

Sing-Wan, Wong Ph.D Curriculum Vitae

A. Education

- Post-Doc. Nov 2016 – Oct 2021 Pharmacology and Regenerative Medicine, University of Illinois at Chicago, College of Medicine (Advisor: Prof. Jae-Won Shin)
- Ph.D Aug 2012 – Jul 2016 Biomedical Engineering, The Chinese University of Hong Kong (Advisor: Prof. Arthur Mak)
- B.Sc Aug 2007 – Jul 2010 Biology, The Chinese University of Hong Kong

B. Research synopsis

I aim to establish myself at the interface of biology and engineering to study mechanobiology and develop novel cell-based therapeutic strategies for various disease models. My research focus has been the effect of oxidative stress on tissue mechanics and biomaterial design to study the impact of matrix mechanics on directing the functions of stem cells, including paracrine signaling and differentiation potential. As an independent investigator, I plan to set up a bioengineering laboratory to develop cell-based therapy for fibrosis and tissue regeneration, with the emphasis on how matrix mechanics influence the production of matrix remodeling enzymes, reprogramming factors and oxidative stress regulatory enzymes from stem cells and how these insights can be utilized as a regenerative medicine. I believe that thorough mechanistic investigations enabled by novel engineering approaches are keys to facilitate the translation of scientific insights into clinical applications.

C. Highlight of major achievements

As of February 2022, I have published 7 original research papers and 2 review articles in high impact journals including *Nature Biomedical Engineering*, *Science Advances* and *Advanced Science* as a first author. I am an *awardee of NIH K99/R00* pathway to independence program of National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS). The award provides about 1,000,000 USD research funding for my post-doctoral training and the initial support for my own laboratory as an independent investigator in fiscal years 2021 to 2026. I am also being invited as *a reviewer* of international journals including *Scientific Reports* and *PLoS One*. And I am *a co-inventor of a U.S. patent* on the application of indolinone molecule and derivatives for inhibiting liver fibrosis and hepatitis.

D. Positions and Honors

Positions and Employment

- Oct 2021 – Present Research Assistant Professor, University of Illinois at Chicago
- Nov 2016 – Oct 2021 Postdoctoral Associate, University of Illinois at Chicago
- Oct 2010 – Aug 2012 Research assistant, The Chinese University of Hong Kong
- Jun 2009 – Sept 2009 Teaching assistant, Department of Biology, The Chinese University of Hong Kong

Honors and Awards

- 2021 – 2026 NIH K99/R00 Pathway to Independence Award, NIAMS
- 2017 – 2019 Bristow Poster Award, Department of Pharmacology, University of Illinois at Chicago
- 2015 – 2016 Tutor commendation, The Department of Electronic Engineering, CUHK
- 2014 – 2015 Winner of Student Research Award, Hong Kong Medical and Healthcare Device Industries Association
- 2014 – 2015 Tutor commendation, The Department of Electronic Engineering, CUHK
- 2012 – 2013 Tutor commendation, The Department of Electronic Engineering, CUHK

Reviewer: *Scientific Reports, PLoS One (2021)*

E. Publications

(Total published/accepted articles:16; Total Citations:233) Last updated: 2022-03-17

Research papers:

