Curriculum Vitae

RAYMOND CHEONG

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Education

2002-Present **Johns Hopkins University**, Baltimore, MD
MD-PhD candidate with MSTP (Medical Scientist Training Program) appointment
- PhD advisor: Prof. Andre Levchenko, Dept. of Biomedical Engineering
- Thesis (defended Oct 2010): Information processing in the tumor necrosis factor (TNF) signaling pathway: a systems biology approach
- *On leave since Apr 2011*

2002 **University of Maryland**, College Park, MD
B.S. Chemical Engineering, *summa cum laude*
- Certificate in biochemical engineering
- University Honors Citation

Professional Activities

Work Experience

2011-present **Euveda Biosciences, Inc.**, Baltimore, MD
Co-Founder and President
- Commercialize microfluidics-based platform for high content analysis and cell-based assays

Research Experience

2003-2011 Dept. of Biomedical Engineering, **Johns Hopkins University**, Baltimore, MD
Graduate student, advisor Dr. Andre Levchenko
- Integrate computer modeling and microfluidic experiments to study information processing by the NF-κB transcription factor in response to inflammation

1999-2002 Dept. of Chemistry & Biochemistry, **University of Maryland**, College Park, MD
Undergraduate research fellow, advisor Dr. Jason Kahn
- Modeled effect of protein interactions on DNA topology, using Monte Carlo methods

Summers 1996-1998 Dept. of Pathology, **Johns Hopkins University**, Baltimore, MD
Research assistant, advisor Dr. Gary Pasternack
- Studied interactions between the oncogene myc and the cancer-related protein pp32 (research during high school)

Teaching Experience

Dept. of Biomedical Engineering, **Johns Hopkins University**, Baltimore, MD
Spring 2007 Teaching Assistant for 580.223: Biological Models and Simulation with Matlab
Fall 2006 Teaching Assistant for 510.312: Physical Chemistry of Materials I: Thermodynamics

Dept. of Chemical Engineering, **University of Maryland**, College Park, MD
Summer 2001 Teaching Assistant for ENCH250: Computer Methods in Chemical Engineering
Fall 2000 Teaching Assistant for ENCH300: Chemical Engineering Thermodynamics

Publications

Papers

1. **R Cheong**, A Rhee, CJ Wang, I Nemenman, A Levchenko. "Information transduction capacity of noisy biochemical signaling networks." Science. 334(6054):354-8 (2011). **(Featured in Science's Perspectives and Biopolymers' Research highlights.)**

2. EM Hur, IH Yang, DH Kim, J Byun, Saijilafu, WL Xu, PR Nicovich, **R Cheong**, A Levchenko, N Thakor, FQ Zhou. "Engineering neuronal growth cones to promote axon regeneration over inhibitory molecules." *Proceedings of the National Academy of Sciences (USA).* 108(12):5057-62 (2011).

3. MJ Stine, CJ Wang, WF Moriarty, B Ryu, **R Cheong**, WH Westra, A Levchenko, RM Alani. "Integration of genotypic and phenotypic screening reveals molecular mediators of melanoma-stromal interaction." *Cancer Research.* 71(7):2433-44 (2011).

4. **R Cheong**, A Levchenko. "Oscillatory signaling processes: the how, the why and the where." *Current Opinion in Genetics and Development.* 20(6):665-9 (2010).

5. B Compani, T Su, I Chang, J Cheng, KH Shah, T Whisenant, Y Dou, A Bergmann, **R Cheong**, B Wold, L Bardwell, A Levchenko, P Baldi, E Mjolsness. "A scalable and integrative system for pathway bioinformatics and systems biology." *Advances in Experimental Medicine and Biology*. 680:525-34 (2010).

6. Z Yin, SC Tao, **R Cheong**, H Zhu, A Levchenko. "An integrated micro-electro-fluidic and protein arraying system for parallel analysis of cell responses to controlled microenvironments." *Integrative Biology.* 2(9):416-23 (2010).

7. **R Cheong**, S Paliwal, A Levchenko. "High content screening in microfluidic devices." *Expert Opinion on Drug Discovery*. 5(8): 715-20 (2010).

8. D Fan, Z Yin, FQ Zhu, **R Cheong**, R Cammarata, CL Chien, A Levchenko. "Subcellular-resolution delivery of a cytokine through precisely manipulated nanowires." *Nature Nanotechnology*. 5(7):545-51 (2010). **(Featured in News and Views.)**

9. M Fosbrink, NN Aye-Han, **R Cheong**, A Levchenko, J Zhang. "Visualization of JNK activity dynamics with a genetically encoded fluorescent biosensor." *Proceedings of the National Academy of Sciences (USA).* 107(12):5459-5464 (2010).

10. DH Kim, EA Lipke, P Kim, **R Cheong**, S Thompson, M Delannoy, KY Suh, L Tung, A Levchenko. "Nanoscale cues regulate the structure and function of macroscopic cardiac tissue constructs." *Proceedings of the National Academy of Sciences (USA).* 107(2):565-570 (2010).

