

Rumen Kostadinov

Curriculum Vitae

Current Position

- 2014-present **Research Associate, Pediatric Oncology,**
Sidney Kimmel Comprehensive Cancer Center,
Johns Hopkins School of Medicine, Baltimore, MD,
Detecting and targeting epigenetic changes driving chemoresistance and relapse in infant MLL-rearranged acute lymphoblastic leukemias.
Primary Mentors: Patrick Brown MD, Sarah Wheelan MD PhD

Education

- 2012-2014 **Postdoctoral Fellow, Biostatistics,**
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD,
Epigenetic mechanisms of chemotherapy resistance in pediatric acute lymphoblastic leukemias.
Mentors: Patrick Brown MD, Rafael Irizarry PhD, and Robert Scharpf PhD
- 2012 **Ph.D. Genomics and Computational Biology,**
University of Pennsylvania, Philadelphia, PA,
Evolutionary dynamics of neoplastic cell populations in Barrett's esophagus.
PhD Advisor: Carlo Maley PhD
- 2005 **B.S. Bioinformatics,**
Ramapo College of New Jersey, Mahwah, NJ,
Graduated with *cum laude* honors and minor in Computer Science.

Publications

- 2018 Mallo D, **Kostadinov R**, Cisneros L, Kuhner M, and Maley, C. Cryptsim: Modeling the evolutionary dynamics of the progression of Barrett's esophagus to esophageal adenocarcinoma. *bioRxiv*. 2018:323485.
- 2016 **Kostadinov R**, Maley C, and Kuhner M. Bulk genotyping of biopsies can create spurious evidence for heterogeneity in mutation content. *PLoS Computational Biology* 12(4):e1004413.
- 2016 Kuhner M, **Kostadinov R**, and Reid B. Limitations of the driver/passenger model in cancer prevention. *Cancer Prevention Research* 9(5):335-8.
- 2016 Somarelli J, Ware K, **Kostadinov R**, Robinson J, Amri H, Abu-Asab M, Fourie N, Diogo R, Swofford D, and Townsend J. PhyloOncology: Understanding cancer through phylogenetic analysis. *Biochimica et Biophysica Acta - Reviews Cancer*.
- 2015 Crane G, Powell H, **Kostadinov R**, Rocafort P, Rifkin D, Burger P, Ambinder R, Swinnen L, Borowitz M, and Duffield A. Primary CNS lymphoproliferative disease, mycophenolate and calcineurin inhibitor usage. *Oncotarget* 6(32):33849-33866

- 2014 Li X, Galipeau P, Paulson T, Sanchez C, Arnaudo J, Liu K, Sather C, **Kostadinov R**, Odze R, Kuhner M, Maley C, Self S, Vaughan T, Blount P, and Reid B. Temporal and spatial evolution of somatic chromosomal alterations: A case-cohort study of Barrett's esophagus. *Cancer Prevention Research*. 7(1):114-127
- 2013 **Kostadinov R**, Kuhner M, Sanchez C, Galipeau P, Paulson T, Li X, Sather C, Srivastava A, Odze R, Blount P, Vaughan T, Reid B, and Maley C. NSAIDs modulate clonal evolution in Barrett's esophagus. *PLoS Genetics* 9: e1003553.
- Press coverage:*
 Nicholas Bakalar. "Longevity: How Aspirin May Stem Cancer" *New York Times* 07/09/2013. D6. Print.
 Carl Zimmer. "Putting the Brakes on Cancer's Evolution" *National Geographic Phenomena*. 06/13/2013
- 2011 Martens E, **Kostadinov R**, Maley C, and Hallatschek O. Spatial structure increases the waiting time for cancer. *New Journal of Physics* 13:115014
- 2011 Reid B, **Kostadinov R**, and Maley C. New strategies in Barrett's esophagus: Integrating clonal evolutionary theory with clinical management. *Clinical Cancer Research* 17:3512-3519
- 2010 Lai L, **Kostadinov R**, Barrett M, Peiffer D, Pokholok D, Odze R, Sanchez C, Maley C, Reid B, Gunderson K, and Rabinovitch P. Deletion at fragile sites is a common and early event in Barrett's esophagus. *Molecular Cancer Research* 8:1084-1094
- 2006 **Kostadinov R**, Malhotra N, Viotti M, Shine R, D'Antonio L, and Bagga P. GRSDB: a database of quadruplex forming G-rich sequences in alternatively processed mammalian pre-mRNA sequences. *Nucleic Acids Research* 34:D119-24
- 2003 **Kostadinov R**, and Kumar A. A tutor for learning encapsulation in C++ classes. *World Conference on Educational Multimedia, Hypermedia and Telecommunications 2003*:1311-1314

