Chi Zhang

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I will become an assistant professor in the Center of Computational Biology and Bioinformatics, and Department of Medical and Molecular Genetics at Indiana University, School of Medicine in this August.

RESEARCH INTERESTS

- Mathematical and computational modelling of cancer initiation and progression, including energy metabolism reprogramming, interactions between cancer cells and microenvironment
- Intra-tumor heterogeneity and its relationship with cancer associated micro-environmental stress
- Prediction of gain or loss of function of certain mutations and interactive effect of multiple mutations
- Develop statistical deconvolution method to predict the alterations of immune and stroma cells in tissue based omics data.
- Develop novel computation methods to integrate multiple omics types to model the biological characteristics in progression of inflammatory diseases and cancer
- Statistical modelling of large biological network

EDUCATION

Ph.D. Ph.D. student in Bioinformatics with a secondary master degree in statistics
Advisor: Dr. Ying Xu.
The University of Georgia, Athens, GA (2010.9-2015.11)
Thesis: Identification of the key micro-environmental alterations, genomic alterations and their associations in cancer initiation and progression

M.S. Secondary master degree in Statistics
Advisor: Dr. Ying Xu, Dr. Ping Ma
The University of Georgia, Athens, GA (2015.5-now)
Thesis: Improved sampling method for regression analysis on big data

B.S. Bachelor of Science in Mathematics and Applied Mathematics.
Peking University, Beijing, China (2006.9-2010.7)

WORKING EXPERIENCE:

2015.8-now Co-advisor of Undergraduate Research Thesis (BCMB 4990H)
Computational Systems Biology Laboratory,
The University of Georgia, Athens, GA

2014.1-now Instructor of Undergraduate Research Course (BIOL/BCMB 4960/4970)

Computational Systems Biology Laboratory,
The University of Georgia, Athens, GA

2010-now Graduate Research Assistant Advisor: Dr. Ying Xu
Computational Systems Biology Laboratory,
The University of Georgia, Athens, GA

2008-2010 Undergraduate Research Assistant Advisor: Dr. Hong Qu
Center of Bioinformatics (CBI), School of Life Sciences
Peking University Beijing, China,

GRANTS AND AWARDS:

1. Graduate student excellence-in-research award. (Five recipients every year. Awarded as the recipient in Life Sciences)
   The University of Georgia. Feb 2016
2. Best poster award in the "Big data challenge in life sciences"
   The University of Georgia. Oct 2015
3. Graduate school travel funding for talk "Cancer is not a bad luck disease" in JSM2015
   The University of Georgia. Aug 2015
4. Best student publication award, "Ying Xu" award, at Institute of Bioinformatics.
   The University of Georgia. Mar 2015
5. Innovative and Interdisciplinary Research Grant.
   The University of Georgia May 2013
6. Outstanding Graduate with honor.
   Peking University Jul 2010

PUBLICATIONS:

2016:

1. Zhang C+, Sheng T+, Cao S, Issa-Boube S, Tang T, Zhu X, Dong N, Du W, Xu Y. Autophagy in Cancer Cells vs Cancer Tissues: two different stories. [Book] Targeting Autophagy in Cancer Therapy, ed. J. Yang. 2016: Springer.
2. Sun H+, Zhang C+, Dong N, Tao S, Xu Y. Fenton Reactions Are a Fundamental Driver of Cell Division in Cancer. Under review. (2016)

2015:

3. Zhang C+, Chao L, Cao S+ and Xu Y. Elucidation of Divers of High-Level Production of Lactates throughout a Cancer Development. **Journal of Molecular Cell Biology**. (2015) DOI: 10.1093/jmcb/mjv031
4. Liu C+, Zhang C+, Su J, Zhang DS, Cao S. Stresses drive a cancer's initiation, progression and metastasis: Critical comments on the book "Cancer Bioinformatics". **Journal of bioinformatics and computational biology**. (2015) DOI: 10.1142/S021972001571002X
5. Cao S+, Zhang C+, and Xu Y. Somatic Mutations May Not Be the Primary Drivers of Cancer Formation. **International Journal of Cancer.** (2015) DOI: 10.1002/ijc.29639
6. Yao F+, Zhang C+, Du W, Chao L, Ying Xu. Identification of Gene-expression Signatures and Protein Markers for Breast Cancer Grading and Staging. **Plos One**.

