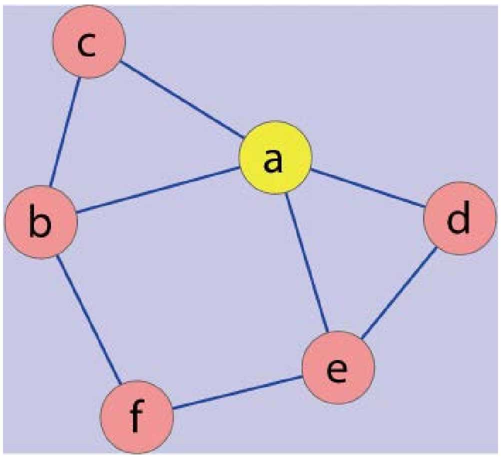
Electronic Supplementary Material (ESI) for Molecular BioSystems

Supporting information

Here we introduce some basic network parameters that characterize the networks.



Degree and degree distribution

The node degree is the number of edges linked to the node. For example, in the above network, node *a* has degree k=4. The degree distribution is the statistical analysis of all the degree of nodes in a network. With the degree distribution, we could distinguish between different classes of networks. For example, in a random network, the node degrees follow a Poisson distribution which means most nodes have approximately degrees and no highly connected nodes exist. However, a power-law degree distribution indicates that the network is a scale-free network.

Scale-free network and the exponent of power law

The characteristic of scale-free network is that its degree distribution follows a power law, which means a few hubs in the network hold together many other small nodes. This typical characteristic applies to most biological networks like metabolic networks; therefore they are all scale-free networks. The exponent of power law is closely related to many properties of the network. When the exponent $\gamma>3$, the hubs in the network are insignificant. When $2<\gamma<3$, the central hub will connect with a small part of all nodes. When the exponent is smaller, the central hub will connect with a large part of all nodes. In general, only for $\gamma<3$, the scale-free network will be useful. And with a smaller exponent, the hubs in the network will be more important.

Path length

The path length is the numbers of edges/steps we need to pass through between two nodes and the smaller number we call the shortest path length. The shortest path length distribution may indicate small-world properties, such as the information transfer efficiency and the overall navigability of the network. For example, in above network, the shortest path length between *a* and *d* is 1.

Clustering coefficient

In above network, the clustering coefficient $\boldsymbol{C}$ of a node is defined as $\boldsymbol{C} = 2e/(k\,(k-1))$, where k is the number of node neighbors and e is the number of connected pairs between all node neighbors. In brief, the clustering coefficient of a node is the number of triangles (3-loops) that pass through this node, relative to the maximum number of 3-loops that could pass through the node. For example, in above network, there are two triangles that pass through node *a* (*abc*, *ade*). The maximum number of triangles that could pass through node *a* is six (*abc*, *abd*, *abe*, *acd*, *ace*, *ade*). So the clustering coefficient of node *a* is 1/3.

Figure S1. Network modules.

Table S1. Total of 558 proteins were derived from reports.

Table S2. Topological properties of ten sub-networks.

Table S3. Differentially expressed genes in each pathway after treated with DHA.

Table S4. Topological parameters of potential drug target proteins.