BIOGRAPHICAL SKETCH

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NAME: Chen, Yupeng

eRA COMMONS USER NAME (credential, e.g., agency login): yupengchen

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Fudan University	B.S.	05/2006	Chemistry
Brown University	M.S.	05/2009	Nanomaterials Engineering
Brown University	Ph.D.	05/2010	Nanomaterials and Drug Delivery for Cartilage Repair
Rhode Island Hospital and the Alpert Medical School of Brown University	Postdoctoral research associate	09/2012	Cartilage Biology and Translational Medicine

A. Personal Statement

I dedicate in translational research bringing advances in nanomaterials into clinical applications. As early as in my PhD study, I started to focus on engineering a family of self-assembled nanotubes into a variety of non-covalent architectures for biomedical applications. I am the first researcher to use these nanotubes for drug delivery and tissue regeneration in cartilage. Today, I have developed two major applications: 1) Tiny nanopiece to deliver small RNA or molecular imaging probes into the cells and matrix-rich tissues (such as cartilage and brain) in an effective and long-lasting manner. 2) Injectable nano-matrix consisting multiple functional compartments to integrate therapy and diagnosis for difficult-to-reach tissue regeneration. These studies have produced a series of papers, meeting proceedings, book chapters and several international and US patents. Moreover, I have successfully managed several research grants including NIH R01 and R03. Therefore, my long-term motivation, multidisciplinary background, research expertise and management experience will enable me to accomplish my research goals.

(Key personnel of this proposal were underlined in the list below.)

1. **Chen Y**, Bilgen B, Pareta RA, Fenniri H, Ciombor DM, Aaron R and Webster TJ. Self-assembled Rosette Nanotube/Hydrogel Composites for Cartilage Tissue Engineering, Tissue Engineering, 2010;16(6):1233-43. PMID: 20184414
2. **Chen Y**, Song S, Yan Z, Fenniri H, Webster TJ. “Self-assembled Rosette Nanotubes Encapsulate and Slowly Release Dexamethasone”, Int J Nanomedicine. 2011; 6:1035-44. PMCID: PMC3124389
3. A series of published US and international (PCT) patents from 2012 to 2015: i) Chen Q, Webster TJ and **Chen Y**. Nanotubes as Carriers of Nucleic Acids into Cells, 2012, PCT/US2012/020056; ii) Chen Q, **Chen Y**, Yu H, Ehrlich M. Nanocarriers and Their Processing For Diagnostics and Therapeutics, 2015, PCT/US2015/020801; iii) Chen Q, Yu H, **Chen Y**. Nanomaterials Compositions, Synthesis and Assembly, 2015, PCT/US15/61193.
4. **Chen Y***, Cossman J, Jayasuriya CT, Li X, Guan YJ, Fonseca V, Yang K, Charbonneau C, Yu H, Kanbe K, Ma PX, Darling E and Chen Q*. Deficient Mechanical Activation of Anabolic Transcripts and Post-Traumatic Cartilage Degeneration in Matrilin-1 Knockout Mice. PLOS One. 2016 Jun 7;11(6):e0156676. PMID: 27270603 (*Corresponding author)

B. Positions and Honors

Positions and Employment

2012-2014 *Instructor*, Department of Orthopaedics, Rhode Island Hospital and the Warren Alpert Medical School of Brown University, Providence, RI

2014- *Assistant Professor*, Department of Orthopaedics, Rhode Island Hospital and the Warren Alpert Medical School of Brown University, Providence, RI

Other Experience and Professional Memberships

2008- *Member*, Biomedical Engineering Society (BMEs)

2009- *Member*, Society For Biomaterials (SFB)

2013- *Member*, Orthopaedic Research Society (ORS)

2010- *Editor*, International Journal of Case Reports and Images (IJCRI), ISSN: 0976-3198

2010- *Associate Editor*, Biosensors Journal, Ashdin Publishing, Electronic ISSN: 2090-4967, Print ISSN: 2090-4959

2011- *Editor*, Rheumatology, OMICS Publishing Group, ISSN: 2161-1149

2011.10 *Co-Chair*, Immunonobioengineering and Regenerative Medicine, Biomedical Engineering Society annual meeting

2014-2016 *Committee*, Annual Meeting Committee, Orthopaedic Research Society

2015.03 *Moderator*, Hip Disease, Kinematics, FAI, 2015 annual meeting of Orthopaedic Research Society

2015- *Committee*, Associate Member Forum, Orthopaedic Research Society

Honors

2010.04 *STAR Awards* (student travel achievement recognitions), Society For Biomaterials, annual meeting, Seattle.

