

Molecular mechanism underlying metameric morphogenesis

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【Outline of survey】

In vertebrates, metameric structures such as the vertebrae of the axial skeleton are generated from somites, morphologically distinct segmental units that are transiently formed during early development. The somites are subdivided from the anterior end of the unsegmented paraxial mesoderm (or presomitic mesoderm: PSM) and sequentially generated in an anterior to posterior direction in a rhythmic fashion at regular spatiotemporal intervals. The molecular mechanism underlying the periodical formation of somites is coupled to an internal oscillator, referred to as the “segmentation clock,” which has been evidenced by the cyclic expression of genes in the PSM. Thus the temporal periodicity generated by this clock in the PSM is converted into the structural periodicity of somites. Currently we are examining the molecular mechanism underlying this conversion by using zebrafish and mice as model systems.

【Expected results】

To gain insight into the mechanism underlying somite development, we performed an ENU mutagenesis screening of zebrafish and isolated a number of mutants defective in somite segmentation. In this ongoing study, we are trying to identify the genes responsible for these defects and examine interaction between the proteins encoded by these genes and other factors involved in several processes of somite segmentation.

This analysis is expected to reveal the yet unknown molecular mechanism required for the conversion from the temporal periodicity to the spatial one. In addition, by examining mouse and/or zebrafish mutants, we are addressing the question as to whether the mechanism underlying somite segmentation is also involved in other developmental events.

【References by the principal researcher】

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【Term of project】 FY2006 - 2010

【Budget allocation】 18,800,000 yen

【Homepage address】

<http://www.nibb.ac.jp/cib2/>