(2015) DOI: 10.1371/journal.pone.0138213

7. Chen X, Ma Q, Rao XL, Tang YH, Zhang C, Wang Y, Lo GY, Mao XZ, Dixon R and Xu Y. Genome-Scale Identification of Cell-Wall Related Genes in Switchgrass through Comparative Genomics and Computational Analyses of Transcriptomic Data, **BioEnergy Research**. (2015) DOI:10.1007/?s12155-015-9674-2

2014:

8. Zhang C, Cao S, Toole B, and Xu Y. (2014) Cancer may be a pathway to cell survival under persistent hypoxia and elevated ROS: A model for solid-cancer initiation and early development. **International Journal of Cancer**: DOI: 10.1002/ijc.28975.
9. Zhang C, Cao S and Xu Y. (2014) Population Dynamics inside Cancer Biomass Driven by Repeated Hypoxia-Reoxygenation Cycles. **Quantitative Biology**. Doi: 10.1007/s40484-014-0032-8
10. Cui J, Mao X, Ma Q, Zhou W, Zhang C, et al. (2014) Comprehensive characterization of the genomic alterations in human gastric cancer. **International Journal of Cancer**. DOI: 10.1002/ijc.29352

Before 2013:

11. Xu K, Mao X, Cui J, Zhang C, et al. (2013) Elucidation of How Cancer Cells Avoid Acidosis through Comparative Transcriptomic. **PLOS ONE**. DOI: 10.1371/journal.pone.0071177
12. Xu K, Mao X, Mehta M, Cui J, Zhang C, et al. (2012) A Comparative Study of Gene-Expression Data of Basal Cell Carcinoma and Melanoma Reveals New Insights about the Two Cancers. **PLOS ONE** 7(1): e30750. DOI:10.1371/journal.pone.0030750

(+ for co-first author)

MANUSCRIPTS SUBMITTED OR IN PREPARATION:

1. Zhang C, Cao S, Ma Q, Xu Y. An algorithm for clusters and outliers identification in single cell and spatial transcriptomics data. (Submitted to Nucleic Acid Research).
2. Zhang C, Yao F, Dong N, Du W, Tang T, Cao S, Sheng T, Chen X, Xu Y. A Pan-inflammatory and precancerous disease analysis reveals key biological characteristics in cancer risking chronic inflammatory disease types. (2016) Ready for submission.
3. Zhang C, Sheng T, Cao S, Issa-Boube S, Alsaihati B, Ma Q, Xu Y. A bi-clustering based method to predict gain or loss of function of somatic mutations. (2016) Ready for submission.
4. Zhang C, Zhang Y, Cao S, Alsaihati B, Xu Y. A fast algorithm to compute correlation networks in DNA methylation data. (2015) Ready for submission.
5. Ma Q, Li GY, Zhang C, Chang Z, Xu Y. The Exon-Intron Structures of Human Genes Are Mainly to Facilitate Alternative Splicing, under review.

BOOK CHAPTER:

1. Zhang C, Sheng T, Cao S, Xu Y. Computational analysis of the impact of Autophagy in

different stages of cancer progression. (2015 Dec, Invited by Dr. Jin-ming Yang, for book "Autophagy and Cancer")

INVITED TALKS:

Mar 9th 2016 "Understanding Malignant Transformation from Chronic Inflammation: a data mining approach." Department of Computational Medicine & Bioinformatics, University of Michigan

Feb 26th 2016 "Understanding Malignant Transformation from Chronic Inflammation: a data mining approach." Institute of Bioinformatics, the University of Georgia

