Functional genomics and drug discovery: use of alternative model organisms

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Abstract

Over the past few decades there had been massive collaborative efforts among groups of scientists all over the world to determine the complete genomic sequences of various organisms. This exercise has resulted in the generation of enormous sequence database comprising of the genome sequences of the various model organisms such as *E coli*, yeast, *C. elegans*, *Drosophila*, *Arabidopsis*, mouse, etc. One of the most exciting milestone in this sequencing effort has been the complete sequencing of human genome. However, the real challenge and the overwhelming task that now lies ahead is to decipher functional correlates of the patterns embedded in these sequences. Large number of studies have shown that protein sequences and their basic functions are conserved amongst various species of animals. The application of molecular genetics to study animal development has also revealed striking conservation of developmental mechanisms between vertebrate and invertebrate systems. Comparative genomic studies between human and other organisms has already led to the discovery of a number of genes associated with diseases and traits. In post-genome era, comparative genomic studies will further help determine the yet-unknown function of thousands of other genes, and ultimately to understand human evolution and the common biology we share with all of life.

One of the immediate benefits of human genome project is the identification of suitable targets for screening drugs against various diseases. With the increasing rates of identification of the genes causing human diseases - it is now of paramount importance to develop alternative model systems to study functions of genes at much lower costs. Although one would be curious to know what makes us unique amongst all organisms, the fact that the genetic differences between us and other organisms is far less than expected has triggered efforts all over the world to make use of simple model organisms (such as yeast, *C. elegans*, *Drosophila*) to study human diseases and develop potential therapeutics.