Anthony Almudevar, PhD
Rochester, NY
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SUMMARY

Statistician with 30+ years' experience in research, consulting, and teaching in statistics, computer science and applied mathematics.

EDUCATION

- **Doctor of Philosophy (1994)** Department of Statistics, University of Toronto, Toronto, Ontario, Canada
- **Master's Degree (1989)** Department of Statistics, University of Toronto, Toronto, Ontario, Canada
- **Bachelor of Science (1988)** Department of Mathematics, Concordia University, Montreal, Quebec, Canada

EMPLOYMENT/APPOINTMENTS

- **Professor Emeritus**   **January 2022 - Current**
  Department of Biostatistics and Computational Biology, University of Rochester
- **Associate Professor**   **November 2009 – December 2021**
  Department of Biostatistics and Computational Biology, University of Rochester
- **Assistant Professor**   **August 2009 – October 2009**
  Department of Biostatistics and Computational Biology, University of Rochester

CONTRACT WORK (RECENT)

- **Statistical Consultant**   **October 2021 – March 2022**
  Daiichi Sankyo Inc.
- **Textbook - Theory of Statistical Inference**   **Published January 2022**
  Chapman & Hall/CRC Press (Texts in Statistical Science), Boca Raton FL
- **Textbook - Structural Inference for Graphical Models**   **In progress**
  Chapman & Hall/CRC Press (Monographs on Statistics and Applied Probability), Boca Raton FL

BOOKS

1) Almudevar, A. (2014) *Approximate Iterative Algorithms*. CRC Press/Balkema
2) *Statistical Modeling for Biological Systems: In Memory of Andrei Yakovlev*. A. Almudevar, D. Oakes and J. Hall, Eds, Springer (2020)
3) Almudevar, A. (2022) *Theory of Statistical Inference*. Chapman & Hall/CRC Press (Texts in Statistical Science)
4) In preparation: Almudevar, A. (2022) *Structural Inference for Graphical Models*. Chapman & Hall/CRC Press (Monographs on Statistics and Applied Probability)

BOOK CHAPTERS

1) Almudevar A (2013) Multiple hypothesis testing: a methodological overview. In *Statistical Methods for Microarray Data Analysis (Methods in Molecular Biology),* ed Yakovlev A, Klebanov L, Gaile D. Springer, New York.
2) Chen L, Almudevar A, Klebanov L (2013) Aggregation effect in microarray data analysis. In *Statistical Methods for Microarray Data Analysis (Methods in Molecular Biology),* ed Yakovlev A, Klebanov L, Gaile D. Springer, New York.
3) Almudevar A (2016) A functional analytic approach to approximate iterative algorithms. In *Modern Trends in Controlled Stochastic Processes: Theory and Applications, Volume II* (ed. A. Piunovskiy), pp 66-85, Luniver Press
4) Almudevar A (2020) Applications of sequential methods in multiple hypothesis testing. In *Statistical Modeling for Biological Systems: In Memory of Andrei Yakovlev,* Almudevar, Oakes and Hall, Editors. Springer, NY
5) Chen L, Klebanov L, Almudevar A, Proschel C (2020) A study of the correlation structure of microarray gene expression data based on mechanistic modeling of cell population kinetics. In *Statistical Modeling for Biological Systems: In Memory of Andrei Yakovlev*, Almudevar, Oakes and Hall, Editors. Springer, NY
6) Almudevar A (2021). A model for the regulation of follicular dendritic cells predicts invariant reciprocal-time decay of post-vaccine antibody response. In *Modern Trends in Controlled Stochastic Processes: Theory and Applications, Volume III* (ed. A. Piunovskiy and Y. Zhang) Springer Nature

PUBLISHED SCIENTIFIC ARTICLES

Approximately 100 peer-reviewed publications. A selection is given below, in order of publication year:

