





Mary Frances Nunez Teruel

Asst Professor, Chemical and Systems Biology

 NIH Biosketch available Online

 Curriculum Vitae available Online

CONTACT INFORMATION

- **Alternate Contact**

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Bio

BIO

Mary Teruel is an Assistant Professor of Chemical and Systems Biology and, by Courtesy, of Bioengineering at Stanford University. She received a B.S. degree in Mechanical Engineering from the University of Pennsylvania and an M.S. and Ph.D. in Aeronautical Engineering from Stanford. She has been working at the interface of engineering, medicine, and biology for over 15 years - designing, building, and implementing new quantitative microscopy, proteomic, and computational tools to understand fundamental principles in cell differentiation and tissue regeneration, especially in the context of obesity, diabetes, cardiovascular disease, and cancer. Her current research focuses on understanding how timed application and synergy of hormones, particular in the context of circadian rhythms, can be harnessed to dynamically control tissue regeneration and to restore healthy tissue function in vivo. The Teruel Lab uses mesenchymal stem cell differentiation into the fat lineage (stem cell differentiation, adipogenesis) as model systems.

ACADEMIC APPOINTMENTS

- Assistant Professor, Chemical and Systems Biology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Stanford Cancer Institute

PROFESSIONAL EDUCATION

- Ph.D., Stanford University , Aeronautical Engineering
- M.S., Stanford University , Aeronautical Engineering
- B.S., University of Pennsylvania , Mechanical Engineering

LINKS

- Teruel Lab Website: <https://teruel.stanford.edu/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The Teruel Lab uses a combination of engineering and biological approaches including high-throughput screening of RNAi and DNA construct libraries, CRISPR libraries, targeted mass spectrometry, live-cell fluorescence microscopy, and bioinformatics to investigate the systems biology of cell differentiation and tissue regeneration, with a particular focus on uncovering the molecular mechanisms underlying insulin resistance, diabetes, and obesity.

Teaching

COURSES

2019-20

- Research Seminar: CSB 270 (Aut, Win, Spr)

2018-19

- Research Seminar: CSB 270 (Aut, Win, Spr)

2017-18

- Chemical and Systems Biology Bootcamp: CSB 201 (Aut)
- Imaging: Biological Light Microscopy: BIO 152, CSB 222, MCP 222 (Spr)
- Research Seminar: CSB 270 (Aut, Win, Spr)

2016-17

- Chemical and Systems Biology Bootcamp: CSB 201 (Aut)
- Imaging: Biological Light Microscopy: BIO 152, CSB 222, MCP 222 (Spr)
- Research Seminar: CSB 270 (Aut, Win, Spr)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Zhibo Zhang

Doctoral Dissertation Advisor (AC)

Kyle Kovary

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biophysics (Phd Program)
- Cancer Biology (Phd Program)
- Chemical and Systems Biology (Phd Program)

Publications

PUBLICATIONS

- **Molecular competition in G1 controls when cells simultaneously commit to terminally differentiate and exit the cell-cycle** *Cell Reports (in press)*
Zhao, M. L., Rabiee, A., Kovary, K. M., Bahrami-Nejad, Z., Taylor, B., Teruel, M. N.
2020
- **The highly expressed lipid buffer FABP4 enforces adipocyte cell identity by driving the initial cell differentiation process** *bioRxiv*
Bahrami-Nejad, Z., Chen, T., Tholen, S., Zhang, Z., Zhao, M. L., Rabiee, A., Kraemer, F. B., Teruel, M. N.
2020

