Erzsébet Ravasz Regan

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ACADEMIC APPOINTMENT

Instructor of Medicine 2007 – present
Division of Molecular and Vascular Medicine, Department of Medicine Boston, MA
Harvard Medical School, Beth Israel Deaconess Medical Center

OTHER PROFESSIONAL POSITION

Principle Investigator Member 2007 – present
Center for Vascular Biology Research Boston, MA
Beth Israel Deaconess Medical Center

POSTDOCTORAL TRAINING

Postdoctoral Fellow in Biology 2006 – 2007
Division of Molecular and Vascular Medicine, Department of Medicine Boston, MA
Harvard Medical School, Beth Israel Deaconess Medical Center
Advisor: William C. Aird

Director Funded Postdoctoral Fellow in Physics 2004 – 2006
Center for Nonlinear Studies, Los Alamos National Laboratory Los Alamos, NM
Mentor: Zoltán Toroczkai

EDUCATION

Ph.D. in Physics 2000 – 2004
University of Notre Dame Notre Dame, IN
Advisor: Albert-László Barabási

M.S. in Physics 1999 – 2000
Babeș-Bolyai University Cluj Napoca, RO
Advisor: Zoltán Néda

B.S. in Physics 1995 – 1999
Babeș-Bolyai University Cluj Napoca, RO
Advisor: Zoltán Néda

AWARDS AND HONORS

Best Participation Award at Data and Journal Club 2012
Center for Vascular Biology Research, Beth Israel Deaconess Medical Center

Alumni Association Research Award 2005
University of Notre Dame Graduate School, University of Notre Dame

Director Funded Postdoctoral Fellowship (2 years) 2004
Center for Nonlinear Studies, Los Alamos National Laboratory
Mentor: Zoltán Toroczkai

Fisher Graduate Fellowship (2 years) 2000
Physics Department, University of Notre Dame
Advisor: Albert-László Barabási

Research Scholarship Sponsored by the University of Notre Dame (2 months) 2000
Eötvös Loránd University, Budapest, Hungary
Advisor: Albert-László Barabási

Valedictorian, Hungarian Commencement, Physics Majors 1999
Babeș-Bolyai University, Cluj Napoca, Romania

Socrates-Erasmus Research Scholarship (3 months) 1999
Centre national de la recherché scientifique, Grenoble, France
Advisor: Yves Bréchet

Performance Undergraduate Scholarship (1 year) 1999
Babeș-Bolyai University, Cluj Napoca, Romania

Research Scholarship (2 months) 1998
Institute for Particle and Nuclear Physics, Központi Fizikai Kutatóintézet, Budapest, Hungary
Advisor: Tamás S. Bíró

1st prize, Scientific Conference for Transylvanian Students 1998
Cluj Napoca, Romania
Advisor: Zoltán Néda

RESEARCH INTERESTS

The central goal of my research program is to uncover the principles of coordination between cellular phenotypes at multiple scales of organization, and build predictive models of this coordination in endothelial health and disease. To this end, I pursue four complementary lines of inquiry:

1) Computational modeling of coupled biological circuits, each of which drive small-scale phenotypic switches. The goal is to predict the coordination of module phenotypes and the emergence of complex phenotypes at a larger scale.
2) Development of theoretical measures, computational tools, and visualization techniques to aid dynamical modeling of multi-scale, hierarchically organized phenotypes.
3) Measuring, modeling, and predicting the behavior of noise driven mosaic heterogeneity of the endothelium *in vitro* and *in vivo* (collaboration with William Aird).
4) Leveraging mosaic heterogeneity of the endothelium to identify regulatory switches in: *a)* TNF-induced inflammation, *b)* sensory-motor feedback sprouting angiogenesis (collaborations with William Aird and Katie Bentley).

RESEARCH EXPERIENCE

Instructor of Medicine, Harvard Medical School 7/2007 – present
— Identification of general principles that characterize Boston, MA, USA

coordination between cellular regulatory switches; development of quantitative measures that test the validity of these principles in arbitrary Boolean networks; construction of a dynamically modular model of cell cycle (Deritei et al, *in prep. for submission, 2014;* last and corresponding author).