1) Almudevar A, Field C (1999) Estimation of single generation sibling relationships based on DNA markers. *J of Agricultural, Biological and Environmental Statistics.*
2) Almudevar A (2000) Exact confidence regions for species assignment based on DNA markers. *The Canadian J of Statistics.*
3) Almudevar A, Field C, Robinson J (2000) The density of multivariate M-estimates. *Annals of Statistics.*
4) Almudevar A (2001) A bootstrap assessment of variability in pedigree reconstruction based on DNA markers. *Biometrics.*
5) Almudevar A (2001) Most powerful permutation invariant tests for relatedness hypotheses based on genotypic data. *Biometrics.*
6) Almudevar A (2001) A dynamic programming algorithm for the optimal control of piecewise deterministic Markov processes. *SIAM J on Control and Optimization.*
7) Almudevar A (2006) Using artificial neural networks to predict claim duration in a work injury compensation environment. *Proceedings 2006 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology.*
8) Almudevar A (2007) Efficient coding of labeled graphs. *Proceedings of 2007 IEEE Information Theory Workshop.*
9) Almudevar A (2008) Approximate fixed point iteration with an application to infinite-horizon Markov decision processes. *SIAM J on Control and Optimization.*
10) Almudevar A, Leibovici A, Tentler A (2008) Home monitoring using wearable radio frequency transmitters. *Artificial Intelligence in Medicine.*
11) Almudevar A (2008) Approximate calibration-free trajectory reconstruction in a wireless network. *IEEE Transactions on Signal Processing.*
12) Almudevar A (2009) Selection of statistical thresholds in graphical models. *EURASIP J on Bioinformatics and Systems Biology.*
13) Almudevar A (2010) A hypothesis test for equality of Bayesian network models. *EURASIP J on Bioinformatics and Systems Biology.*
14) Almudevar A, McCall M, McMurray H, Land H (2011) Fitting Boolean networks from steady state perturbation data. *Statistical Applications in Genetics and Molecular Biology.*
15) Almudevar A, Lacombe J (2012) On the choice of prior density for the Bayesian analysis of pedigree structure. *Theoretical Population Biology.*
16) Almudevar A, Lacombe J (2012) An extension of a calibration-free trajectory reconstruction method for wireless networks. *IEEE Transactions on Signal Processing.*
17) Almudevar A, Anderson EC (2012) A new version of PRT software for sibling groups reconstruction with comments regarding several issues in the sibling reconstruction problem. *Molecular Ecology Resources.*
18) Barry CT, D'Souza M, McCall M, Safadjou S, Ryan C, Kashyap R, Marroquin C, Orloff M, Almudevar A, Godfrey TE (2012) Micro RNA expression profiles as adjunctive data to assess the risk of hepatocellular carcinoma recurrence after liver transplantation. *Am J Transplant.*
19) Almudevar A, Arruda EF (2012) Optimal approximation schedules for a class of iterative algorithms, with an application to multigrid value iteration. *IEEE Transactions on Automatic Control.*
20) Xu Z, Almudevar A, Mathews D (2012) Statistical evaluation of improvement in RNA secondary structure prediction. *Nucleic Acids Res.*
21) Arruda E, Ourique F, Almudevar A, Silva R (2013) On cost based algorithm selection for problem solving. *American J of Operations Research.*
22) Tran V, McCall MN, McMurray HR, Almudevar A (2013) On the underlying assumptions of threshold Boolean networks as a model for genetic regulatory network behavior. *Frontiers in Genetics.*
23) McCall MN, McMurray H, Land H, Almudevar A (2014) On non-detects in qPCR data. *Bioinformatics.*
24) Almudevar A (2016) An information theoretic approach to pedigree reconstruction. *Theoretical Population Biology.*
25) Almudevar A (2017) A model for the regulation of follicular dendritic cells predicts invariant reciprocal-time decay of post-vaccine antibody response. *Immunology and Cell Biology.*
26) Pichichero M, Kaur R, Scott DA, Gruber WC, Trammel J, Almudevar A, Center KJ (2018) Effectiveness of 13-valent pneumococcal conjugate vaccination for protection against acute otitis media caused by Streptococcus pneumoniae in healthy young children: a prospective observational study. *Lancet Child Adolesc Health.*
27) Demian C, Barron B, Almudevar A (2018) Effects of the New York State Workers Compensation Board Medical Treatment Guidelines on Return to Work. *J Occup Environ Med.*
28) Ren D, Xu Q, Almudevar A, Pichichero ME (2019) Impaired proinflammatory response in stringently defined otitis prone children during viral upper respiratory infections. *Clin Infect Dis.*
29) Almudevar A, Kaur R, Pichichero M (2019) Statistical projection of post-vaccination antibody kinetics between dosing schedules. *Vaccine.*

30) Patel, S., Shah, L., Dang, N., Tan, X., Almudevar, A. & White, P. M. (2020). SIRT3 promotes auditory function in young adult FVB/nJ mice but is dispensable for hearing recovery after noise exposure. *PloS one.*

RESEARCH GRANTS

I have over 20 years' experience in the preparation of grant proposals as a biostatistician, primarily for submission to the National Institutes of Health (NIH). I have been awarded as Principal Investigator the following grants:

- **May 2008 – April 2012** "Novel methods of hypothesis testing for pathway recognition in genomic data"
  - NIH R21 - National Human Genome Research Institute
- **July 2009 – July 2012** "Gene regulatory network models in cancer research"
  - Edelman-Gardner Foundation
- **March 2009 – February 2012** "NTHi immunity in young children"
  - NIH Subaward as Biostatistician
- **April 2010 – March 2012** "Methodologies for the clinical application of motion data collected in a home monitoring environment"
  - Clinical Translational Science Institute, Novel Biostatistical and Epidemiologic Methodology Program, University of Rochester Medical Center
- **July 2013 – June 2014** "Predictive Models for Longitudinal Technological Home Monitoring Data"
  - Clinical Translational Science Institute, Novel Biostatistical and Epidemiologic Methodology Program University of Rochester Medical Center
- **July 2015 – December 2018** "Immunogenicity of moraxella catarrhalis vaccine candidates in children"
  - NIH Subaward as Biostatistician
- **July 2017 – June 2019** "Antibody & cellular immune responses in children after 2 vs 3 doses and pre vs post booster of PCV13 vaccine"
  - NIH Subaward as Biostatistician