Conference Proceedings

- 2017 Fry J, Farooqi M, Yoo B, **Kostadinov R**, Farrow E, Kelley S, Gibson M, Miller N, Johnston J, Brown P, and Guest E. Genomic analysis and pathway characterization of genes with somatic variants in infant acute lymphoblastic leukemia. *Blood*. 130:3970.
- 2017 Guest E, Yoo B, Farooqi M, Miller N, Johnston J, **Kostadinov R**, Farrow E, Kelley S, Gibson M, and Brown P. Genomic breakpoint and fusion transcript analysis of KMT2A rearrangement in infant acute lymphoblastic leukemia. *Pediatric Blood and Cancer* Vol. 64, pp. S31-S32 (abstract)
- 2017 Yoo B, Farooqi M, **Kostadinov R**, Miller N, Johnston J, Farrow E, Kelley S, Gibson M, Brown P, and Guest E. Abstract 2416: Transcriptome and cluster analysis of infant acute lymphoblastic leukemia cases with and without MLL (KMT2A) rearrangement. *Cancer Research*. 2017;77(13 Supplement):2416-2416.
- 2016 **Kostadinov R**, Farooqi M, Yoo B, Farrow E, Kelley S, Gibson M, Miller N, Guest E, and Brown P. Landscape of somatic mutations and gene expression changes in relapsed infant MLL-rearranged acute lymphoblastic leukemia. *Blood*. 128(22).
- 2014 Crane G, Powell H, **Kostadinov R**, Ambinder R, Swinnen L, Borowitz M, and Duffield A. A rise in CNS lymphoproliferative disease incidence reveals a protective role of calcineurin inhibitors. *Blood*. 124(21).
- 2014 **Kostadinov R**, Scharpf R, Sabunciyani S, Magoon D, Irizarry R, and Brown P. Identifying methylation changes driving evolution of relapse in MLL-rearranged acute lymphoblastic leukemias. 56th American Society of Hematology Annual Meeting, Dec 6-9, San Francisco, CA