— Exploring the role of bistability in endothelial regulatory circuits involved in sensorimotor feedback and vascular morphogenesis (Bentley et al, *Dev Cell* 2014*;* Bentley et al, *ALife14* 2014).

— Modeling biological noise-driven dynamic mosaic heterogeneity in the endothelium (Yuan et al, *in revision for Nature Communications*, 2014; co-corresponding).

— Endothelial heterogeneity as a product of multi-stable dynamical processes on regulatory circuits (Regan & Aird, *Circ Res* 2012, corresponding author);

— Uncovering the role of a FoxO1-Akt negative feedback loop in endothelial proliferation and vascular development; transcriptional profiling of FoxO1 deficient and over-expressing endothelium *in vitro* and *in vivo*; *in silico* prediction of combinatorial transcriptional regulation; (Dharaneeswaran et al, *Circ Res,* 2014; Co-Investigator on NIH-RO1 grant).

— Metabolite profiling of Akt- and Myc-overexpressing prostate cancer samples to uncover oncogene-specific metabolic alterations (Priolo et al, *Cancer Research* 2014, in press).

— Genome-wide transcriptional profiling of phenotypic drift in freshly isolated endothelial cells (collaboration with G. Molema, W. Aird; in progress)

— Prediction of vWF transcriptional activators using conserved transcription factor binding sites and microarray compendia (Liu et al, *Blood,* 2011).

Postdoctoral Fellow, Harvard Medical School 11/2006 – 7/2007
Advisor: William Aird Boston, MA

— Genome-wide transcriptional profiling of multi-potent mouse and rat brain arachnoid cells (Wada et al, *in preparation,* 2014).

— Identification of transcription factor binding sites in conserved regions of the VEGFR1 promoter (Jin et al, *Blood,* 2009).

— Computational toolkit for extending bioinformatics approached to endothelial biology (microarray compendia of cell types and tissues; endothelial compendium of diverse vascular beds; endothelial cell specificity of genes; endothelial-specific combinatorial regulation of transcription).

Director Funded Postdoctoral Fellow, Los Alamos National Laboratory 10/2004 – 10/2006
Advisor: Zoltán Toroczkai Los Alamos, NM

— Complex networks approach to the energy landscape of folding proteins (Ravasz et al, *ArXiv [q-bio.BM]*, 2007); minimal models of protein folding landscapes (robot arm models, gradient networks).

Graduate Student, University of Notre Dame 8/2000 – 9/2004
Advisor: Albert-László Barabási Notre Dame, IN

— Evolutionary conservation and lethality in the hierarchical modules of the *E. Coli* metabolism (Gerdes et al, *J. Bacter,* 2003).

— Discovery of hierarchical modularity in metabolic reaction network structure; signature of hierarchical modularity in complex networks (Ravasz et al, *Science*, 2002); hierarchical modularity in large complex networks in society, language, and technology (Ravasz et al, *Phys Rev E*, 2002).

— Development of hierarchically modular scale-free network models (Ravasz et al, *Phys Rev E*, 2002); development of deterministic fractal model for scale-free networks (Barabási et al, *Physica A,* 2001).

Visiting Masters Student Intern, Eötvös Loránd University 2000
Advisor: Albert-László Barabási Budapest, HU

— Characterization and modeling the evolution of large scientific coauthorship networks (Barabási et al, *Physica A,* 2002).

Undergraduate and Masters Student, Babeș-Bolyai University 9/1995 – 7/2000
Advisor: Zoltán Néda Cluj Napoca, RO

— Measurement, analysis and modeling of the transition from random to synchronized clapping following concert halls performances (Néda et al, *Nature* 2000; Néda et al, *Phys Rev E* 2000).

— Computer simulation of spacial stochastic resonance in Ising systems exposed to spatially periodic magnetic fields (Néda et al, *Phys Rev E,* 1999).

RESEARCH SUPPORT

Completed:

Forkhead Signaling in the Endothelium (PI: Aird - $1,570,000 direct costs) 04/2010 – 03/2015
NIH/NHLBI - 2R01HL077348-05A1
Co-Investigator

— Objective: identify FoxO1-associated transcriptional networks in endothelial cells and decipher their vascular bed-specific role in gene expression.

