Gene networks that regulate dynamics of cytoskeletons in animal development

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【Outline of survey】

Cells divide, move, and change shape to give rise to a complete organism during animal development, and cytoskeletons (e.g., microtubules and actin filaments) play crucial roles in these cellular changes,. Cytoskeletons are filamentous structures made by the polymerization of protein components, and affect cellular behaviors by changing their structures dynamically in response to the environment. The genetic programs that regulate cytoskeletal dynamics are encoded in the organism's genome, but the complete picture remains unclear. Using the nematode *C. elegans*, whose complete genome sequence and cell lineage are known, as a model system, we will analyze gene networks that regulate the dynamics of cytoskeletons during embryogenesis. Specifically, three-dimensional live imaging and systematic gene knock-down analyses will be used to identify gene sets involved in cytoskeletal dynamics. Through these analyses, we aim to understand how cytoskeletal dynamics are hierarchically coordinated at the molecular, cellular, and organismal level.

【Expected results】

Three-dimensional (3D) live imaging analysis of protein behaviors in live animals with high temporal- and spatial-resolution will reveal novel cellular dynamics at an organismal level, which may have been missed in studies using previously available techniques. Because the core components of cytoskeletons are evolutionarily conserved, the gene networks revealed in this study may contribute to elucidating the basic principle of cellular dynamics in animal development.

【References】

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【Term of project】 FY2007－2011	【Budget allocation】 49,200,000 yen (2007 direct cost)

【Homepage address】 http://www.cdb.riken.jp/dge/