

Joseph Rosenthal

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EDUCATION

Ph.D. in Mathematics

Rensselaer Polytechnic Institute, Troy, NY, from August 2010 to July 2015

Dissertation title: Mathematical models of amyloid-beta production, aggregation, and treatment in Alzheimer's disease

Advisor: David Isaacson (Department of Mathematical Sciences)

Co-advisor: Georges Belfort (Department of Chemical and Biological Engineering)

Research description:

- Built predictive models and simulation software to study the production of amyloid-beta in diseased mice, and the effect of the drug bexarotene on the reversal of Alzheimer's disease symptoms.
- Developed quantitative models and created simulation software in order to predict the aggregation behavior of insulin and amyloid-beta to gain insight into Alzheimer's disease.
- Made use of non-linear regression algorithms to fit parameters of systems of differential equations to experimental data.

M.S. in Mathematics

Rensselaer Polytechnic Institute, Troy, NY, from January 2009 to May 2010

B.S. in Mathematics

Rensselaer Polytechnic Institute, Troy, NY, from August 2006 to May 2010

WORK EXPERIENCE

SURVICE Engineering Company, Applied Technology Operation,

Pittsburgh, PA and Saint Paul, MN

Research Scientist, from January 2016 to Present

- As part of the High-Performance Computing team, I research mathematics and computer science, and I leverage high-performance computing to develop simulation software.

Rensselaer Polytechnic Institute, Troy, NY

Research Assistant, from August 2013 to May 2014

- Developed codebase, created video, and formulated calculus problems in a collaborative project between the mathematical science and computer science departments for a Calculus Massive Open Online Course.

Teaching assistant, from August through May of 2010 to 2013

- Taught weekly hour-long recitations for multiple sections of approximately 30 undergraduate students per section. Held office hours, graded exams and weekly assignments for up to 120 students per semester. Led weekly tutoring sessions.

PUBLICATIONS

- J. Rosenthal, G. Belfort, and D. Isaacson, "Early treatment critical: Bexarotene reduces amyloid-beta burden in silico," *PLOS ONE*, vol. 11, no. 4, e0153150, 2016
- B. Murray, M. Sorci, J. Rosenthal, J. Lippens, D. Isaacson, P. Das, D. Fabris, S. Li, and G. Belfort, "A2T and A2V ABeta peptides exhibit different aggregation kinetics, primary nucleation, morphology, structure, and ltp inhibition," *Proteins: Structure,*

Function, and Bioinformatics, vol. 84, no. 4, pp. 488–500, 2016

- B. Murray, J. Rosenthal, Z. Zheng, D. Isaacson, Y. Zhu, and G. Belfort, “Cosolute effects on amyloid aggregation in a nondiffusion limited regime: Intrinsic osmolyte properties and the volume exclusion principle,” *Langmuir*, vol. 31, no. 14, pp. 4246–4254, 2015

PRESENTATIONS

- J. Rosenthal, G. Belfort, and D. Isaacson, *A mathematical model of the effect of beaxarotene on Alzheimer’s disease treatment*, presented at the 4th New York Conference on Applied Mathematics, Cornell University, Ithaca, NY, Nov. 2013
- J. Rosenthal, G. Belfort, and D. Isaacson, *A mathematical model of the effect of beaxarotene on neuronal cell death via amyloid-beta toxicity in Alzheimer’s disease*, poster session presented at the 27th Annual Symposium of The Protein Society, Boston, MA, Jul. 2013
- J. Rosenthal, G. Belfort, and D. Isaacson, *A mathematical model of the effect of beaxarotene on neuronal cell death via amyloid-beta toxicity*, poster session presented at the School of Science Graduate Symposium, Rensselaer Polytechnic Institute, Troy, NY, Apr. 2013

COMPUTER SKILLS

- Development: C++, C, ISPC, TBB, OpenMP, CUDA, Java, Kotlin, Python, TensorFlow, Caffe, JavaScript, Node.js, VueJS, Nuxt.js, MATLAB, PHP, MySQL, Perl, HTML5 and CSS3, \LaTeX
- Software: Nginx, Apache HTTP Server, Adobe Photoshop, AutoCAD, Maple, Mathematica, Microsoft Windows and Office, Linux (Arch Linux, Debian, Gentoo, Red Hat), Apple macOS

SELECTED COURSEWORK

- Graduate: Algebraic Topology, Homology Theory, Complex Analysis, Distribution Theory, Functional Analysis I & II, Genomics and Proteomics, Measure & Integration Theory, Linear Partial Diff. Operators, Microlocal Analysis, Real Analysis, Partial Differential Equations, Methods of Medical Imaging
- Undergraduate: Abstract Algebra, Galois Theory, Analytic Number Theory, Complex Variables, Differential Geometry, Linear Algebra, Mathematical Analysis I & II, Topology, Probability Theory and Applications, Ordinary Differential Equations, Quantitative Analysis, Organic Chemistry, Creative Writing: Poetry, Creative Writing: Nonfiction