2012.09 *Webster Jee Travel Award*, International Conference on Osteoporosis and Bone Research, Xi'an.

2013.01 *New Investigator Recognition Award*, 2013 Orthopaedic Research Society Annual Conference, San Antonio. (Note: Top one among 10 awardees selected from 40 finalists out of 545 young investigator applicants over the world.)

2017.06 *Faculty Early Career Development (CAREER) award*, National Science Foundation (NSF).

C. Contribution to Science

1. **Janus bases for intra-cartilage delivery for therapeutics and diagnostics:** As the first researcher to investigate the applications of rosette nanotubes (the earliest member in the Janus base family) for cartilage therapy and diagnosis, I keep focusing on designing, developing and evaluating biomedical uses of Janus bases. I found that these Janus bases presented unique properties significantly different from conventional nanomaterials (such as polymers or carbon nanotubes): 1) Small: they are the smallest compounds for delivery vehicles and the Nanopieces they formed also present the smallest cross section among all delivery vehicles; 2) Smart: their non-covalent architecture enables them pH-trigger dis-assembly to simultaneously release RNA cargoes inside cells; and 3) Safe: they present biomimetic formula with excellent biocompatibility. Based on these properties, I developed advanced delivery strategies for RNA, protein, molecular probes and small-molecule drugs for cartilage therapy and diagnosis.
    a. **Chen Y**, Bilgen B, Pareta RA, Fenniri H, Ciombor DM, Aaron R and Webster TJ. Self-assembled Rosette Nanotube/Hydrogel Composites for Cartilage Tissue Engineering, Tissue Engineering, 2010; 16(6):1233-43. PMID: 20184414
    b. **Chen Y**, Song S, Yan Z, Fenniri H, Webster TJ., Self-assembled Rosette Nanotubes Encapsulate and Slowly Release Dexamethasone", Int J Nanomedicine. 2011; 6:1035-44. PMCID: PMC3124389
    c. Song S, **Chen Y**, Yan Z, Fenniri H, Webster TJ.,Self-assembled rosette nanotubes for incorporating hydrophobic drugs in physiological environments, Int J Nanomedicine. 2011 Jan 10;6:101-7. PMID: 21289987
    d. A series of published US and international (PCT) patents from 2012 to 2015: i) Chen Q, Webster TJ and **Chen Y**. Nanotubes as Carriers of Nucleic Acids into Cells, 2012, PCT/US2012/020056; ii) Chen Q, **Chen Y**, Yu H, Ehrlich M. Nanocarriers and Their Processing For Diagnostics and Therapeutics, 2015, PCT/US2015/020801; iii) Chen Q, Yu H, **Chen Y**. Nanomaterials Compositions, Synthesis and Assembly, 2015, PCT/US15/61193.

2. **Key mediators in joint and cartilage functions:** In addition to the contributions to novel nanomaterials and delivery strategies, I am also interested in understanding biological mechanisms in joint diseases and then identifying potential biological targets to combine with the nanomaterials for treatment. In one of my early studies, I successfully identified shortest bioactive BMP peptides with only 11 amino acids for bone regeneration (down from 20 amino acids in previous works). Later on, I started to focus on cartialge degradation and regeneration in post-traumatic osteoarthritis progression. For the first time, I determined the role of mechanotransductive matrilin-1 in post-traumatic osteoarthritis progression. These works identified novel biological mechanisms and provided potential therapeutic targets for nanomedicine.
   a. **Chen Y** and Webster TJ, Increased Osteoblast Functions in the Presence of BMP-7 Short Peptides for Nanostructured Biomaterial Applications, Journal of Biomedical Materials Research: Part A, 2009 91(1):296-304. PMID: 18980196
   b. **Chen Y*** and Yang K. Intra-articular Drug Delivery Systems for Arthritis Treatment. Rheumatology: Current Research, 2012: 2: 2-3. doi: 10.4172/2161-1149.1000e106
   (*Corresponding author)
   c. **Chen Y***, Cossman J, Jayasuriya CT, Li X, Guan YJ, Fonseca V, Yang K, Charbonneau C, Yu H, Kanbe K, Ma PX, Darling E and Chen Q*. Deficient Mechanical Activation of Anabolic Transcripts and Post-Traumatic Cartilage Degeneration in Matrilin-1 Knockout Mice. PLOS One. 2016 Jun 7;11(6):e0156676. PMID: 27270603.
   (*Corresponding author)
   d. Jayasuriya CT, **Chen Y**, Liu W, Chen Q. The influence of tissue microenvironment on stem cell-based cartilage repair. Ann N Y Acad Sci. 2016 Jul 27. doi: 10.1111/nyas.13170. [Epub ahead of print] PMID: 27464254.

