S7-1

MicroRNA Maturation

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Hundreds of small RNAs of ~22-nt in length, collectively named microRNAs (miRNAs), have been discovered in animals and plants whereas their functions, such as in developmental control, are being unraveled, their biogenesi s mechanism remains poorly understood. MiRNAs are transcribed as long primary transcripts (pri-miRNAs) whose maturation occurs through sequential processing events (1): the nuclear processing of the pri-miRNAs into stem-loop precursors of ~70-nt (pre-miRN A s) and the cytoplasmic processing of pre-miRNAs into mature miRNAs of ~22-nt. Dicer, a member of the Ribonuclease III (RNase III) superfamily of bidentate nucleases, mediates the latter step, whereas the processing enzyme for the former step was unknown. Here we identify another RNase III type protein, Drosha, as the core nuclease that executes the initiation step of miRNA processing in the nucleus (2). Immunopurified human Drosha cleaved pri-miRNA to release pre-miRNA *in vitro*. Furthermore, RNA interfere nce of human Drosha resulted in strong accumulation of pri-miRNA and reduction of pre-miRNA and mature miRNA *in vivo*. Thus the two RNase III proteins, Drosha and Dicer, act consecutively in the stepwise processing of miRNAs and may be the key players in mi RNA-mediated gene regulation such as developmental control.

S7-2

Suppression of *Nek2* Expression in Mouse Early Embryos Confirmed Its Requirement for Mitosis

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Nek2, a mammalian structural homologue of *Aspergillus* NIMA, was best known as a centrosomal kinase that controls centriole-centriole linkage during cell cycle. However, its dynamic subcellular localization during mitosis suggested that Nek2 might be involved in diverse cell cycle events, in addition to the centrosomal cycle. In order to have an insight on functional significance of Nek2, we suppressed *Nek2* expression in mouse early embryos by RNAi. The results showed that development of the *Nek2*-suppressed embryos were arrested at the 2- or 4-cell stage. Many of the blastomeres appeared to be blocked in the middle of mitosis with morphological abnormalities in nucleus, spindle fiber and centrosome. These results confirmed that Nek2 is required for chromosome segregation during mitosis.