- **Flattened circadian glucocorticoid oscillations cause obesity due to increased lipid turnover and lipid uptake** *bioRxiv*
Tholen, S., Kovary, K. M., Rabiee, A., Bielczyk-Maczynska, E., Yang, W., Teruel, M. N.
2020
- **A Transcriptional Circuit Filters Oscillating Circadian Hormonal Inputs to Regulate Fat Cell Differentiation.** *Cell metabolism*
Bahrami-Nejad, Z., Zhao, M. L., Tholen, S., Hunerdosse, D., Tkach, K. E., van Schie, S., Chung, M., Teruel, M. N.
2018; 27 (4): 854–68.e8
- **Expression variation and covariation impair analog and enable binary signaling control.** *Molecular systems biology*
Kovary, K. M., Taylor, B., Zhao, M. L., Teruel, M. N.
2018; 14 (5): e7997
- **Heterogeneous Ribosomes Preferentially Translate Distinct Subpools of mRNAs Genome-wide.** *Molecular cell*
Shi, Z., Fujii, K., Kovary, K. M., Genuth, N. R., Röst, H. L., Teruel, M. N., Barna, M.
2017
- **Using SRM-MS to quantify nuclear protein abundance differences between adipose tissue depots of insulin-resistant mice** *JOURNAL OF LIPID RESEARCH*
Ota, A., Kovary, K. M., Wu, O. H., Ahrends, R., Shen, W., Costa, M. J., Feldman, B. J., Kraemer, F. B., Teruel, M. N.
2015; 56 (5): 1068-1078
- **Controlling low rates of cell differentiation through noise and ultrahigh feedback.** *Science*
Ahrends, R., Ota, A., Kovary, K. M., Kudo, T., Park, B. O., Teruel, M. N.
2014; 344 (6190): 1384-1389
- **Consecutive Positive Feedback Loops Create a Bistable Switch that Controls Preadipocyte-to-Adipocyte Conversion** *CELL REPORTS*
Park, B. O., Ahrends, R., Teruel, M. N.
2012; 2 (4): 976-990
- **Parallel adaptive feedback enhances reliability of the Ca²⁺ signaling system** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Abell, E., Ahrends, R., Bandara, S., Park, B. O., Teruel, M. N.
2011; 108 (35): 14485-14490
- **Matrix stiffness induces a tumorigenic phenotype in mammary epithelium through changes in chromatin accessibility.** *Nature biomedical engineering*
Stowers, R. S., Shcherbina, A., Israeli, J., Gruber, J. J., Chang, J., Nam, S., Rabiee, A., Teruel, M. N., Snyder, M. P., Kundaje, A., Chaudhuri, O.
2019
- **A dynamic picture of protein behavior in cells.** *Nature biotechnology*
Teruel, M. N., Gu, B., Zhao, M. L.
2015; 33 (4): 356-357
- **Measuring Gli2 Phosphorylation by Selected Reaction Monitoring Mass Spectrometry.** *Methods in molecular biology (Clifton, N.J.)*
Ahrends, R., Niewiadomski, P., Teruel, M. N., Rohatgi, R.
2015; 1322: 105-123
- **Gli protein activity is controlled by multisite phosphorylation in vertebrate hedgehog signaling.** *Cell reports*
Niewiadomski, P., Kong, J. H., Ahrends, R., Ma, Y., Humke, E. W., Khan, S., Teruel, M. N., Novitch, B. G., Rohatgi, R.
2014; 6 (1): 168-181
- **The proteome of cholesteryl-ester-enriched versus triacylglycerol-enriched lipid droplets.** *PloS one*
Khor, V. K., Ahrends, R., Lin, Y., Shen, W., Adams, C. M., Roseman, A. N., Cortez, Y., Teruel, M. N., Azhar, S., Kraemer, F. B.
2014; 9 (8)
- **The E3 ubiquitin ligase UBE3C enhances proteasome processivity by ubiquitinating partially proteolyzed substrates.** *journal of biological chemistry*
Chu, B. W., Kovary, K. M., Guillaume, J., Chen, L., Teruel, M. N., Wandless, T. J.
2013; 288 (48): 34575-34587
- **Neuropilins are positive regulators of Hedgehog signal transduction** *GENES & DEVELOPMENT*
Hillman, R. T., Feng, B. Y., Ni, J., Woo, W., Milenkovic, L., Gephart, M. G., Teruel, M. N., Oro, A. E., Chen, J. K., Scott, M. P.

