

# NURCAN TUNCBAG, PhD

Middle East Technical University (METU)

Informatics Institute

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**Date of Birth:** December 09, 1982

## Current Position

2014 – present FP7 the Marie Curie Action and TUBITAK Co-funded Brain Circulation Scheme Fellow at Health Informatics Department  
**Middle East Technical University (METU)**, Ankara Turkey

## Past Positions

2010 – 2014 Postdoctoral Associate in Biological Engineering  
**Massachusetts Institute of Technology (MIT)**, Cambridge, MA  
*Supervisor:* Prof. Ernest Fraenkel

January 2012 Visiting Researcher at **Microsoft New England Research and Development**, Cambridge, MA  
In collaboration with Jennifer Chayes and Christian Borgs

January 2011 Visiting Researcher at **Politecnico di Torino**, Turin, Italy  
In collaboration with Prof Riccardo Zecchina

July 2009 – August 2009 Visiting Researcher at **National Institute of Health (NIH)**,  
**National Cancer Institute (NCI)**, Frederick, MD

2005 – 2010 Research Assistant at **Koç University**, Istanbul, Turkey

2005 – 2010 Teaching Assistant at **Koç University**, Istanbul, Turkey

July 2004 Intern at Mustafa Nevzat Pharmaceuticals

June 2003 Intern at the Scientific and Technological Research Council of Turkey (TUBITAK)

## Education

2007 – 2010 Ph.D., Computational Science and Engineering  
**Koç University**, Istanbul, Turkey  
*Dissertation Title:* Multi-Scale Analysis and Prediction of Protein-Protein Interactions  
*Supervisors:* Prof Ozlem Keskin & Prof Attila Gursoy

2005 – 2007 M.Sc., Computational Science and Engineering  
**Koç University**, Istanbul, Turkey  
*Dissertation Title:* Characterization and analysis of protein-protein interfaces  
*Supervisors:* Prof Ozlem Keskin and Prof Attila Gursoy

2000 – 2005 B.Sc., Chemical Engineering  
**Istanbul Technical University**, Istanbul, Turkey  
(with Honors)  
2000 Uskudar Anatolian High School (with Honors)

### Courses Taught

BIN500 – Programming for Informatics (Spring 2015, Fall 2015), METU (**Primary Instructor**)  
BIN503 – Biological Databases and Data Analysis Tools (Fall 2014, Spring 2015), METU  
(**Primary Instructor**)  
Bioinformatics Course organized by the Department of Chemistry at METU (September 2015) (**Guest Lecturer**)  
ChBI201 – Introduction to Chemical and Biological Engineering, Koç University (Teaching Assistant)  
ChBI308 – Chemical Reaction Engineering, Koç University (Teaching Assistant)  
CMSE520 – Biomolecular Structure, Function and Dynamics (Grad Course), Koç University (Teaching Assistant)  
ECOE570 – Bioinformatics and Algorithms in Computational Biology (Grad Course), Koç University (Teaching Assistant)

### Scientific/Academic honors

2015 Young Scientist Award (BAGEP 2015) of the Science Academy in Turkey  
2014 – 2016 FP7 the Marie Curie Action and TUBITAK Co-funded Brain Circulation Scheme Fellow  
2014 ACM Conference on Bioinformatics, Computational Biology and Health Informatics Program Committee Member  
2012 RECOMB, Barcelona, Spain – Travel Award, sponsored by International Society for Computational Biology  
2012 ICBP Mathematical Modeling Meeting 2012, Tampa, USA. (Travel Support by NCI)  
2010 Computer Science Student Workshop (CSW'10), Istanbul, Turkey – Best Work in-progress Paper Award  
2009 ISMB/ECCB, Stockholm, Sweden – Travel Award, sponsored by BioSapiens  
2008 ECCB, Cagliari, Italy – Travel Award, sponsored by EMBRACE  
2007 ISMB/ECCB, Vienna, Austria – Student Council Travel Award, sponsored by European Bioinformatics Institute (EBI) assigned only to five people all over the Europe.  
2007 – 2010 TUBITAK PhD Fellowship.  
2007 – 2008 Director of the Graduate Student Association (GSA) at Koc University  
2006 – 2007 TUBITAK, MS Fellowship.

### Publications in International Peer-Reviewed Journals

1. Tuncbag N, Gosline SJC, Kedaigle A, Soltis AR, Gitter A, Fraenkel E. Network-based interpretation of diverse high-throughput datasets through the Omics Integrator software package, *PLOS Comp Bio*, 2016, *accepted*.

