

Sara H. Rouhanifard, Ph.D.

Research Interests

I am interested in understanding the mechanisms and biological consequences of RNA processing on single cells in development and disease. Throughout my scientific training, I have gained extensive experience developing tools for imaging biological molecules using chemical biology, microscopy, and quantitative approaches. I will utilize these tools to understand RNA processing and transport, and towards the development of clinical diagnostics.

Research Experience

Postdoctoral Researcher, University of Pennsylvania

Philadelphia, PA

Principal Investigator: Arjun Raj, Ph.D, *Associate Professor of Bioengineering*

2015-Current

- Utilized high-powered fluorescence microscopy to visualize RNA editing on mammalian cells to study subcellular localization and single cell heterogeneity. This work resulted in a manuscript in *Nature Methods* for which I am the corresponding author as well as follow up collaborations at other institutions.
- Developed non-enzymatic amplification tools for imaging and sorting on RNA differences in single cells. This project has resulted in a provisional patent as well as a primary author manuscript that is in review at *Nature Methods*, and a preprint is available on BioRxiv. This work has also been presented at 3 national conferences.

Graduate Researcher, Albert Einstein College of Medicine

Bronx, NY

Principal Investigator: Peng Wu, Ph.D, *Associate Professor of Biochemistry*

2010- 2015

- Developed a magnetic, glyco-nanoparticle for enriching human dendritic cells from peripheral blood. This work was presented at the ACS national conference in 2012 and also resulted in a publication in *Biomacromolecules*.
- Developed histological methods to visualize complex polysaccharides on diseased human samples. Applied this method towards the early detection of lung adenocarcinomas. This work resulted in a primary-authored manuscript in *ChemBioChem* as well as a patent.
- Discovered that the glycocalyx of intestinal Paneth cells contributes to the stem cell niche by regulating stem cell proliferation via N-acetyllactosamine on the cell surface. This work resulted in a manuscript that is currently *In Press* at *Cell Chemical Biology*.

Education

Doctor of Philosophy in Biomedical Sciences, Department of Biochemistry

Bronx, NY

Albert Einstein College of Medicine, Yeshiva University

2014

Thesis title: *Exploiting nature's glycan transfer enzymes to investigate glycan function*

Thesis advisor: Peng Wu, Ph.D.

Master of Science in Biomedical Sciences

Bronx, NY

Albert Einstein College of Medicine, Yeshiva University

2012

Bachelor of Science in Biochemistry and Molecular Biology

Amherst, MA

University of Massachusetts, Amherst

2007

Grants

Ruth S. Kirschstein F32 National Research Service Award

2017-current

Funding institution: National Institute of General Medical Sciences

Publications

Submitted:

Rouhanifard SH, Dunagin M, Cote A, Bayetpour S, Mellis I, Raj A. Non-enzymatic fluorescent amplification of individual RNAs in single cells using ClampFISH probes. *In revision at Nature Methods*.
Preprint link: <https://www.biorxiv.org/content/early/2017/11/21/222794>

Rouhanifard SH*, Lopez-Aguilar A*, Meng L, Moreman KW, Wu P. Engineered glycocalyx regulates stem cell proliferation in murine crypt organoids. In Press. *Cell Chemical Biology* (2018)
<https://doi.org/10.1016/j.chembiol.2018.01.010>
*equal contribution

Mellis IA, Gupte R, Raj A, **Rouhanifard SH***. Visualizing adenosine to inosine RNA editing in single mammalian cells. *Nat Methods*. 2017 Jun 12. doi: 10.1038/nmeth.4332.
*Corresponding author

Casson CN, Doerner JL, Copenhaver AM, Ramirez J, Holmgren AM, Boyer MA, Siddarthan IJ, **Rouhanifard SH**, Raj A, Shin S. Neutrophils and Ly6Chi monocytes collaborate in generating an optimal cytokine response that protects against pulmonary *Legionella pneumophila* infection. *PLoS Pathog*. 2017 Apr 6;13(4):e1006309.

Rouhanifard SH, Lopez-Aguilar A, Wu P. CHoMP: A Chemoenzymatic Histology Method Using 'Clickable' Probes. *ChemBioChem*. 2014 Dec 15;15(18):2667-73.

Rouhanifard SH, Nordstrøm LU, Zheng T, Wu P. Chemical probing of glycans in cells and organisms. *Chem Soc Rev*. 2013 May 21;42(10):4284-96. Review.

