASA.
- (f) Brian Wiens: Best Student Paper Award, Biopharmaceutical Section of ASA.
- (g) Brian Wiens: Student Scholarship Award, Society for Clinical Trials.
- (h) Radha Railker: Best Student Paper Award, Biopharmaceutical Section of ASA.
- (i) Radha Railker: First Place Presentation Award, Biopharmaceutical Section of ASA.

- (j) Terry Hyslop: Best Student Paper Award, Biopharmaceutical Section of ASA.
- (k) Inna Chervoneva: ENAR best Student Paper Award
- (l) Inna Chervoneva: Institute of Mathematical Statistics (IMS) Laha Award.
- (m) Qi Jiang: WNAR Best Student Paper Award.
- (n) Qi Jiang: Society for Clinical Trials Student Scholarship Award.
- (o) Qi Jiang: International Chinese Statistical Association Student Travel Award.

Next is a list of their Ph.D. dissertation-related publications.

1. Shen, F. and Iglewicz, B. (1994). "Robust and Bootstrap Testing Procedures for Bioequivalence." *Journal of Biopharmaceutical Statistics* **4**(1), 65-90.
2. Kwong, K. S. and Iglewicz, B. (1996). "On Singular Multivariate Normal Distribution and Its Applications," *Computational Statistics and Data Analysis* **22**, 271-285.
3. Tan, C. Y. and Iglewicz, B. (1999). "Measurement Methods Comparisons and Linear Statistical Relationship," *Technometrics* **41**, 192-201.
4. Wiens, B. and Iglewicz, B. (1999). "On Testing Equivalence of Three Populations," *Journal of Biopharmaceutical Statistics* **9**, 465-483.
5. Wiens, B. and Iglewicz, B. (1999). "Design and Analysis of Three treatment Equivalence Trials," *Controlled Clinical Trials* **21**, 127-137.
6. Carides, G., Heyse, J., and Iglewicz, B. "A regression-Based Method for Estimating Mean Treatment Cost in the Presence of Right Censoring," *Biostatistics* **1-3**, 299-313.
7. Railker, R., Mehrotra, D. and Iglewicz, B. (2000). "A Simultaneous Testing Strategy for Comparing Two Treatments in a Stratified Binomial Trial," *Journal of Biopharmaceutical Statistics* **10**, 335-349.
8. Wiens, B. and Iglewicz, B. (2001). "Testing Equivalence of Response Rates for Regulatory Filings Using Transformations," *Drug Information Journal* **35-4**, 1165-1171.
9. Jiang, Q., Snapinn, S., and Iglewicz, B. (2003). "Sample Size Calculation for Survival Data," in

Encyclopedia of Biopharmaceutical Statistics, Second Edition, Edited by Shein-Chung Chow; Marcel Dekker, Inc., New York, 892-898.

10. Jiang, Q., Snapinn, S. and Iglewicz, B. (2004). "Calculation of Sample Size in Survival Trials: The Impact of Informative Noncompliance," *Biometrics* **60**, 800-806.
11. Jiang, Q., Snapinn, S., and Iglewicz, B. (2004). "Informative Noncompliance in Endpoint Trials," *Current Controlled Trials in Cardiovascular Medicine* **5:5**, (9 pages).
12. Chervoneva, I. and Iglewicz, B. (2005) "Orthogonal Bases Approach for Comparing Nonnormal Continuous Distributions," *Biometrika*. In Press.
13. Snapinn, S., Jiang, Q., and Iglewicz, B. (2005) "Illustrating the Impact of a Time-Varying Covariate with an Extended Kaplan-Meier Estimator," *The American Statistician*. In Press.
14. Snapinn, S., Jiang, Q., and Iglewicz, B. (2005) "Accounting for Informative Noncompliance with a Bivariate Exponential Model in the Design of Time-to-Event Trials," *Pharmaceutical Statistics*. In Press.