1. Singh A., Chakraborty S., **Wong SW.**, Hefner N., Stuart A., Qadir AS., Mukhopadhyay A., Bachmaier K., Shin JW., Rehman J., Malik A. Nanoparticle Targeting of *de novo* Pro-fibrotic Macrophages Mitigates Lung Fibrosis (2022). **PNAS** (In Press)
2. Lenzini S., Debnath K., Joshi J., **Wong SW.**, Srivastava K., Geng X., Cho IS, Song A., Bargi R., Lee J., Mo G., Mehta D., Shin JW. (2021). Cell-matrix interactions regulate functional extracellular vesicle secretion from mesenchymal stromal cells. **ACS Nano.** 2021, 15, 17439-17452
3. **Wong SW.** Tamatam C., Cho IS., Toth P.T., Belvich P., Bargi R., Lee JC., Rehman J., Reddy S.P., Shin JW. (2021). Inhibition of aberrant tissue remodeling by mesenchymal stromal cells singly coated with soft gels presenting defined chemomechanical cues. **Nat. Biomed. Eng.** 6, 54-66 (2022).
4. **Wong SW.**, Lenzini S., Bargi R., Feng Z., Macaraniag C., Lee JC., Peng Z., Shin JW. (2020) Controlled deposition of three-dimensional matrices to direct single cell functions. **Adv. Sci.** 2020, 7, 2001006. (*UIC Today, 3rd September 2020*)
5. Devine D.*, Vijayakumar V.*, **Wong SW.***, Lenzini S., Shin JW. Hydrogel micropost arrays with single post tunability to study cell volume and mechanotransduction. (2020) **Adv. Bio.** 2020, 4, 2000012 (*:co-first author)
6. **Wong SW.**, Lenzini, S., Cooper MH., Mooney DJ., Shin JW. (2020). Soft extracellular enhances inflammatory activation of mesenchymal stromal cells to induce monocyte production and trafficking. **Sci Adv.** 6(15): eaaw0158. (**Top Story of Extracellular Matrix News Volume 9th April, 2020*)
7. Mao AS., Özkale B., Shah NJ., Vining KH., Descombes T., Zhang L., Tringides CM., **Wong SW.**, Shin JW., Scadden DT., Weitz DA., Mooney DJ. (2019). Programmable microencapsulation for enhanced mesenchymal stem cell persistence and immunomodulation. **Proc Natl Acad Sci USA** 116(31): 15392-15397.
8. **Wong SW.**, Cheung BCH., Pang BTK., Kwong A., Chung A., Lee K.KH., Mak A.FT. (2017). Intermittent vibration protects aged muscle from mechanical and oxidative damage under prolonged compression. **J Biomech.** 55: 113-120.
9. **Wong SW.**, Yao Y., Hong Y., Ma Z., Kok SHL., Sun S., Cho M., Lee KKH., Mak AFT. (2017). Preventative Effects of poloxamer 188 on Muscle Cell Damage Mechanics Under Oxidative Stress. **Ann Biomed Eng.** 45(4): 1083-1092.
10. Hong Y., Yao Y., **Wong SW.**, Bian L., Mak AFT. (2016) Change in viability of C2C12 Myoblasts under Compression, Shear and Oxidative Challenges. **J Biomech.** 49(8): 1305-1310.
11. **Wong SW.**, Sun S., Cho M., Lee KKH., Mak AFT. (2015) H₂O₂ exposure affects myotube stiffness and actin polymerization. **Ann Biomed Eng.** May;43(5): 1178-88.
12. Yao Y., Xiao Z., **Wong SW.**, Hsu YC., Cheng T., Bian L., Mak AFT. (2014). The Effects of Oxidative Stress on the Compressive Damage Threshold of C2C12 Muscle Cells - Implication on Deep Tissue Injury. **Ann Biomed Eng.** Feb;43(2): 287-296

13. Sun S., **Wong SW.**, Mak AFT., Cho M. (2014) Impact of oxidative stress on cellular biomechanics and Rho signaling in C2C12 myoblasts. *J Biomech.* 47(15): pp3650-3656.
14. Tang MK., Liang YJ., Chan YJH., **Wong SW.**, Chen E., Yao Y., Gan J., Xiao L., Leung HC., Kung HF., Wang H., Lee KKH. (2013) Promyelocytic Leukemia (PML) Protein Plays Important Roles in Regulating Cell Adhesion, Morphology, Proliferation and Migration. *PLoS ONE* 8(3): e59477.

Review articles:

15. **Wong SW.**, Lenzini S., Giovanni R., Knowles K., Shin JW. (2021) Matrix biophysical cues direct mesenchymal stromal cell functions in immunity. *Acta Biomater* 133: 126-138.
16. **Wong SW.**, Lenzini S, Shin JW. (2018). Perspective: Biophysical regulation of cancerous and normal blood cell lineages in hematopoietic malignancies. *APL Bioengineering* 2, 031802.

