高等生物化学 Advanced Biochemistry

- 教师介绍 Faculty

Long CHEN （陈龙）
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Research Field: Peptide drugs, Drug delivery, Natural proteins and peptides

Education

Jan.2008-Dec.2012:
Stevens Institute of Technology, Hoboken, New Jersey, USA
PhD in Chemical Biology

Sep.2004-Jul.2007:
Tsinghua University, Beijing, China
MS in Biology

Sep.2000-Jul.2004:
Tsinghua University, Beijing, China
BS in Biological Science

Work Experience

Sept.2013-Present: Associate Professor
College of Life Science and Technology, Beijing University of Chemical Technology

Representative Publications

1. **Long Chen**, Lili Jia, Qiang Zhang, Xirui Zhou, Zhuqing Liu, Bingjie Li, Zhentai Zhu, Fenwei Wang, Changyuan Yu, Qian Zhang, Feng Chen, Shi-Zhong Luo*. **A novel antimicrobial peptide against dental-caries-associated Bacteria.** *Anaerobe*, 2017, 47: 165-172.
2. Fude Sun, Xiufang Ding, Lida Xu, Jun F. Liang, **Long Chen*** and Shi-Zhong Luo*. **A Molecular Dynamics Study of the Short-Helical-Cytolytic Peptide Assembling and Bioactive on Membrane Interface**. *Journal of Physical Chemistry C*. 2017, 121: 17263-17275.
3. Fude Sun#, **Long Chen#**, Xiufang Ding, Lida Xu, Xirui Zhou, Peng Wei, Jun F. Liang* and Shi-Zhong Luo*. **High-Resolution Insights into the Stepwise Self-Assembly of Nanofiber from Bioactive Peptides.** *Journal of Physical Chemistry B*. 2017, 121: 7421-7430. (Co-first author)
4. Xi-Rui Zhou, Yimeng Cao, Qiang Zhang, Xi-Bo Tian, He Dong, **Long Chen***, Shi-Zhong Luo*. **Self-assembly nanostructure controlled sustained release, activity and stability of peptide drugs.** *International Journal of Pharmaceutics*. 2017, 528: 723-731.
5. Ruru Fan, Yanyan Yuan, Qiang Zhang, Xi-Rui Zhou, Lili Jia, Zhuqing Liu, Changyuan Yu, Shi-Zhong Luo*, **Long Chen***. **Isoleucine/leucine residues at "a" and "d" positions of a heptad repeat sequence are crucial for the cytolytic activity of a short anticancer lytic peptide.** *Amino Acids*. 2017, 49(1): 193-202.
6. **Long Chen**, Qiang Zhang, Xiushuang Yuan, Yimeng Cao, Yanyan Yuan, Huiwei Yin, Xiufang Ding, Zhentai Zhu, Shi-Zhong Luo. **How Charge Distribution Influences the Function of Membrane-active Peptides: Lytic or Cell-Penetrating?** *International Journal of Biochemistry & Cell Biology*, 2017, 83: 71-75.
7. X.R. Zhou, Q. Zhang, X.B. Tian, Y.M. Cao, Z.Q. Liu, R. Fan, X.F. Ding, Z. Zhu, **L. Chen** and S.Z. Luo. **From a pro-apoptotic peptide to a lytic peptide: One single residue mutation.** *Biochim. Biophys. Acta.-Biomembranes*. 2016, 1858 (8): 1914-1925.
8. X. Tian, F. Sun, X.R. Zhou, S.Z. Luo* and **L. Chen***. **Role of peptide self-assembly in antimicrobial peptides**. *Journal of Peptide Science*. 2015, 21(7): 530-539.
9. **L. Chen** and J. F. Liang. **The Potential Roles of Cell Surface pHs in Bioactive Peptide Activation.** *Chemical Biology and Drug Design*. 2015, 85(2): 208-215.
10. Y. Sun#, **L. Chen#**, F. Sun, X. Tian and S. Luo. **New Amphiphilic N-phosphoryl Oligopeptides Designed for Gene Delivery**. *International Journal of Pharmaceutics*, 2014, 468 (1-2):83-90. (Co-first author)

11. **L. Chen** and J. F. Liang. **Peptide fibrils with altered stability, activity, and cell selectivity.** *Biomacromolecules*, 2013, 14(7): 2326-2331.
12. **L. Chen**, S. Dong and J. F. Liang. **The effects of metal ions on the cytotoxicity and selectivity of a histidine-containing lytic peptide.** *International Journal of Peptide Research and Therapeutics*. 2013, 19(3): 239-244.
13. **L. Chen**, N. Patrone, J.F. Liang. **Peptide self-assembly on cell membranes to induce cell lysis**. *Biomacromolecules*, 2012, 13(10): 3327-3333.
14. **L. Chen**, Z. Tu, N. Voloshchuk, and J. F. Liang. **Lytic Peptides with Improved Stability and Selectivity Designed for Cancer Treatment.** *Journal of Pharmaceutical Sciences*. 2012, 101: 1508-1517.
15. **L. Chen** and J. F. Liang. **Metabolic Oligosaccharides Altered Cell Responses to Anticancer Drugs.** *European Journal of Pharmaceutics and Biopharmaceutics*. 2012, 81: 339-345.
16. **L. Chen**, L. Zhang, X. Wang, H. Lin, L. Du. **Determination of dopamine and its relativity to baicalin in rat nuclei after intravenous administration of flavonoids from Scutellariae radix**. *Biomedical Chromatography*. 2007, 21: 84-88.
17. R. Kharidia, Z. Tu, **L. Chen**, and J. F. Liang. **Activity and Selectivity of Histidine-Containing Lytic Peptides to Antibiotic Resistant Bacteria.** *Archives of Microbiology.* 2012, 194: 769-778.
18. C. Traba, **L. Chen** and J.F. Liang, **Low power gas discharge plasma mediated inactivation and removal of biofilms formed on biomaterials**. *Current Applied Physics*. 2013, 13(S1): S12–S18.
19. C. Traba, **L. Chen**, R. Azzam and J.F. Liang. **Insights into discharge argon mediated biofilm inactivation**. *Biofouling*. 2013, 29(10): 1205-1213.