— As Co-Investigator: delineate the combinatorial regulatory interplay between FoxO1 and NF-kB (*in silico* and *in vitro*); transcriptional profiling of endothelial FoxO1 overexpression and knockdown.

Director Funded Postdoctoral Fellowship Research Support ($40,000) 10/2004 – 10/2006
Los Alamos National Laboratory
Principle Investigator

— Objective: study complex networks in biological systems, in particular conformation networks in protein folding.

Pending:

Mechanisms of mosaic heterogeneity in endothelium (PIs: Aird & Regan) 2014 – 2019
NIH/NHLBI
PI

— Objective: characterize the dynamics, molecular mechanism and physiological role of mosaic heterogeneity in vWF expression

Novel Aspect of vWF Gene Regulation (PI: Aird) 2014 – 2019
NIH/NHLBI

Co-Investigator

— Objective: characterize the mechanisms of endothelial and macrophage-specific vWF expression, the role of DNA methylation in flow-mediated repression of vWF and the role of mosaic vWF expression in cardiac health.

— As Co-Investigator: characterize functional relevance of mosaic vWF expression; model the flow-sensitive DNA methylation switch.

TEACHING EXPERIENCE

Lectures and Seminars:

Lecturer, Northeastern University 01/2012 – 05/2012
Physics Department Boston, MA

— *Interactive Learning Seminars for Physics 101* (1 semester)
Two 180 min seminars/week for undergraduate students.

Course Founder and Lecturer, Beth Israel Deaconess Medical Center 03/2010 – 12/2010
Center for Vascular Biology Research Boston, MA

— *The Complexity of Cellular Networks* (1 series)
Fourteen 1-hour lectures for fellow faculty and postdoctoral fellows.

Teaching Assistant, Babeș-Bolyai University 10/1999 – 02/2000
Physics Department Cluj Napoca, RO

— *Learning Seminars for Quantum Mechanics* (2 semesters)
One 2-hour seminar/week for 3rd year physics majors (leading session, selecting problems, grading).

Teaching Assistant, Babeș-Bolyai University 02/1998 – 07/1998
Physics Department Cluj Napoca, RO

— *Learning Seminars for Quantum Mechanics* (1 semester)
One 2-hour seminar/week for 3rd year mathematics/physics double majors (leading session, selecting problems, grading).

Mentoring:

Mentor for the NetSci High Program

Educational outreach program to introduce the science of networks to high school students.

NetSci High 2012 8/2012 – 6/2013
— Team of 4 high school students, Boston University Academy Boston, MA
— Objective: model the influence of external inputs on the energy landscape of small regulatory networks (weekly meetings).

NetSci High 2011 (Pilot) 10/2010 – 6/2011
— One high school student (ML Cerulli), Winsor High School
Boston, MA
— Objective: map the phenotypic heterogeneity of endothelial cells in distinct segments of the kidney vasculature (weekly meetings).

Mentor for the Research Science Institute (RSI)

Summer science and engineering program to combine theory course work and research (Center for Excellence in Education, hosted by MIT).

RSI 2013 7/2013
— One high school student, "XIV Liceum Ogolnoksztalcace" High School Boston, MA
— Objective: study the combinatorial regulation of endothelial apoptosis by VEGF and TSP1 with a Boolean network model (daily meetings).

RSI 2012 7/2012
— One high school student, "Dr. Petar Beron" High School of Mathematics Boston, MA
— Objective: develop energy landscape visualization for Boolean regulatory network state transition graphs (daily meetings).

Mentor for the Center for Vascular Biology Summer Student Research Program

CVBR Summer Student Research Program 2012 7/2012
— One high school student, Winsor High School (volunteer) Boston, MA
— Objective: build an agent-based model of spatial patterns in heterogeneous vWF expression, observed in the mouse aorta (daily meetings).

CVBR Summer Student Research Program 2011 7/2011 – 10/2011
— One undergraduate student, University of Massachusetts (paid) Boston, MA
— Objective: develop a sampling algorithm of the state space of large Boolean regulatory networks (1-2 meetings/week).