- 2013 **Kostadinov R**, Kuhner M, Sanchez C, Galipeau P, Paulson T, Li X, Sather C, Srivastava A, Odze R, Blount P, Vaughan T, Reid B, and Maley C. NSAIDs modulate clonal evolution in Barrett's esophagus. 6th Annual Young Investigator Symposium on Genomics and Bioinformatics, Johns Hopkins University, Oct 17, Baltimore, MD [1st prize poster](#)
- 2013 **Kostadinov R**, Kuhner M, Sanchez C, Galipeau P, Paulson T, Li X, Sather C, Srivastava A, Odze R, Blount P, Vaughan T, Reid B, and Maley C. NSAIDs modulate clonal evolution in Barrett's esophagus. 2nd International Biannual Evolution and Cancer Conference. University of California San Francisco, June 12-16, San Francisco, CA
- 2012 Schafer E, **Kostadinov R**, Murakami P, Negi S, Figueroa M, Melnick A, and Brown P. Lineage, fusion partner, and age differences in the methylome of MLL-r leukemias. American Society of Hematology Annual Meeting, Atlanta, GA, Abstracts 120: 3506
- 2010 **Kostadinov R**, Sprouffske K, Merlo L, Kuhner M, and Maley C. The mechanism of clonal expansion determines the tempo and mode of neoplastic progression in Barrett's esophagus. Proceedings of the 101st Annual Meeting of the American Association for Cancer Research. Apr 17-21, Washington, DC, Cancer Research 2010;70 (8 Suppl) Abstract 101 Vol 70
- 2010 **Kostadinov R**, Sprouffske K, Merlo L, Kuhner M, and Maley C. An agent-based model for simulating the evolutionary dynamics of neoplastic cell populations. Society for Industrial and Applied Mathematics Conference on Parallel Processing & Scientific Computing, Feb 24-26, Seattle, WA
- 2008 **Kostadinov R**, Li X, Paulson T, Galipeau P, Reid B, and Maley C. Cross sectional analysis of copy loss in Barrett's esophagus. 7th Annual AACR International Conference on Frontiers in Cancer Prevention Research, Nov 16-19, National Harbor, MD, 2008;1 (7 Suppl) Abstract B48
- 2008 **Kostadinov R**, Kuhner M, and Maley C. Detecting mutation rate change in Barrett's esophagus after treatment with NSAIDs. The First Annual EITC-Bio Workshop, Jun 7, Princeton, NJ
- 2007 **Kostadinov R**, Kuhner M, and Maley C. Detecting mutation rate change in Barrett's esophagus after treatment with NSAIDs. 6th Annual AACR International Conference on Frontiers in Cancer Prevention Research, Dec 5-8, Philadelphia, PA, Abstract B29
- 2006 Kikin O, **Kostadinov R**, Malhotra N, Viotti M, D'Antonio L, and Bagga P. Web-Based computational tools for predicting G-quadruplexes in mammalian genes. The 14th annual international conference on Intelligent Systems for Molecular Biology. Fortaleza, Brazil
- 2006 **Kostadinov R**, Kosoff R, Kuhner M, Galipeau P, Rabinovitch P, Reid B, and Maley C. Genome-wide case study of clonal evolution over 16 years in Barrett's esophagus. 5th Annual AACR International Conference on Frontiers in Cancer Prevention Research, Nov 12-15, Boston, MA, Abstract B71
- 2004 **Kostadinov R**, Bagga P, and D'Antonio L. Development of computational tools for predicting G-quadruplex forming motifs in mammalian transcripts. 7th Annual Undergraduate Research Symposium in the Chemical and Biological Sciences. University of Maryland Baltimore County, MD. [1st prize poster](#)
- 2004 **Kostadinov R**, Gonzalez M, Freeland S, and Miller S. Identifying class II transposons within the shotgun sequenced *Volvox Carteri* genome: A bioinformatics analysis. University of Maryland Baltimore County Summer Research Festival, Baltimore, MD
- 2003 **Kostadinov R**, Dancik G, Bagga P, D'Antonio L, and Shine R. Development of bioinformatics tools for analysis of conserved regulatory sequences in mammalian pre-mRNAs. 6th Annual Undergraduate Research Symposium in the Chemical and Biological Sciences. University of Maryland Baltimore County, MD. p.157. [2nd prize poster](#)

- 2002 **Kostadinov R.** Web page presenter. CCSC 7th Annual Northeastern Conference. Worcester State College. The Journal of Computing in Small Colleges. Vol 17, Issue 6 May 2002. p.273-275

Invited Talks

- 2018 **Kostadinov R.**, Yoo B, Farooqi M, Kelley S, Guest E, Burke M, Wheelan S, and Brown P. Whole genome bisulfite sequencing (WGBS) robustly measures the pharmacodynamic effect of decitabine/vorinostat epigenetic treatment in relapsed pediatric ALL demonstrating potent hypomethylation associated with upregulation of PRC2 and TP53 targets. Blood (2018) 132:918. 60th American Society of Hematology Annual Meeting and Exposition, San Diego, CA
- 2015 **Kostadinov R.**, Scharpf R, and Brown P. Identifying subclonal epigenetic changes driving chemoresistance in infant MLL-r acute lymphoblastic leukemias. Blood (2015) 126(23):809. 57th American Society of Hematology Annual Meeting and Exposition, Orlando, FL
- 2015 **Kostadinov R.** Inferring phylogenies and deconvoluting subclones to understand the evolutionary dynamics of individual tumors. PhyloOncology: the phylogenetics of cancer evolution meeting. National Evolutionary Synthesis Center, Durham, NC
- 2014 **Kostadinov R.** Clonal evolution in Barrett's esophagus: the effects of NSAIDs. Barts Cancer Institute, University of London, UK
- 2012 **Kostadinov R.** Punctuated genomic clonal evolution in Barrett's esophagus. 6th Annual Young Investigator Symposium on Genomics and Bioinformatics, Johns Hopkins University, Baltimore, MD
- 2011 **Kostadinov R.** Clonal expansion during neoplastic progression in Barrett's esophagus. First Biannual International Evolution and Cancer Conference, University of California San Francisco, San Francisco, CA
- 2010 **Kostadinov R.** Evolutionary dynamics of cell populations in pre-cancerous Barrett's esophagus: evidence, theory and practice. EcoLunch, Department of Biology, University of Pennsylvania, Philadelphia, PA
- 2010 **Kostadinov R.** Inferring mutation rate change associated with NSAIDs use from longitudinal biopsy samples in Barrett's esophagus. Evolution chalk talks, Department of Biology, University of Pennsylvania, Philadelphia, PA
- 2006-2010 **Kostadinov R.** Annual research in progress seminar talks, Wistar Institute, Philadelphia, PA
- 2005-2010 **Kostadinov R.** Annual chalk talks, Genomics and Computational Biology Graduate Group, University of Pennsylvania, Philadelphia, PA

