



# **Computational Systems Biology: Chapter 7. Reconstruction of Metabolic Network from Genome Information and its Structural and Functional Analysis**

*Hong-Wu Ma, An-Ping Zeng*

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Understanding the complex interactions among cellular components (genes, proteins and metabolites) at a network level is a key issue in systems biology. In this chapter, we give an overview of metabolic network reconstruction from genome information and its structural analysis. First, two approaches for genome scale metabolic network reconstruction: high throughput reconstruction and high quality reconstruction, are discussed. Then the various means for mathematical representation of metabolic networks are explained, with particular emphasis on the problem arising from currency metabolites. Several topological features of metabolic network such as the power law connection degree distribution and the “bow-tie” global connectivity structure are explained in detail. In the last section, we discuss the different types of methods for network decomposition which can be used to identify somehow structurally and functionally independent modules in a complex network. This allows us to understand the functional organization of metabolic network from a modular perspective.

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