2. Budak G, Eren-Ozsoy O, Aydin-Son Y, Can T, **Tuncbag N**. Modeling and reconstruction of temporal signaling networks in Salmonella-infected human cells, **Frontiers in Microbiology**, 2015, 20(6):730.
3. Ersahin T, **Tuncbag N**, Cetin-Atalay R. The PI3K/AKT/mTOR interactive pathway, **Molecular Biosystems**, 2015, 11(7):1946-54.
4. **Tuncbag N**, Braunstein A, Pagnani A, Huang SSC, Chayes J, Borgs C, Zecchina R, Fraenkel E. Simultaneous reconstruction of multiple signaling pathways via the prize-collecting Steiner forest problem, **Journal of Computational Biology**, 2013, 20, pp. 1-13.
5. **Tuncbag N**, McCallum S, Huang SSC, Fraenkel E. SteinerNet: A Web Server for Integrating “Omic” data to Discover Hidden Components of Response Pathways, **Nucleic Acids Research (Web Server Issue)**, 2012, doi: 10.1093/nar/gks445.
6. **Tuncbag N**, Keskin O, Nussinov R, Gursoy A. Fast and Accurate Modeling of Protein-Protein Interactions by Combining Template-Interface-Based Docking with Flexible Refinement, **Proteins: Structure, Function and Bioinformatics**, 2012, 80(4):1239-49.
7. **Tuncbag N**, Gursoy A, Nussinov R, Keskin O. Predicting Protein-Protein Interactions on a Proteome Scale by Matching Evolutionary and Structural Similarities at Interfaces Using PRISM, **Nature Protocols**, 2011, 6(9):1341-54..
8. **Tuncbag N**, Gursoy A, Keskin O. Prediction of protein-protein interactions: Unifying evolution and structure at protein interfaces, **Physical Biology**, 2011, 8(3):035006.
9. **Tuncbag N**, Keskin O, Gursoy A. “HotPoint: Hot Spot Prediction Server for Protein Interfaces” **Nucleic Acids Research**, 2010, 38(Web Server issue):W402-6.
10. **Tuncbag N**, Salman FS, Keskin O, Gursoy A. “Analysis and network representation of hot spots in protein interfaces using minimum cut trees” **Proteins: Structure, Function and Bioinformatics**, 2010, 78(10):2283-94.
11. **Tuncbag N**, Kar G, Gursoy A, Keskin O, Nussinov R. “Towards inferring time-dimensionality in protein-protein interaction networks by intergrating structures: the p53 example” **Molecular Biosystems**, 2009, 5:1770-1778.  
Amongst the top ten accessed articles in June, July, August 2011 and in February 2012.
12. **Tuncbag N**, Gursoy A, Keskin O. “Identification of computational hot spots in protein interfaces: Combining solvent accessibility and inter-residue potentials improves the accuracy” **Bioinformatics**, 2009, 25(12):1513-1520.  
“Fast Breaking Paper in Engineering” by Thomson Reuters and Science Watch in December 2010 in the field of Computer Science
13. **Tuncbag N**, Kar G, Gursoy A, Keskin O, Nussinov R. “A survey of available tools and web servers for analysis of protein–protein interactions and interfaces” **Briefings in Bioinformatics**, 2009, 10:217-232.
14. Guney E, **Tuncbag N**, Keskin O, Gursoy A. “HotSprint: database of computational hot spots in protein interfaces” **Nucleic Acids Research**, 36(Database Issue):D662-666, 2008.

15. Keskin O, **Tuncbag N**, Gursoy A. "Characterization and Prediction of Protein Interfaces to Infer Protein-Protein Interaction Networks" *Curr. Phar. Biotech.*, 9(2):67-76, 2008.
16. **Tuncbag N**, Guney E, Gursoy A, Keskin O, Nussinov R. "Architectures and Functional Coverage of Protein-Protein Interfaces" *Journal of Molecular Biology*, 381:785-802, 2008.

## Talks & Posters

1. Bilkent University, Molecular Biology and Genetics Seminar Series, December 2015 (Invited Talk)
2. Gazi Pharma Symposium Series, Antalya, Turkey, November 2015 (Invited Talk)
3. MolBioCon'15, Ankara Turkey, November 2015 (Invited Talk)
4. METU, Department of Chemistry, November 2015 (Invited Talk)
5. METU, Department of Biology, November 2015 (Invited Talk)
6. University of Zurich, von Mering Lab, October 2015 (Invited Talk)
7. HIBIT 2015, October 2015 (Poster)
8. ISMB/ECCB 2015, July 2015 (Poster)
9. METU, Biomedical Engineering Seminar Series, Ankara, Turkey, October 2014 (Invited Talk)
10. ITU, Istanbul Turkey, March 2013 (Invited Talk)
11. METU, Ankara Turkey, March 2013 (Invited Talk)
12. Bilkent University, Ankara Turkey, March 2013 (Invited Talk)
13. Yeditepe University, Istanbul Turkey, March 2012 (Invited Talk)
14. Turkish Chemical Engineering Society, Istanbul Turkey, November 2012 (Invited Talk)
15. Koc University College of Engineering Seminar Series, Istanbul Turkey, November 2012 (Invited Talk)
16. ICBP Retreat 2012, Danver, MA, USA (Talk)
17. RECOMB 2012, Barcelona, Spain (**Travel Award, sponsored by International Society for Computational Biology**) (Talk)
18. ICBP Mathematical Modeling Meeting 2012, Tampa, USA. (**Travel Support by NCI**) (Poster)
19. MIT-Biological Engineering Retreat 2011, Boston, USA (Poster)
20. Protein Society Symposium 2011, Boston, USA (Poster)
21. 3DSIG-ISMB/ECCB 2011, Vienna, Austria (Talk, **presented by Prof. Ruth Nussinov as the Keynote**)
22. Biophysical Society Meeting 2011, Baltimore, USA (Poster)
23. ISMB 2010, Boston, USA (Poster)
24. 3dSig-ISMB 2010, Boston, USA (Poster)
25. HIBIT'10, Antalya, Turkey (Poster)
26. Computer Science Student Workshop (CSW'10), Istanbul, Turkey (**Best Work in-progress Paper Award**) (Talk)
27. ISMB/ECCB 2009, Stockholm, Sweden (Poster)
28. 3dSig-ISMB/ECCB 2009, Stockholm, Sweden. (**Travel Award, sponsored by BioSapiens**) (Poster)
29. ECCB 2008, Cagliari, Italy. (**Travel Award, sponsored by EMBRACE**) (Poster)
30. ISMB/ECCB 2007, Vienna. (**Student Council Travel Award, sponsored by European Bioinformatics Institute (EBI) assigned only 5 people all over the Europe.**) (Poster)
31. ISMB/ECCB 2007, Vienna (Poster)