2011; 25 (22): 2333-2346

- **Comprehensive identification of PIP3-regulated PH domains from *C elegans* to *H sapiens* by model prediction and live imaging** *MOLECULAR CELL*
Park, W. S., Do Heo, W., Whalen, J. H., O'Rourke, N. A., Bryan, H. M., Meyer, T., Teruel, M. N.
2008; 30 (3): 381-392
- **Rab10, a target of the AS160 rab GAP, is required for insulin-stimulated translocation of GLUT4 to the adipocyte plasma membrane** *CELL METABOLISM*
Sano, H., Eguez, L., Teruel, M. N., Fukuda, M., Chuang, T. D., Chavez, J. A., Lienhard, G. E., McGrau, T. E.
2007; 5 (4): 293-303
- **siRNA screen of the human signaling proteome identifies the PtdIns(3,4,5) P-3-mTOR signaling pathway as a primary regulator of transferrin uptake** *GENOME BIOLOGY*
Galvez, T., Teruel, M. N., Do Heo, W., Jones, J. T., Kim, M. L., Liou, J., Myers, J. W., Meyer, T.
2007; 8 (7)
- **Single cell imaging of PI3K activity and glucose transporter insertion into the plasma membrane by dual color evanescent wave microscopy.** *Science's STKE : signal transduction knowledge environment*
Tengholm, A., Teruel, M. N., Meyer, T.
2003; 2003 (169): PL4-?
- **Fluorescence imaging of signaling networks** *TRENDS IN CELL BIOLOGY*
Meyer, T., Teruel, M. N.
2003; 13 (2): 101-106
- **Parallel single-cell monitoring of receptor-triggered membrane translocation of a calcium-sensing protein module** *SCIENCE*
Teruel, M. N., Meyer, T.
2002; 295 (5561): 1910-1912
- **Control of astrocyte Ca²⁺ oscillations and waves by oscillating translocation and activation of protein kinase C** *CURRENT BIOLOGY*
Codazzi, F., Teruel, M. N., Meyer, T.
2001; 11 (14): 1089-1097
- **Localized biphasic changes in phosphatidylinositol-4,5-bisphosphate at sites of phagocytosis** *JOURNAL OF CELL BIOLOGY*
Botelho, R. J., Teruel, M., Dierckman, R., Anderson, R., Wells, A., York, J. D., Meyer, T., Grinstein, S.
2000; 151 (7): 1353-1367
- **Spatial sensing in fibroblasts mediated by 3' phosphoinositides** *JOURNAL OF CELL BIOLOGY*
Haugh, J. M., Codazzi, F., Teruel, M., Meyer, T.
2000; 151 (6): 1269-1279
- **Translocation and reversible localization of signaling proteins: A dynamic future for signal transduction** *CELL*
Teruel, M. N., Meyer, T.
2000; 103 (2): 181-184
- **Molecular memory by reversible translocation of calcium/calmodulin-dependent protein kinase II** *NATURE NEUROSCIENCE*
Shen, K., Teruel, M. N., Connor, J. H., Shenolikar, S., Meyer, T.
2000; 3 (9): 881-886
- **Differential codes for free Ca²⁺-calmodulin signals in nucleus and cytosol** *CURRENT BIOLOGY*
Teruel, M. N., Chen, W., PERSECHINI, A., Meyer, T.
2000; 10 (2): 86-94
- **A versatile microporation technique for the transfection of cultured CNS neurons** *JOURNAL OF NEUROSCIENCE METHODS*
Teruel, M. N., Blanpied, T. A., Shen, K., Augustine, G. J., Meyer, T.
1999; 93 (1): 37-48
- **CaMKII beta functions as an F-actin targeting module that localizes CaMKII alpha/beta heterooligomers to dendritic spines** *NEURON*
Shen, K., Teruel, M. N., Subramanian, K., Meyer, T.
1998; 21 (3): 593-606

- **Green fluorescent protein (GFP)-tagged cysteine-rich domains from protein kinase C as fluorescent indicators for diacylglycerol signaling in living cells** *JOURNAL OF CELL BIOLOGY*
Oancea, E., Teruel, M. N., Quest, A. F., Meyer, T.
1998; 140 (3): 485-498
- **Electroporation-induced formation of individual calcium entry sites in the cell body and processes of adherent cells** *BIOPHYSICAL JOURNAL*
Teruel, M. N., Meyer, T.
1997; 73 (4): 1785-1796