11. **R Cheong***, Paliwal S*, A Levchenko. "Models at the single cell level." *Wiley Interdisciplinary Reviews: Systems Biology and Medicine*. 2(1):34-48 (2010).

12. **R Cheong**, CJ Wang, A Levchenko. "Using a microfluidic device for high-content analysis of cell signaling." *Science Signaling*. 2(75):pl2 (2009). **(Featured on cover.)**

13. **R Cheong***, CJ Wang*, A Levchenko. "High-content cell screening in a microfluidic device." *Molecular and Cellular Proteomics*. 8(3):433-42 (2009). **(Featured in Science Signaling.)**

14. **R Cheong**, A Hoffmann, A Levchenko. "Understanding NF-kappaB signaling via mathematical modeling." *Molecular Systems Biology*. 4:192 (2008).

15. **R Cheong**, A Levchenko. "Wires in the soup: quantitative models of cell signaling." *Trends in Cell Biology*. 18(3):112-8 (2008).

16. A Kaneda, CJ Wang, **R Cheong**, W Timp, P Onyango, B Wen, CA Iacobuzio-Donahue, R Ohlsson, R Andraos, MA Pearson, AA Sharov, DL Longo, MS Ko, A Levchenko, AP Feinberg. "Enhanced sensitivity to IGF-II signaling links loss of imprinting of IGF2 to increased cell proliferation and tumor risk." *Proceedings of the National Academy of Sciences (USA)*. 104(52):20926-31 (2007).

17. **R Cheong**, RK Wilson, I Cortese, DE Newman-Toker. "Mothball withdrawal encephalopathy: case report and review of paradichlorobenzene neurotoxicity." *Substance Abuse*. 27(4):63-7 (2006).

18. **R Cheong**, A Bergmann, S Werner, A Hoffmann, A Levchenko. "Transient IkappaB kinase activity mediates temporal NF-kappaB dynamics in response to a wide range of tumor necrosis factor-alpha doses." *Journal of Biological Chemistry*. 281(5):2945-50 (2006).

19. JD Kahn, **R Cheong**, RA Mehta, LM Edelman, MA Morgan. "Flexibility and control of protein-DNA loops." *Biophysical Reviews and Letters*. 1(4):327-41 (2006).

20. D Barken, CJ Wang, J Kearns, **R Cheong**, A Hoffmann, A Levchenko. "Comment on 'Oscillations in NF-kappaB signaling control the dynamics of gene expression'." *Science*. 308(5718):52 (2005).

21. LM Edelman, **R Cheong**, JD Kahn. "Fluorescence resonance energy transfer over approximately 130 basepairs in hyperstable lac repressor-DNA loops." *Biophysical Journal*. 84(2 Pt 1):1131-1145 (2003).

Book Chapters

1. **R Cheong**, A Levchenko. "Survey of the NF-kappaB Transcription Factor: Function, Structure, Regulation, Pathways, and Applications." Encyclopedia of Molecular Cell Biology and Molecular Medicine, 2nd edition. Wiley-VCH: New York, 2005.

Conferences

1. **R Cheong**. "Methods to reverse engineer sports rating formulas applied to the Sagarin ratings." New England Symposium on Statistics in Sports. Cambridge, MA, USA (Sep 24 2011).

2. **R Cheong**, A Rhee, CJ Wang, I Nemenman, A Levchenko. "Information transduction capacity of noisy biochemical signaling networks." Mathematical Biosciences Institute Workshop 2: Stochastic Processes in Cell and Population Biology. Columbus, OH, USA (Oct 24 2011 – Oct 28 2011).

3. **R Cheong**, A Rhee, CJ Wang, I Nemenman, A Levchenko. "Advantages and limitations of network-based information processing in biological signaling systems." 5th q-bio Conference on Cellular Information Processing. **Selected for oral presentation.** Santa Fe, NM, USA (Aug 10 2011 – Aug 13 2011).

4. **R Cheong**, A Rhee, I Nemenman, A Levchenko. "Information processing in the TNF-stimulated NF-κB signaling pathway in fibroblasts: what thousands of little cells can tell you?" 3rd q-bio Conference on Cellular Information Processing. Santa Fe, NM, USA (Aug 5 2009 – Aug 9 2009).

5. **R Cheong**, A Levchenko. "A consensus model for the TNF-NF-kappaB signaling pathway." Pacific Symposium on Biocomputing. Kamuela, Big Island, Hawaii, USA (Jan 5 2009 – Jan 9 2009).

6. CJ Wang*, **R Cheong***, A Levchenko. "Microfluidic device for high-throughput immunofluorescent staining of signaling proteins in attachment-dependent cells." 10th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μTAS2006). *Equal contribution from these authors. **Selected for oral presentation** (session 4A2, given by CJW). Tokyo, Japan (Nov 5 2006 – Nov 9 2006).

7. **R Cheong**, CJ Wang, A Levchenko. "Towards systems-level understanding of NF-κB signaling through integrated modeling and experimentation." Keystone Symposia, NF-κB: 20 Years on the Road from Biochemistry to Pathology. **Selected for oral presentation.** Banff, Canada. (Mar 23 2006 – Mar 28 2006).