Mentor for High school Research Volunteer 6/2011 – 6/2012
— One high school student (ML Cerulli), Winsor High School (volunteer) Boston, MA
— Objective: assemble a Boolean network model of angiogenic pattern formation (weekly meetings for 3 semesters; daily meetings during 1 month of her full-time *Independent Learning Experience* internship).

Host for Center for Nonlinear Studies Visiting Students
Los Alamos National Laboratory
— One undergraduate student, Babeș-Bolyai University (paid) 3/2006
— One graduate student, University of Notre Dame (paid) 8/2005

ADMINISTRATIVE LEADERSHIP POSITIONS

Satellite Conference Organizer, NetSci 2015 Conference 2015
***NetSciReg'15 - Network Models in Cellular Regulation* (1 day, 9 presentations)**
— Role: co-proposed satellite conference to NetSci organizers, designed, scheduled and co-chaired the conference; helped raised funding, designed website and handled registration.
http://regan.med.harvard.edu/NetSciReg2015

Satellite Conference Organizer, NetSci 2014 Conference 2014
***NetSciReg'14 - Network Models in Cellular Regulation* (1/2 day, 5 presentations)**
— Role: proposed satellite conference to NetSci organizers, designed, scheduled and chaired the conference; raised funding, designed website and handled registration.
http://regan.med.harvard.edu/NetSciReg2014

Satellite Conference Organizer, NetSci 2013 Conference 2013
NetSciReg'13 - Network Models in Cellular Regulation (1 day, 10 presentations)
— Role: proposed satellite conference to NetSci organizers, designed, scheduled and chaired the conference; raised funding, designed website and handled registration.
http://regan.med.harvard.edu/NetSciReg2013

Course Director - Center for Vascular Biology Research 2010
The Complexity of Cellular Networks (14 informal, 1-hour lectures)
— Role: proposed, designed, scheduled and taught the course, designed course website.
http://regan.med.harvard.edu/CVBR-course.php

Symposium Organizer, American Physical Society March Meeting 2007
Networks in genetic regulation (Invited symposium)
— Role: proposed symposium to APS, developed program, invited speakers.

Workshop Sponsor and Advisory Committee Member 2006
Optimization in Complex Networks
Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, NM

GRANT REVIEW ACTIVITIES

Grant Review Panelist, National Science Foundation 2010
Advancing Theory In Biology, Directorate of Biological Sciences

Ad Hoc Grant Reviewer, National Science Foundation 2009
Condensed Matter and Materials Theory, Division of Materials Research

Ad Hoc Grant Reviewer, Defense Threat Reduction Agency 2007, 2008
Basic Research Proposals on Understanding Target Network Response to WMD Attack

EDITORIAL ACTIVITIES

Reviewer 2004 – present
General: Proceedings of the National Academy of Sciences, Nature Biotechnology
Systems/Computational Biology: PLOS Computational Biology, BMC Systems Biology, Bioinformatics, Journal of Biological Systems, Theoretical Biology, Journal of the Royal Society Interface, NeuroComputing
Statistical Physics / Network Science: Physical Review E, Biophysics, Biophysical Journal, Journal of Physica A, Physica D, The European Physical Journal B
Endothelial Biology and Biomedicine: FEBS Letters, Frontiers in Cancer Endocrinology, Circulation, Circulation: Cardiovascular Genetics, Journal of Thrombosis and Haemostasis

PROFESSIONAL SOCIETIES

American Physical Society 2002, 2007

OUTREACH ACTIVITIES

Invited Presentation, Mikes Kelemen High School (Alma Mater) 2008
Where is the physics in this? (in Hungarian) Sepsiszentgyörgy, RO
General presentation about the role of physics in understanding biological systems.

Invited Presentation, "Tusványos" Summer University and Festival 2007
A physicist in the world of proteins: networks and the blocks of life (in Hungarian) Bálványos, RO
General presentation about network approaches to protein folding.

