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Thursday, February 7, 2008
11:30 a.m.
101 Biochemistry

Genetic redundancy associated with tumor suppressor genes and systematic analysis of microRNA effector complexes in *C. elegans*

Research in the Han Laboratory

Considering the enormously diverse functions associated with cellular, developmental, and behavioral activities in mammals, the number of genes encoded by the genomes seems much too small. However, we may also “complain” that there are too many genes in the genomes, as a large percentage of the genes in model organisms, from yeast to mouse, seem “dispensable”. Knockout mutations in these genes often do not cause any obvious developmental or behavioral defects, presenting a major obstacle for a genetic approach to study gene functions. In the first half of the talk, I will report on our systematic efforts in the last a few years to tackle genetic redundancies associated with two tumor suppressor genes that play many critical roles in *C. elegans* development. In our studies, we made a breakthrough in solving a long-standing and popular developmental biology problem in the field: the mechanism of the synthetic multivulva phenotype, discovered by Bob Horvitz and his colleagues. I will also discuss the relationship of genetic redundancy with pleiotropism regarding gene functions in development.

Developmental timing regulation is another fascinating problem that is relatively under-explored compared to studies on spatial regulation. During the second half of my talk, I will report on how our analysis of spatial and temporal regulation of vulval differentiation in *C. elegans* serendipitously lead us into the red-hot field of miRNA regulation. We discovered that GW182 family proteins are essential components of miRNA effector complexes. We then carried out a systematic analysis of the components of these complexes using a biochemical approach. Our studies lead to the physical identification of more than 3500 potential miRNA targets that may provide valuable information for further experimental and computational predications of miRNA-mRNA regulations.

References

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