Rouhanifard SH, Xie R, Zhang G, Sun X, Chen X, Wu P. Detection and isolation of dendritic cells using Lewis X-functionalized magnetic nanoparticles. *Biomacromolecules*. 2012 Oct 8;13(10):3039-45.

Zheng, T; **Rouhanifard SH**; Jalloh AS; Wu P. Click Triazoles for Bioconjugation. *Top. Heterocycl. Chem*. 2012, 28,163.

Bachu R, Padlan FC, **Rouhanifard S**, Brenowitz M, Schlatterer JC. Monitoring equilibrium changes in RNA structure by 'peroxidative' and 'oxidative' hydroxyl radical footprinting. *J Vis Exp*. 2011 Oct 17;(56):e3244.

Huse JT, Brennan C, Hambardzumyan D, Wee B, Pena J, **Rouhanifard SH**, Sohn-Lee C, le Sage C, Agami R, Tuschl T, Holland EC. The PTEN-regulating microRNA miR-26a is amplified in high-grade glioma and facilitates gliomagenesis in vivo. *Genes Dev*. 2009 Jun; 23(11):1327-37.

Pena JT, Sohn-Lee C, **Rouhanifard SH**, Ludwig J, Hafner M, Mihailovic A, Lim C, Holoch D, Berninger P, Zavolan M, Tuschl T. miRNA in situ hybridization in formaldehyde and EDC-fixed tissues. *Nat Methods*. 2009 Feb; 6(2):139-41.

Thum T, Gross C, Fiedler J, Fischer T, Kissler S, Bussen M, Galuppo P, Just S, Rottbauer W, Frantz S, Castoldi M, Soutschek J, Koteliansky V, Rosenwald A, Basson MA, Licht JD, Pena JT, **Rouhanifard SH**, Muckenthaler MU, Tuschl T, Martin GR, Bauersachs J, Engelhardt S. MicroRNA-21 contributes to myocardial disease by stimulating MAP kinase signalling in fibroblasts. *Nature*. 2008 Dec 18; 456(7224):980-4.

Vallender EJ, Priddy CM, **Hakim S**, Yang H, Chen G-L, Miller GM. Functional variation in the 3' UTR of the serotonin transporter in human and rhesus macaque. *Genes, Brain and Behavior*. 2008 Aug; 7(6):690-7.

Chen GL, Novak MA, **Hakim S**, Xie Z, Miller GM. Tryptophan hydroxylase-2 gene polymorphisms in rhesus monkeys: association with hypothalamic pituitary-adrenal axis function and in vitro gene expression. *Molecular Psychiatry*, 2006 Jul; 11(10):914-28.

Patents & Patent Applications

Methods for Single-Molecule Fluorescence Amplification of RNA (2017)

A Raj, **S Rouhanifard**

US Provisional Patent App, 62/513,774

Methods of grading carcinomas (2015)

P Wu, **S Rouhanifard**, T Zheng

US Patent App, 15/117,472

Methods to fix and detect nucleic acids (2013)

T Tuschl, J Pena, C Sohn, **S Hakim**, J Ludwig, P Cekan

US Patent 8,394,588

Recent Conference Presentations

Speaker:

1. 4D Nucleome conference, 2017
2. Nucleosides, Nucleotides and Oligonucleotides, Gordon Research Seminar, 2017.
3. Nucleic Acids, Gordon Research Seminar, 2017.
4. QBio conference, 2017

Poster Presenter:

1. RNA Institute Symposium, 2017
2. RNA Institute Symposium, 2016.
3. NIH Single Cell Meeting, 2016

Academic Service

Ph.D. applicant screening committee (UPenn bioengineering)	2016
Orientation Co-chair, Graduate Admissions Office, AECOM	2011 – 2013
Recruitment Co-chair, Graduate Admissions Office, AECOM	2010 – 2013
Co-Chair of Declaration Celebration and Qualification Jubilation planning committee, AECOM	2010 – 2013

Teaching and Mentoring Experience

Guest Lecturer, Drug Delivery course at Rutgers University.	Spring 2017
Mentor for undergraduate researcher	Fall 2016-Spring 2017
Mentor for graduate researchers and rotation students	Spring 2015-Current
Mentor for undergraduate researcher	Summer 2013
Teaching certificate from Fundamentals of Course Design offered at AECOM.	Spring 2013
Teaching Assistant for Graduate Biochemistry Course	Fall 2013