PUBLICATIONS

Peer Reviewed Articles

Citations: Web of Science [WoS] - 3,741; Google Scholar - 7,476
H-index: Web of Science - 11; Google Scholar -13

1. Dharaneeswaran, H. Abid R, Yuan L, Dupuis D, Beeler D, Spokes KC, Janes L, Sciuto T, Kang P, Jaminet SC, Dvorak A, Grant MA, **Ravasz Regan E**, Aird WC, FoxO1-mediated Activation of Akt plays a critical role in vascular homeostasis, *Circulation Research* 2014; 115:238-51.
2. Bentley K, Philippides A, **Ravasz Regan E**. Do Endothelial Cells Dream of Eclectic Shape? *Developmental Cell* 2014; 29:146-158. (Citations: WoS - 3, Google Scholar - 5)
3. Deritei D, Lazar Zs, Papp I, Jarai-Szabo F, Sumi R, Varga L, **Ravasz Regan E**, Ercsey-Ravasz MM, Community detection by graph Voronoi diagrams, *New Journal of Physics* 2014; 16:063007.
4. Bentley K, Harrington K, **Ravasz Regan E,** Can active perception generate bistability? Heterogeneous collective dynamics and vascular patterning, *ALife14: The 14th International Conference on the Synthesis and Simulation of Living Systems,* 2014; 14:328-335.
5. Priolo C, Pyne S, Rose J, **Ravasz Regan E**, Zadra G, Photopoulos C, Cacciatore S, Schultz D, Scaglia N, McDunn J, DeMarzo A, Loda M. AKT1 and MYC Induce Distinctive Metabolic Fingerprints in Human Prostate Cancer. *Cancer Research* 2014 (in press; doi: 10.1158/0008-5472. CAN-14-1490).
6. Kurniati NF, Jongman RM, von Hagen F, Spokes KC, Moser J, **Ravasz Regan E,** Krenning G, Moonen JRAJ, Harmsen MC, Struys MMRF, Hammes HP, Zijlstra JG, Aird WC, Heeringa P, Molema G, van Meurs M. The flow dependency of Tie2 expression in endotoxemia. *Intensive Care Medicine* 2013; 39:1262-1271 (Citations: WoS - 2, Google Scholar - 3).
7. **Ravasz Regan E***, Aird WC. Dynamical systems approach to endothelial heterogeneity. *Circulation Research* 2012; 111:110-30 (*corresponding author; Citation: WoS - 22, Google Scholar - 25).
8. Liu J, Yuan L, Molema G, **Regan E**, Janes L, Beeler D, Spokes KC, Minami T, Oettgen P, Aird WC, Vascular bed-specific regulation of the von Willebrand factor promoter in the heart and skeletal muscle, *Blood* 2011; 117(1):342-51 (Citations: WoS - 9, Google Scholar - 12).
9. Jin E, Liu J, Suehiro J, Okada Y, Yuan L, Nikolova-Krstevski V, Yano K, Janes L, Beeler D, Spokes KC, **Regan E**, Shih SC, Oettgen P, Minami T, Aird WC. Differential Roles for ETS, CREB and EGR Binding Sites in Mediating VEGF Receptor 1 Expression in Vivo, *Blood* 2009; 114(27): 5557-66 (Citations: WoS - 7, Google Scholar - 9).
10. Gerdes SY, Scholle MD, Campbell JW, Balázsi G, **Ravasz E**, Daugherty MD, Somera AL, Kyrpides NC, Anderson I, Gelfand MS, Bhattacharya A, Kapatral V, D'Souza M, Baev MV, Grechkin Y, Mseeh F, Fonstein MY, Overbeek R, Barabási A-L, Oltvai ZN, Osterman AL. Experimental Determination and System Level Analysis of Essential Genes in Escherichia coli MG1655. *Journal of Bacteriology* 2003; 185, 5673 (Citations: WoS - 345, Google Scholar - 750).
11. **Ravasz E**, Barabási AL. Hierarchical organization in complex networks. *Phys Rev E* 2003; 67:026112 (Citations: WoS - 661, Google Scholar - 1281).
12. Farkas I, Derényi I, Jeong H, Néda Z, Oltvai ZN, **Ravasz E**, Schubert A, Barabási AL, Vicsek T. Networks in life: Scaling properties and eigenvalue spectra. *Physica A* 2002; 314:25 (Citations: WoS - 37, Google Scholar - 78).
13. **Ravasz E**, Somera AL, Mongru DA, Oltvai ZN, Barabási AL. Hierarchical organization of modularity in metabolic networks. *Science* 2002; 297:1551 (Citations: WoS - 1501, Google Sch. - 2595).