Jan 4th 2016 "Understanding Malignant Transformation from Chronic Inflammation: a data mining approach." Center for Computational Biology and Bioinformatics. Indiana University, Medical School

Feb 25th 2016 "Understanding Malignant Transformation from Chronic Inflammation: a data mining approach" in Institute of Bioinformatics, the University of Georgia

Jan 4th 2016 "Understanding Malignant Transformation from Chronic Inflammation: a data mining approach" in Center for Computational Biology and Bioinformatics, University of Indiana School of Medicine

Oct 16th 2015 "A pan-inflammatory diseases study reveals key characteristics of the cancer prone diseases and their possible roles in cancer initiation" in Department of Biostatistics and Bioinformatics, Emory University

Nov 21st 2014 "Identification of dynamic cell populations in cancer biomass" in Department of Biostatistics and Bioinformatics, Emory University

Nov 14th 2014 "Identification of dynamic cell populations in cancer biomass in response to repeated hypoxia and reoxygenation" in Institute of Bioinformatics, the University of Georgia

Aug 11th 2014 "Cancer may be a pathway to cell survival under persistent hypoxia and elevated ROS –a model of cancer initiation" at Dr. Jun Liu's lab, Department of Statistics, Harvard University

Jul 22nd 2014 "Models of cancer development driven by micro-environmental stresses" at Dr. Zhiping Weng's lab, University of Massachusetts Medical School

Jun 19th 2013 "Computational modelling of biological networks" in Norman Bethune University of Medical Science, Changchun, China

Jun 2011 "Introduction of bioinformatics and cancer bioinformatics to undergraduates" in School of Mathematical Sciences, Peking University, Beijing, China

CONFERENCE TALKS:

Aug 11th 2015 "Cancer is not a bad luck disease" in 2015 Joint Statistical Meetings, Seattle

Jul 10th 2015 "Modelling large biological network and deciphering cancer micro-environmental stresses by multiple data types", a joint seminar with ICSB2015 in Jilin University, Changchun, China

CONFERENCE POSTERS:

Oct 12h 2014 "Modeling the micro-environmental alterations through cancer progression via integrative analysis of cancer transcriptomic data with multiple omics data types" in the Big data challenges in Life Sciences, UGA

Feb 24th 2014 "Prediction of transcriptional regulatory logic in Clostridium Thermocellum ATCC 27405" in the RNA Symposium hosted by Department of Biochemistry and Molecular Biology, UGA

Nov 7th-9th 2013 "Flux estimation analysis (FEA) reveals key alterations of metabolic flux in colorectal cancer" in the 9th international conference on Bioinformatics, Georgia tech.

Jul 22nd-25th 2013 "Prediction of transcriptional regulatory logic in Clostridium Thermocellum ATCC 27405" in the BESC (Bio-energy Science Center) retreat 2013, Chattanooga, TN

TEACHING EXPERIENCES:

Lecturer Cancer bioinformatics (BINF8125)
2016 spring:
Giving 10-12 lectures (1h15min per class) for the graduate level class through the whole semester.

Instructor Undergraduate Research Course (BIOL/BCMB 4960/4970L) in Computational Systems Biology Laboratory, the University of Georgia.
2014 spring: Reconstruction of Tp53 network, 7 students.
2014 summer: Identification metastasis associated mutations, 5 students.
2014 fall: Evaluating the possible patient age related bias and biological characteristics in TCGA data, 3 students.
2015 spring: Prediction gain or loss of function of Tp53, 2 students.