8. **R Cheong**, A Bergmann, A Hoffmann, A Levchenko. "The IkappaB-NFkappaB Signaling Module: Signal Downregulation Is Required for Initial Response to TNFalpha." Foundations of Systems Biology in Engineering. Santa Barbara, CA, USA (Aug 7 2005 – Aug 10 2005).

9. **R Cheong**, A Bergmann, A Levchenko. "Using similarity metrics in robustness analysis of a NF-kappaB model." Workshop on Genomic Signal Processing and Statistics (GENSIPS). Baltimore, MD, USA (May 26 2004 – May 27 2004)

10. JD Kahn, LM Edelman, **R Cheong**, RA Mehta. "Analysis and control of protein-DNA loops." American Chemical Society, 226th Annual Meeting. New York, NY, USA (Sep 07 2003 – Sep 11 2003).

11. M Morgan, L Edelman, **R Cheong**, R Mehta, J Kahn. "Design and analysis of hyperstable protein-DNA loops and nanostructures." Greater Washington Area Nanoscience Open House, University of Maryland. College Park, MD, USA. (Oct 25 2001)

12. **R Cheong**, JR Brody, L Lee, GR Pasternack. "Phosphoprotein 32 (pp32) inhibits c-myc transactivation and transformation." American Association for Cancer Research (AACR), 90th Annual Meeting. Philadelphia, PA, USA. (Apr 10 1999 – Apr 14 1999)

13. J Bai, SS Kadkol, **R Cheong**, JR Brody, M Chamberlin, GR Pasternack. "Cell-type specific suppression of human prostate carcinoma cell proliferation by a novel tumor suppressor, pp32." American Association for Cancer Research (AACR), 90th Annual Meeting. Philadelphia, PA, USA. (Apr 10 1999 – Apr 14 1999)

Grants

Small Business Innovation Research (SBIR) Phase I $150,000
- Dates: 01/2012 – 06/2012
- Grantor: National Science Foundation (NSF)
- Title: Microfluidic platform for high throughput drug screening using primary cells
- Goals: Development of an ultraminiaturized cell-based assay
- Role: PI

Maryland Technology Transfer and Commercialization Award (MTTCF) $75,000
- Dates: 04/2011 – 12/2011
- Grantor: Maryland Technology Development Corporation (TEDCO)
- Title: Microfluidic cell-based assays
- Goals: Refinement of microfluidic technology into high content screening products
- Role: PI

TechStart Award $15,000
- Dates: 04/2010 – 07/2010
- Grantor: Maryland Technology Development Corporation (TEDCO)
- Title: Microfluidic cell-based assays: applications in drug discovery and personalized medicine

Goals: Business plan development and freedom-to-operate analysis
Role: PI

Mathematics Education Partnership Program (MEPP) $12,500 (total)
Dates: 03/2007 – 02/2008, renewed 03/2008 – 02/2009
Grantor: National Security Agency (NSA)
Title: Baltimore County Math League and Baltimore County Math Team
Goals: Expand extracurricular math activities for Baltimore County (MD) public high schools
Role: Primary grant author, Director of BCML, Head Coach of BCMT

Math Circle Mini-Grant $1,000
Dates: 09/2006 – 06/2007
Grantor: Mathematical Sciences Research Institute (MSRI)
Title: Baltimore County Math League
Goals: Launch a math contest league for the Baltimore County (MD) public high schools
Role: PI

Honors

Scholarships and Fellowships

2010	Siebel Scholarship
2002-present	Medical Scientist Training Program appointment at Johns Hopkins University
2001	American Institute of Chemical Engineers Othmer National Scholarship
2000-2002	Howard Hughes Medical Institute Undergraduate Research Fellowship
1998-2002	University of Maryland Banneker/Key Scholarship (highest academic scholarship)

Awards

2004	North American Winner, Biotechnology Young Entrepreneurs Scheme
2002	A. James Clark School of Engineering Dean's Award
2000, 2001	Winner, International Obfuscated C Code Contest
1999	Ranked among top 300 students nationwide, 1999 Putnam Mathematical Exam
1998	Fourth Place Grand Award, Biochemistry, Intel International Science & Engineering Fair
1998	Semifinalist, Westinghouse Science Talent Search

Personal Activities

2010-present Member, Advisory Board, Siebel Scholars
- Advise and design events and initiatives for the Siebel Scholars community.

2008-present Member, Board of Directors, New York City Interscholastic Math League (NYCIML)
- Advise the student-run NYCIML executive committee, and review contest questions.

2005-2008 Founder, Baltimore County Math League and ARML Team
- Created, piloted, and expanded a new extracurricular mathematics activity for public high schools in Baltimore County, MD.

2002-present Archivist, Student-authored medical school notes
- Curate an extensive collection of student-authored resources for medical education.

1999-present Men's college basketball computer rankings
- Created a mathematical formula to robustly rank basketball teams based on scores and game locations. Rankings are published online.