14. Barabási AL, Jeong H, Néda Z, **Ravasz E**, Schubert A, Vicsek T. Evolution of the social network of scientific collaborations. *Physica A* 2002; 311:590 (Citations: WoS - 671, Google Scholar - 1652).
15. Barabási AL, **Ravasz E**, Vicsek T. Deterministic scale-free networks. *Physica A* 2001; 299:559 (Citations: WoS - 174, Google Scholar - 370).
16. Néda Z, **Ravasz E**, Vicsek T, Bréchet Y, Barabási AL. Physics of the rhythmic applause. *Phys Rev E* 2000; 61:6987 (Citations: WoS - 62, Google Scholar - 128).
17. Néda Z, **Ravasz E**, Vicsek T, Bréchet Y, Barabási AL. The sound of many hands clapping, *Nature* 2000; 403:850 (Citations: WoS - 209, Google Scholar - 332).
18. Néda Z, Rusz A, **Ravasz E**, Lakdawala P, Gade PM. Spatial stochastic resonance in one-dimensional Ising systems. *Phys Rev E* 1999; 60:R3463 (Citations: WoS - 11, Google Scholar - 12).

Book Chapters:

1. **Ravasz Regan E.** Hierarchical Modularity in Biological Networks. In: Buchanan M, Calderelli G, De Los Rios P, Rao F, Vendruscolo M (eds). *Networks in Cell Biology*. Cambridge University Press; 2010 (SBN-13: 978-0-521-88273-6).
2. **Ravasz Regan E.** Networks: Structure and Dynamics. In: Meyers RA, editor in chief. *Encyclopedia of Complexity and System Science*. Springer; 2009. p. 6048-6066 (SBN-13: 978-0-387-75888-6).
3. **Ravasz E**. Detecting hierarchical modularity in biological networks. In: McDermott J, Samudrala R, Bumgarner R, Montgomery K (eds). *Computational Systems Biology*. Humana Press; 2009. p. 145-160 (SBN-10: 1588299058) (Citations: WoS - 11, Google Scholar - 28).
4. Wuchty S, **Ravasz E**, Barabási AL. The Architecture of Biological Networks. In: Deisboeck TS, Yasha Kresh J, Kepler TB (eds). *Complex Systems Science in Biomedicine*. New York: Kluwer Academic Publishing; 2005. p. 165-181 (Citations: WoS - 5, Google Scholar - 75).

Proceedings:

1. Barabási AL, Dezső Z, **Ravasz E**, Yook SH, Oltvai ZN. Scale-free and hierarchical structures in complex networks. In: AIP Conf Proc 2003; 661:1. *Proceedings of Modeling of Complex Systems: Seventh Granada Lectures*; 2002; Granada, Spain. New York: Melville; 2003 (Citations: WoS - 14, Google Scholar - 97).
2. Barabási AL, **Ravasz E**, Oltvai ZN. Hierarchical Organization of Modularity in Complex Networks. In: Pastor-Satorras R, Rubi JM, Diaz-Guilera A (eds). *Complex Networks*. *Lecture Notes in Physics* 2003; 625:46. Proceedings of the XVIII Sitges Conference on Statistical Mechanics; 2002; Sitges, Spain. Berlin: Springer; 2003 (Citations: WoS - 4, Google Scholar - 17).

Thesis:

Ravasz E. Evolution, hierarchy and modular organization in complex networks. University of Notre Dame, Notre Dame, IN, 2004 (Google Scholar - 6).

Submitted or in Revision:

1. Yuan L, Chan G, Beeler D, Janes L, Spokes KC, Mojiri A, Adams WJ, Sciuto T, Garcia-Cardeña G, Molema G, Jahroudi N, Marsden PA, Dvorak A, **Ravasz Regan E***, Aird*, WC, Organ-specific stochastic phenotype switching is required for endothelial health, (*in revision for Nature Communications;* *co-corresponding authors) 2014.