Co-advisor Undergraduate Research Thesis (BCMB 4990H) in Computational Systems Biology Laboratory, the University of Georgia:
2015 fall: The role of autophagy in colon cancer progression, 1 students

Teaching assistant Dragon star 2015 Cancer System Biology Course in Jilin University, Changchun, China
July 2015: Teaching assistant

Teaching assistant Cancer system biology workshop in Jilin University, Changchun, China
Jun 2013: Workshop teaching assistant

Instructor "Introduction of bioinformatics and cancer bioinformatics to undergraduates" in summer research workshop for undergraduates in School of Mathematical Sciences, Peking University, Beijing, China
Jun 2011: Three lectures to introduce the possible bioinformatics topics

MENTORING EXPERIENCE:

1. Burair Alsaihati (2015-present), Department of Biology, the University of Georgia, Ph.D student

2. Fang Yao (2015-present), Jilin University, Graduate student
3. Samira Issa-Boube (2014-present), Department of Biology, the University of Georgia, Undergraduate student
4. Hanyuan Zhang (2014-present), Jilin University, Graduate student
5. Huiyan Sun (2014-present), Jilin University, Graduate student
6. Tianxiao Tao (2014-2015), Department of Biochemistry and Molecular Biology, the University of Georgia, Undergraduate student
7. Nicholas Allen Major (2014-2015), Department of Biochemistry and Molecular Biology, the University of Georgia, Undergraduate student
8. Samuel Kwak (2014), Department of Biochemistry and Molecular Biology, the University of Georgia, Undergraduate student.
9. Shreenal Hitendra Patel (2014), Department of Biochemistry and Molecular Biology, the University of Georgia, Undergraduate student.
10. Shivani Reddy (2014), Department of Biochemistry and Molecular Biology, the University of Georgia, Undergraduate student.
11. Yuan Tian (2013-2014), Jilin University, Graduate student
12. Peilin Yang (2015-present), Jilin University, Undergraduate student

ACADEMIC SERVICES:

2015-now Reviewer, BMC Genomics (5)

2012-now Reviewer, PLOS One (14)

2014-now Reviewer, IEEE Transactions on Computational Biology and Bioinformatics (5)

2014 Reviewer, Mathematical Biosciences (4)

2012 Reviewer, International Conference on Intelligent Biology and Medicine (1)

2011 Reviewer, International Symposium on Bioinformatics Research and Applications (1)

GRANTS APPLICATION ATTENDED

Nov 2014 Development of a Computational Infrastructure for Cancer Mechanism Studies through Omic Data Mining. NATIONAL INSTITUTES OF HEALTH / Early Stage Development of Technologies in Biomedical Computing, Informatics, and Big Data Science (R01) / PA-14-155

Contribute the bioinformatics study part including a half page of specific aim and four pages of Preliminary Results and High Level Design.

Feb 2015 Development of an infrastructure for study of cancer evolution based on genomic mutations. NATIONAL INSTITUTES OF HEALTH / NCI Exploratory/ Developmental Research Grant Program (NCI Omnibus R21) / PAR-13-146

Contribute one and a half page of Preliminary Results and Approaches.

Nov 2014 Elucidation of Key Differences between Cancer-Prone and Cancer-Independent Inflammations. NATIONAL INSTITUTES OF HEALTH / Research Answers to NCI's Provocative Questions, and Big Data Science (R01) / RFA-CA-15-008.

Coordinate the complete submission process including collecting materials from co-PIs, completing the application packages and submitting the proposal to the

online system of Office of the Vice President for Research, UGA for final submission. Contribute the bioinformatics study part including a half page of specific aim and three pages of Preliminary Results in the scientific part.

Nov 2015 Development of an infrastructure for study of cancer evolution based on genomic mutations (Resubmission). NATIONAL INSTITUTES OF HEALTH / NCI Exploratory/ Developmental Research Grant Program (NCI Omnibus R21) / PAR-13-146

Contribute four pages of Specific Aims, Preliminary Results and High Level Design out of the total six pages of the proposal. Complete all the supportive materials for the proposal submission and do the final submission.

ACTIVITES:

Sep 2014 Team captain of the Chinese student dragon boat team at the University of Georgia
Won the fourth rank (out of 16) in 2014 Atlanta Dragon Boat Festival, college group tournament

2014-2015 Team captain of the Chinese basketball team at the University of Georgia
Won top eight (out of 64) in the 2014 intramural basketball tournaments at the University of Georgia