D. Research Support

Ongoing Research Support

R03 (1R03AR069383-01) YChen (PI) 09/01/2016-08/31/2019
NIH/NIAMS
Title: Growth Plate Cartilage Repair via Novel Matrilin3/Rosette Nanotube Hybrid Matrix
The goal of this project is to fabricate, characterize and evaluate the MATN3/RNT nano-matrix for growth plate fracture repair
Role: PI

R01 (1R01AR072027-01) YChen (PI) 09.01.2017-08.31.2022
NIH/NIAMS
Title: Developing Nanomaterial Platform for Intra-Cartilage Delivery of RNA Therapeutics against Joint Diseases
The goal of this research is to develop a nanomaterial platform to treat joint diseases and symptoms.
Role: PI

CAREER award (1653702) YChen (PI) 06.01.2017-05.31.2022
NSF
Title: CAREER: Assembly of Nanopieces for Controlled Penetration and Binding of Difficult-to-Reach Cartilage Matrix for siRNA Therapy against Osteoarthritis
The goal of this career development award is to develop research and education activities in understanding the material and engineering basis of the assembly of different nanopiece structures.
Role: PI

Completed Research Support

Major research project of COBRE (P20RR024484) QChen (PI) 09/01/2016-08/31/2017
NIH/NIGMS
Title: Selective Delivery of siRNA into Different Joint Tissues via Matrix-Penetrating Nanopieces to Inhibit Osteoarthritis Progression and Symptoms
The goal of this study is to deliver bioactive molecules for growth plate cartilage repair.
Role: Major research project PI

Medical Research Funds YChen (PI) 09/01/2015-08/31/2016
Rhode Island Foundation
Title: RNA Therapy for Post-Traumatic Osteoarthritis via Highly-Effective Nanopieces
The goal of this project is to study the potential of Nanopiece delivery for treatment of PTOA.
Role: PI

Major research project of COBRE (P20RR024484) QChen (PI) 09/01/2015-08/31/2016
NIH/NIGMS
Title: Delivery of microRNA 365 for Growth Plate Cartilage Repair
The goal of this study is to deliver bioactive molecules for growth plate cartilage repair.
Role: Major research project PI

Pilot project of COBRE (P20RR024484) QChen (PI) 09/01/2013-08/31/2015
NIH/NIGMS
Title: Delivery of microRNA 365 for Growth Plate Cartilage Repair
This study is to investigate whether microRNA 365 can be delivered to improve growth plate cartilage regeneration.
Role: Pilot project PI

Collaborative Research Grant Awards QChen, WLu, RTerek and YChen (co-PIs) 07/01/2014-06/31/2015
State of Rhode Island, Science and Technology Advisory Council (RI-STAC)
Title: Novel siRNA delivery technology via biomimetic nanomaterial for treatment of joint arthritis
The long term goal of this collaborative study is to develop a novel biomimetic nanomaterial termed Nanopieces for small inhibitory RNA (siRNA) delivery into cartilage as a clinical treatment of arthritis.
Role: Co-PI

DEANS Awards YChen/EDarling (multiple PIs) 07/01/2014-06/31/2015
Brown University
Title: Predicting post-traumatic osteoarthritis via in vivo biomarkers of inflammation
This project investigates whether inflammatory gene expression can be used to predict the severity of osteoarthritis in an animal model.
Role: PI