MENTORING EXPERIENCE

My mentoring experience includes supervision of 2 postdoctoral trainees and 4 PhD theses, and I have additionally served as member of 17 graduate or undergraduate thesis committees. Both postdoctoral trainees were awarded the prestigious NIH Career Development (K) grant, and one is now Associate Professor at the University of Rochester. Two predoctoral trainees now have faculty appointments at the Rochester Institute of Technology and the Southampton Business School, University of Southampton, and two others went on to careers as mathematical statisticians in research institutions (Mathematical Statistician at the U.S. Food and Drug Administration; Director of Research and Development (Genetics Division) at Nature Source Improved Plants. LLC, Ithaca NY). I have 15 coauthored publications with my predoctoral trainees, and 9 coauthored publications with my postdoctoral trainees.

CONSULTING EXPERIENCE

I have over 30 years' experience as a statistical consulting, both in private practice and a regular participant in the Consulting Service at the Department of Biostatistics at the University of Rochester. I am expert in many fields of statistics, including regression modeling, GLMs, longitudinal analysis, causal modeling, machine learning, survival analysis, artificial neural networks, ANOVA, Bayesian inference, bioinformatics and analysis of high-throughput data, time series, power analysis and experimental design, sequential testing, and simulation. In addition, I have extensive experience in the following areas:

- Experience with clinical trial documentation, creation of statistical analysis plans; NIH & NSF grant proposals.
- Graphical models, Bayesian & Boolean networks and applications.
- Immunological modeling and vaccine research.
- Optimization; operations research; Markov decision processes approximate dynamic programming, reinforcement learning.
- Information theory, minimum description length principle (MDL) and code theory.

COMPUTER PROGRAMMING EXPERIENCE

I have experience programming in a variety of languages, including Assembler Language, Basic. Pascal (within Delphi IDE), C++, Python (with TensorFlow) and R. I have experience developing R packages based on C++ source code (I created the Bioconductor package [ternarynet](#)) and in the development of complex stand-alone statistical computing applications (for example, my [pedigree reconstruction software](#)). I have the following additional experience:

- Proficiency in most statistical computing environments, such as SAS, Stata and R.

- Algorithm and software development: numerical analysis; optimization; linear & integer programming; combinatorial algorithms; MCMC, simulated annealing, computational Bayesian methods; parallel computing.
- Mathematical modeling & simulation: discrete and continuous time models; stochastic models; immunological models; queuing systems; operations research; gene regulatory networks.

INVITED TALKS (SELECTION)

- **August 2010** *"A Hypothesis Test for Equality of Bayesian Network Models, with an Application to Gene Set Analysis"*.
  - 28th European Meeting of Statisticians, EMS 2010, Piraeus, Greece.
- **September 2014** *"An Information Theoretic Approach to Pedigree Reconstruction"*.
  - Workshop on Statistical and Computational Methods for Relatedness and Relationship Inference from Genetic Marker Data. International Centre for Mathematical Sciences (ICMS), University of Edinburgh.
- **June 2015** *"A Functional Analytic Approach to Approximate Iterative Algorithms."*
  - Workshop: Modern Trends in Controlled Stochastic Processes: Theory and Applications. University of Liverpool.
- **October 2016** *"Modeling Immune Response Kinetics: from Clinical Data to Cellular Process."*
  - Workshop on "Challenges of Using Diverse Data in Model Development", National Institute of Allergy and Infectious Diseases, Committee on Applied and Theoretical Statistics. National Academy of Sciences, Washington DC.
- **December 2017** *"Approximation Methods for the Rice Formula, with Applications to Small Sample Asymptotics."*
  - 11th International Conference on Computational and Financial Econometrics (CFE-2017) University of London, London UK.
- **June 2021** *"A Model for the Regulation of Follicular Dendritic Cells Predicts Invariant Reciprocal-Time Decay of Post-Vaccine Antibody Response."*
  - Workshop: Modern Trends in Controlled Stochastic Processes: Theory and Applications. University of Liverpool.

TALKS GIVEN AT THE UNIVERSITY OF ROCHESTER (SELECTION)

- **October 2017** "[Reproducibility and Statistical Methodology](#)."
  - Center for Biomedical Informatics Seminar Series, University of Rochester
- **November 2017** *"The Historical Foundations of Machine Learning."*
  - Clinical & Translational Science Institute (CTSI) Analytics Colloquium, University of Rochester
- **March 2019** "Evidence of a Rapid Transition from Infant to Adult Nasopharyngeal Microbiome Within the First Year of Life"
  - The Informatics and Genomics Research (TIGR) Meetings, Genomics Research Center, University of Rochester

WEB PAGES

Detailed CV available at www.anthonyalmudevar.com with material & software related to my research and teaching.
LinkedIn web page: www.linkedin.com
University web page: www.urmc.rochester.edu