In Preparation or Posted on ArXiv:

1. Deritei D, Ercsey-Ravasz MM, **Ravasz Regan E***, Principles of dynamical modularity in biological regulatory networks, (*in preparation for Cell,* theory paper; *corresponding author), 2014.
2. Wada H, Ii M, Kohro T, Sciuto TE, **Ravasz Regan E**, Hall S, Adams W, Li D, Stratman AN, Lebastchi A, Sekino M, Ohta Y, Hamakubo T, Ihara S, Asahara T, Ueno S, Losordo DW, Carman CV, Gunel M, Tellides G, Weiler H, Shih SC, Davis G, Garcia-Cardena G, Kodama T, Dvorak AM, Wada Y, Aird WC, The brain arachnoid exhibits a mixed vascular cell phenotype and provides an anatomical niche for multi-lineage progenitor cells, (*in preparation)* 2014.
3. **Ravasz E**, Gnanakaran S, Toroczkai Z. Network Structure of Protein Folding Pathways, 2007, arXiv:0705.0912 [q-bio.BM] (Citations: Google Scholar - 6).

PRESENTATIONS

Invited Conference and Workshop Presentations:

From the Clinic to Partial Differential Equations and Back: Emerging challenges for Cardiovascular Mathematics Institute for Computational and Experimental Research in Mathematics	*Endothelial Cell Heterogeneity - Nature, Nurture or Neither?*	2014 Providence, MA
NetSciEd 2013 Satellite Symposium on Education @ NetSci2013 - International Conference on Network Science	*How to Build Your Very Own Landscape?*	2013 Copenhagen, Denmark
NetSciEd 2012 Satellite Symposium on Education @ NetSci2012 - International Conference on Network Science	*Building a Boolean Network Model of Angiogenic Tip and Stalk cell formation*	2012 Chicago, IL
6th Annual Vascular Biology Research Retreat Center for Vascular Biology Research Beth Israel Deaconess Medical Center	*Functional Modules of Endothelial Cells Hidden in Microarray Data*	2010 N. Falmouth, MA
International Workshop on Stochastic Phenomena 2nd Transylvanian Summer School	*At the Boundary of Signaling and Transcription*	2007 Cluj Napoca, RO
International Workshop on Complex Systems and Networks 1st Transylvanian Summer School	*Networks in Protein Folding*	2007 Szováta, RO
NetSci 2007, International Workshop and Conference on Network Science	*Networks in Protein Folding*	2007 Queens, NY

Computational Methods in Modern Physics (in Hungarian) Hungarian Technical Scientific Society of Transylvania, Babeș-Bolyai Univ.	*Networks in Protein Folding (in Hungarian)*	2006 Cluj Napoca, RO
Optimization in Complex Networks Center for Nonlinear Studies Los Alamos National Laboratory	*Networks in Protein Folding*	2006 Los Alamos, NM
News, Expectations and Trends in Statistical Physics 3rd Next Sigma-Phy International Conference	*Hierarchical Modularity in Complex Networks*	2005 Kolymbari, Greece
Arizona Days Los Alamos National Laboratory	*Hierarchical Modularity in Metabolic Networks*	2005 Tucson, AZ

Invited Seminars:

Systems and Computational Biology Departmental Seminar Albert Einstein College of Medicine Yeshiva University	*Principles of dynamical modularity in biological regulatory networks*	2014 New York, NY
Channing Network Science Seminar Brigham & Women's Hospital Harvard Medical School	*Principles of dynamical modularity in biological regulatory networks*	2014 Boston, MA
Biochemistry and Molecular Biology Seminar The College of Wooster	*Dynamical Modularity in Cellular Regulation*	2014 Wooster, OH
NetSci High 2014 Summer Workshop Boston University	*Dynamical Modularity in Cellular Regulation*	2014 Boston, MA
Vascular Biology Research Seminar Center for Vascular Biology Research Beth Israel Deaconess Medical Center	*The Cell Orchestrates Multi-Faceted Phenotypic Decisions via Modular Dynamics*	2014 Boston, MA
NetSci High 2013 Summer Workshop Boston University	*Dynamical Modularity in Cellular Regulation*	2013 Boston, MA
Physics Department Special Seminar Department of Physics Babeș-Bolyai University	*Dynamical Modularity - the organizing principle of cellular regulation at multiple scales*	2013 Cluj Napoca, RO
Joint Network Seminar Center for Complex Network Research Northeastern University (Boston U.)	*Dynamical Modularity in Regulation of Mammalian Cell Proliferation*	2012 Boston, MA