Teaching Experience

- 2014-present Instructor: Inferring Phylogenies in Cancer
Short course through the Center for Computational Genomics
Johns Hopkins University, Baltimore, MD
Taught a 1-week long course on subclonal deconvolution and inferring phylogenies from genomic and epigenomic cancer datasets
- 2008 Teaching Assistant: Introduction to Bioinformatics (GCB 535),
University of Pennsylvania, Philadelphia, PA
Assisted with computer laboratory hands-on exercises. Prepared homework assignments, graded homeworks, and held TA office hours

- 2003 Teaching Assistant: Computer Science I and College Algebra
Ramapo College of New Jersey, Mahwah, NJ.
Held TA office hours helping students with algebra and computer programming coursework

Grants

- 2016-2019 The V Foundation for Cancer Research. Preventing relapse in infant ALL via epigenetic targeting. Role: Key Research Personnel. PI Brown P.
- 2015-2016 St Baldrick's Foundation Grant. The epigenetic basis of relapse in infant MLL-rearranged ALL. In this study we define the recurrent, functional epigenetic changes that drive chemoresistance and relapse in infant MLL-rearranged acute lymphoblastic leukemias, and explore means of targeting these changes to prevent emergence of resistance and improve cure rates. Role: Co-Investigator with Brown P.

Awards

- 2008 Certificate of achievement, Workshop on Molecular Evolution, Marine Biological Laboratory, Woods Hole, MA
- 2002-2003 Three first place prizes for computer programming team contests. Consortium for Computing Sciences in Colleges (CCSCNE, CCSCE) conferences
- 2001-2005 Ramapo College of New Jersey Presidential Scholarship (4-year full tuition and room expenses)

Skills

- Computational 20+ years of computer programming experience
Emacs, C, C++, Bash, awk, gnuplot, Sqlite, MySQL, Java, Perl, Python, PHP, HTML, Ajax, Javascript, R, Matlab, Linux system administration, Sun Grid Engine cluster administration
- Experimental Tissue culture practices for human cell lines, primary human Barrett's esophagus and leukemia sample processing, primer design, quantitative PCR, DNA/RNA isolation and quantitation, library preparation for whole-genome bisulfite sequencing

Professional Experience

- 2003-2005 Unix Specialist, Center for Computing and Information Services,
Ramapo College of New Jersey, Mahwah, NJ
- 2003 Research Assistant, Bioinformatics,
Ramapo College of New Jersey, Mahwah, NJ
- 2003 Computer Science and Mathematics Tutor,
Ramapo College of New Jersey, Mahwah, NJ
- 2002 Research Assistant, Computer Science,
Ramapo College of New Jersey, Mahwah, NJ

Referees

Patrick Brown, MD
Johns Hopkins Sidney Kimmel Comprehensive Cancer Center

Sarah Wheelan, MD PhD
Johns Hopkins Sidney Kimmel Comprehensive Cancer Center

Mary Kuhner, PhD
University of Washington

Carlo Maley, PhD
School of Life Sciences
Arizona State University

Brian J. Reid, MD PhD
Fred Hutchinson Cancer Research Center
University of Washington