**32.** 51st Biophysical Society Annual Meeting in Baltimore, Maryland, USA, March 3-7, 2007 (Poster)

## **Research interests**

### **Systems biology of different types of human cancers.**

- Combination of proteome, interactome and transcriptional data to infer sub-components of signaling and regulatory networks.
- Analysis of next-generation sequencing data and integrating them in a network context
- Revealing how the networks of interactions among proteins and genome are altered in cells during disease.
- Simultaneous re-construction of multiple pathways via prize-collecting Steiner forest.
- Identification of common pathways across various xenograft models of human Glioblastoma by integrating proteomic and interactome data.

### **Structural analysis and characterization of protein interactions using computational methods.**

- Construction of the non-redundant dataset of protein interfaces
- Architectures and functional coverage of protein interfaces
- Prediction of hot spots in protein interfaces
- Prediction of protein-protein interactions using structural matching and flexible refinement
- Incorporation of time dimensionality into protein interaction networks
- Binding site cooperativity in multi-partner proteins

## **Released Softwares, Webservers and Databases Contributed**

Omics Integrator (Software, <http://fraenkel-nsf.csbi.mit.edu/omicsintegrator/>)

STEINERNET (Webserver, <http://fraenkel.mit.edu/steinernet/>).

PRISM (Software and Webserver, <http://prism.cccb.ku.edu.tr/prism>).

HOTPOINT (Webserver, <http://prism.cccb.ku.edu.tr/hotpoint>).

PRINT (Database, <http://prism.cccb.ku.edu.tr/print>).

HOTSPRINT (Database, <http://prism.cccb.ku.edu.tr/hotsprint>).

## **Technical Skills**

Operating Systems: Windows, Unix/Linux

Programming Languages: Fortran, Python, Matlab

Other Tools: Advanced knowledge in high-throughput sequencing analysis tools (Galaxy, Tophat, Cufflinks, Cuffdiff, MACS, MapSplice etc.), protein structure analysis and visualization (Multiprot, Surfnet, Consurf, Pymol, VMD, Rasmol, ClustalW, FoldX, FiberDock), network visualization (Cytoscape)

## Referee in International Peer-reviewed Journals

PLOS Computational Biology  
Oxford Bioinformatics  
PLOS One  
Proteins: Structure, Function & Bioinformatics  
Transactions on Computational Biology and Bioinformatics  
BMC Structural Biology  
BMC Bioinformatics  
OMICS  
Nucleic Acids Research  
Oxford Briefings in Bioinformatics  
Trends in Biotechnology (Cell Publishing Group)  
Molecular Biosystems  
Computers in Biology and Medicine

## References

1. Prof. Ernest Fraenkel, Department of Biological Engineering, Massachusetts Institute of Technology, Cambridge, MA USA, Tel: +1 617 258 8702 E-mail: [fraenkel@mit.edu](mailto:fraenkel@mit.edu)
2. Prof. Ruth Nussinov, Center for Cancer Research, National Cancer Institute Frederick, MD USA, Tel: +1 301 846 5579 E-mail: [nussinov@helix.nih.gov](mailto:nussinov@helix.nih.gov)
3. Prof. Ozlem Keskin, Department of Chemical and Biological Engineering, Koc University, Istanbul Turkey, Tel:+90 212 338 1538, E-mail: [okeskin@ku.edu.tr](mailto:okeskin@ku.edu.tr)
4. Prof. Attila Gursoy, Department of Computer Engineering, Koc University, Istanbul Turkey, Tel:+90 212 338 1720, E-mail: [agursoy@ku.edu.tr](mailto:agursoy@ku.edu.tr)
5. Prof. Riccardo Zecchina, Department of Applied Science and Technology, Politecnico di Torino, Torino, Italy, Tel: +39 011 0907323 E-mail: [riccardo.zecchina@polito.it](mailto:riccardo.zecchina@polito.it)