NetSci High 2012 Summer Workshop Boston University	*Dynamical Modularity in Cellular Regulation*	2012 Boston, MA
Physics Department Special Seminar Department of Physics Babeș-Bolyai University	*Hierarchical Organization of the Endothelial Regulatory System*	2011 Cluj Napoca, RO
Condensed Matter Physics Seminar Series Department of Physics University of Notre Dame	*At the Boundary of Signaling and Transcription*	2008 Notre Dame, IN
Vascular Biology Research Seminar Center for Vascular Biology Research Beth Israel Deaconess Medical Center	*At the boundary of VEGF signaling and transcription*	2008 Boston, MA
Vascular Biology Research Seminar Center for Vascular Biology Research Beth Israel Deaconess Medical Center	*A dynamic model of VEGF signaling*	2007 Boston, MA
Interdisciplinary Medicine Seminar Series Division of Interdisciplinary Medicine Beth Israel Deaconess Medical Center	*Networks in Protein Folding*	2007 Boston, MA
Job Interview Seminar Center for Systems Biology Institute for Advanced Study	*Networks in Protein Folding*	2005 Princeton, NJ
Job Interview Seminar Division of Molecular and Vascular Medicine Beth Israel Deaconess Medical Center	*Networks in Protein Folding*	2005 Boston, MA
CNLS Seminar series Center for Nonlinear Studies Los Alamos National Laboratory	*Protein Folding Networks*	2005 Los Alamos, NM
Job Interview Seminar Center for Nonlinear Studies Los Alamos National Laboratory	*Hierarchical Organization of Modularity in Complex Networks*	2004 Los Alamos, NM
Job Interview Seminar Brookhaven National Laboratory	*Hierarchical Organization of Modularity in Complex Networks*	2004 Upton, NY

Contributed Talks:

NetSciReg'13 - Network Models in Cellular Regulation @ NetSci2013 - International Conference on Network Science	*Dynamical Modularity of Mammalian Cell Proliferation*	2013 Copenhagen, Denmark

NetSci - International Conference on Network Science	*2012 - Dynamical Modularity in Regulation of Endothelial Cell Life and Death*	2010-2012 Chicago, IL
	2011 - Hierarchical Organization of the Endothelial Regulatory System	2011 Budapest, HU
	2010 - Hierarchical Genetic Regulation Hidden in Microarray Data	2010 Boston, MA
CVBR Journal Club Center for Vascular Biology Research Beth Israel Deaconess Medical Center	*2014 - Dynamics and Memory of Heterochromatin in living cells*	2009 - 2014 Boston, MA
	2013 - A Two-Dimensional ERK-AKT Signaling Code for an NGF-Triggered Cell-Fate Decision	
	2012 - Asymmetric cancer cell division regulated by AKT	
	2010 - Transcriptome-wide Noise Controls Lineage Choice in Mammalian Progenitor Cells	
	2009 - Balance between Maintaining a Stable Vascular Bed and Responding to Stress	
CVBR Data Club Center for Vascular Biology Research Beth Israel Deaconess Medical Center	*2014 - Bistable DNA Methylation is Responsible for vWF mosaic heterogeneity*	2010 - 2014 Boston, MA
	2013 - Mammalian Proliferation is Dynamically Modular	
	2012 - Dynamical systems approach to endothelial heterogeneity	
	2011 - Dynamical modularity links structure to function in cellular regulation	
	2010 - Landscape of an Endothelial Cell	
APS March Meeting American Physical Society	*Evolution of the Social Network of Scientific Collaborations*	2002 Indianapolis, IN

REFERENCES

Endothelial biomedicine:

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Professor of Medicine
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