- **课程介绍 About Course**

This course is mainly established for international MS students and the lectures were given in English. It is also applicable to Chinese MS students who are eager to improve their international perspective, comprehensive knowledge in biochemistry and communication skills in English. The objectives of this course are to help students understand the fundamental theories and knowledge of biochemistry, and to train skills for literature review, critical thinking and experiment design.

Outlines:

1. Introduction (2 hour)
2. Amino acids, peptides, and proteins (3 hours)
3. Carbohydrates (3 hours)
4. Nucleotides and nucleic acids (2 hours)

5. Lipids (2 hours)
6. Biosignaling (4 hours)
7. Membrane transport (2 hours)
8. Carbohydrate metabolism (3 hours)
9. Fatty acid catabolism (2 hours)
10. Amino acid metabolism (2 hours)
11. Oxidative phosphorylation and photophosphorylation (3 hours)
12. Genes and chromosomes (2 hours)
13. DNA metabolism (3 hours)
14. RNA metabolism (4 hours)
15. Protein metabolism (3 hours)

- 课程大纲 Syllabus

Instructor: Long Chen, Dr./Associate Prof.

Course Code: Bio501e

Hours: 40

Credits: 2.5

Prerequisites: Biochemistry

Description: *Advanced Biochemistry* is about the comprehensive use of biochemical knowledge to analyze the important questions in biology, and training in critical thinking and experimental design. The course introduces the chemical basis of living organisms, including structure and catalysis, bioenergetics and metabolism, information pathways. In this course, we will introduce recent advantages in biochemistry beside classical knowledge. Biochemistry is an experimental science, so we will emphasize the research awareness throughout the course to trigger critical thinking and the use of information technology. Meanwhile through literature reading and discussion, we will let student understand the forefront science and technology and research ideas, and improve the students' abilities to review literature.

Textbook: David L. Nelson and Michael M. Cox, "Lihninger Principles of Biochemistry (Fifth Edition)", W.H. Freeman and Company, 2011.

References: 1. Donald Voet, Charlotte W. PrattJudith G. Voet: "Fundamentals of Biochemistry: Life at the Molecular Level", John Wiley & Sons, New Jersey, 2012

2. Sambrook J. et al.: "Molecular cloning-A Laboratory manual (Third Edition)", Cold Spring Harbor Laboratory Press, New York, 2004

3. Bastien. D. Gomperts, IJsbrand M. Kramer, Peter E.R.Tatham: "Signal Transduction (Second Edition)", Science Press, Beijing, 2010

General Syllabus:

1. Introduction (2 hour)

The task, content, development of biochemistry; the molecular basis of disease.

2. Amino acids, peptides, and proteins (3 hours)

The structure, properties of amino acids; the chemistry of peptides; the primary, secondary, tertiary and quaternary structures of proteins; protein folding.

3. Carbohydrates (3 hours)

The structure, properties and classification of carbohydrates; the properties of monosaccride, oligosaccride and polysaccride; starch, glycogen, cellulose, etc.; conjugates of carbohydrates.

4. Nucleotides and nucleic acids (2 hours)

Nucleoside, nucleotide and nucleic acids; structures and properties of nucleic acids.

5. Lipids (2 hours)

The structure, properties, and classification of lipids; functions of triacylglycerol, phospholipids, wax and lipid conjugates.

6. Biosignaling (4 hours)

Types of signal transduction; receptor enzyme, GPCR; oncogenes and tumour suppressor genes; cell cycle; apoptosis.

7. Membrane transport (2 hours)

Types of membrane transport; passive perfusion, affiliated perfusion, active transport, ion channels.

8. Carbohydrate metabolism (3 hours)

Glycolysis; TCA cycle; pentose phosphate pathway; gluconeogenesis.

9. Fatty acid catabolism (2 hours)

β-oxidation of fatty acids; formation of ketone bodies; disorder of fatty acid metabolism.

10. Amino acid metabolism (2 hours)

Urea cycle; glucogenic and ketogenic amino acids.

11. Oxidative phosphorylation and Photophosphorylation (3 hours)

Chemical osmotic hypothesis; respiratory chain; oxidative phosphorylation; photophosphorylation; ATP synthesis.

12. Genes and chromosomes (2 hours)

Function of genes; structure of chromosomes; human genome.

13. DNA metabolism (3 hours)

DNA replication; characteristics of DNA replication; process of DNA replication; mutation.

14. RNA metabolism (4 hours)

RNA transcription; process of RNA transcription; different types of RNAs; ribozymes.

15. Protein metabolism (3 hours)

Protein translation; process of protein translation; codons and anticodons; protein modification.

Grading: Quiz 20% ; Literature discussion 30% ; Final exam 50 %.

- 教案 Teaching Plan
- 视频 Video