F. Funding/Grants

NIH-NIAMS K99AR079561 (07/01/2021 – 06/30/2026) Role: P.I. \$1.02M Total
Engineering mesenchymal stromal cells to treat muscle fibrosis

G. Patents

1. Lee KKH, Kok SH, Kok TW, **Wong SW.**, Chan JYH. Method of using an indolinone molecule and derivatives for inhibiting liver fibrosis and hepatitis. US Patent 10,450, 295. (2019)

H. Conference Presentations

1. **Wong SW.**, Gupta P, Cho IS, Shin JW. Mechanotransduction of matrix remodeling-directed lineage specification. American Physical Society Meeting 2022 (*Invited Focus Session Podium Presentation*).
2. **Wong SW.**, Tamatam C, Cho IS, Toth PT, Bargi R, Belvich P, Lee JC, Rehman J, Reddy SP, Shin JW. Engineered mesenchymal stromal cells to treat pulmonary fibrosis by matrix remodeling. *Stem Cells, Cell Therapies and Bioengineering in Lung Biology and Diseases 2021. (Poster)*
3. **Wong SW.**, Tamatam C, Cho IS, Toth PT, Bargi R, Belvich P, Lee JC, Rehman J, Reddy SP, Shin JW. Engineered gel coating enables mesenchymal stromal cells to resolve pulmonary fibrosis. SFB meeting 2021. (*Rapid fire oral presentation*)
4. **Wong SW.**, Shin JW. Engineering chemomechanical cues around single cells to augment therapeutic efficacy by microfluidic gel coating. *Microfluidics for hematology 2020. (Oral presentation, postponed due to COVID-19)*
5. **Wong SW.**, Tamatam C., Reddy S.P., Shin JW. Defining chemomechanical cues that enable mesenchymal stromal cells to ameliorate pulmonary fibrosis by matrix remodeling. *Stem Cells, Cell Therapies and Bioengineering in Lung Biology and Diseases 2019. (Poster)*

6. **Wong SW**, Shin JW. Soft matrix facilitates the activation of mesenchymal stromal cells into anti-fibrotic phenotypes by tumor necrosis factor-alpha. *ASCB annual meeting 2017. (Poster)*
7. **Wong SW**, Elujoba A., Shin JW. Soft matrix enhances autocrine production of transforming growth factor-beta 1 to facilitate tumor necrosis factors-alpha activation of mesenchymal stromal cells. *ASCB annual meeting 2017. (Poster)*
8. **Wong SW**, Yao Y., Hong JY., Pang BPT, Cheung BCH, Mak AFT. Damage of muscle cells under mechanical and oxidative stresses. *XXIV ICTAM, 2016. (Poster)*
9. **Wong SW**, Sun S., Cho M., Mak AFT. Poloxamer 188 helps myotubes to regain stiffness after H₂O₂ insult. *1st International workshop of multiscale mechanobiology. (Poster)*
10. **Wong SW**, Lee K., Mak AFT. Oxidative Stress compromised the cytoskeleton structure of muscle cells *in vitro*. *BMES Annual Meeting 2013. (Poster)*

I. Leadership roles and activities, outreach and services

Mentoring experience as a postdoc

- Regina Giovanni (Master student, UI Rockford), 2020-2021
- Katherine Knowles (MD/PhD rotation student, UIC), Summer 2020
- Raymond Bargi (Research technician, UIC), 2018-2019
- Celine Macaraniag (Undergraduate student, UIC), 2018-2019
- Yoonje Cho (High School Student), Summer 2018

Mentoring experience as a senior PhD student

- Brian Cheung (Undergraduate student, CUHK), 2015-2016
- Tak-Keung Pang (Undergraduate student, CUHK), 2015-2016
- Ateline Kwong (Undergraduate student, CUHK), 2015-2016
- Toby Lau (Undergraduate student, CUHK), 2015-2016
- Kin-Lun Wan (Undergraduate student, CUHK), 2015-2016
- Wei-Kin Wong (Undergraduate student, CUHK), 2015-2016
- Rui Zhan (Master student, CUHK), 2014-2015
- Iris Sze-Man Cheung (Undergraduate student, CUHK), 2014-2015
- Carlos Tsoi (Research technician, CUHK), 2013-2014
- Cheung-Shuen Wong (Research technician, CUHK), 2013-2014
- Mable Wong (High School student), 2013-2014
- Leong-Man Wong (Undergraduate student, CUHK), 2012-2013
- Christopher Ngai (High School student), 2012-2013