4. Merck-Temple Conferences and Short Courses

The annual Merck-Temple conferences were one of the noteworthy success stories resulting from the Temple-Merck partnership. This partnership resulted in the organization of 12 annual Merck-Temple Conferences that averaged over 100 attendees per conference. The speakers included Colin Begg, Donald Berry, Raymond Carroll, David DeMets, Bradley Efron, Susan Ellenberg, Robert Elston, Mitchell Gail, Lawrence Gould, David Harrington, Daniel Heitjan, Joseph Heyse, Michael Hughes, Steven Lagakos, Nan Laird, Richard Landis, Thomas Louis, Paul Meier, Raymond Myers, Ingram Olkin, Damaraju Raghavarao, Frank Rockhold, Louise Ryan, David Scott, Sanat Sarkar, Frank Shen, Steven Snapinn, Keith Soper, Robert Starbuck, Anastasios Tsiatis, John W. Tukey, L. J. Wei, Scott Zeger, and Marvin Zelen.

As one example, the second Merck-Temple Conference dealt with multiple comparisons and had as speakers and discussants, Donald Berry, Steven Lagakos, John W. Tukey, and Marvin

Zelen. At that stage, multiple comparison research was at a relatively dormant stage. Today, it is a relatively hot topic that includes a number of active faculty within our department, e.g. Sanat Sarkar, who received a \$234,000 grant from NSF in this area. Additionally, a number of present department Ph.D. students' work in this area, with some having won awards for dissertation research.

The Biostatistics Research Center also organized a number of successful full day local short courses in addition to the Merck-Temple conferences. These consisted of: "Designing and Implementing Economic Evaluation in Health Care," by Michael Drummond, Joseph Heyse, and John Cook; Generalized Linear and Other Nonlinear Regression Models," by Raymond Myers; "Group Sequential Clinical Trials," by David DeMets and Anastasios Tsiatis; Statistical Genetics, Human Disease Gene Studies," by Bruce Weir; and "Some Newer Issues in Multiple Comparisons," by Yoseph Hochberg and Sanat Sarkar. In addition, the Center organized the half day American Statistical Association's continual education workshop titled, "Strategies for Obtaining a Biostatistics Position." Participants were: Vance Berger (FDA); Thomas Bradstreet (Merck); Susan Ellenberg (FDA); Joseph Heyse (Merck); Boris Iglewicz (Temple, Organizer); Sandra Lee (Harvard); Frank Shen (Bristol-Myers Squibb); and Marvin Zelen (Harvard). This half day workshop was repeated in 1998 and filmed by ASA. More recently, the adjacent local chapters of ASA became active in organizing excellent one day short courses, resulting in the phase-out of the Biostatistics Research Center's activities in this area.

5. Summary and Conclusions

The Temple-Merck partnership is an excellent example of a cooperative relationship between an academic institution and a neighboring pharmaceutical company. The success of this partnership is due to the advantages available locally and our taking full advantage of them. The greater Philadelphia area contains a number of leading pharmaceutical companies and medical research centers that naturally lend themselves to summer employment possibilities for graduate students, successful conferences and short courses in the biostatistics area, ideas for Ph.D. dissertation research, and numerous employment opportunities upon graduation. The Temple-Merck partnership took full advantage of these assets, resulting in benefits to Temple's graduate program, Merck, and the greater Philadelphia statistics community. Other successful academic partnership with government and/or industry need to take advantage of their region's assets and can thus differ considerably from the Temple-Merck model. The key to all successful partnerships is to develop a win-win situation that benefits both the academic and non-academic components. When done properly such partnerships become an asset to everyone concerned.

The Temple-Merck partnership led to a number of pioneering undertakings. The early salary surveys of biopharmaceutical statisticians were a forerunner to the more extensive SPAIG salary surveys of non-academic statisticians. The excellent organized short courses were a forerunner to the first rate short courses offered by the Philadelphia Chapter of ASA and other local chapters. The annual Merck-Temple Conferences have received recognition. Finally, the large number of summer internships and cooperative dissertation supervisions led to numerous award winning Ph.D. dissertations and publications that can serve as a model to other such partnerships.