32nd CDB FORUM

Date: Friday, February 25, 2005
4:30 P.M.～6:30 P.M.
Place: 1F Auditorium of Building C

16:30-17:30

Speaker 1 : **Laboratory for Body Patterning, CDB**

1. "Morphological segmentation during somitogenesis is induced by ephrin-Eph signaling downstream of Notch and cMeso1"

< Tadayoshi Watanabe >

The segmentation of the somitic mesoderm is the basis of the reiterated structures along the antero-posterior axis of the vertebrate body. In this process, the presomitic mesoderm (PSM) undergoes segmentation to form somites. We previously reported that the posterior border cells at the prospective boundary of chick embryo PSM exhibit fissure-inducing activity (designated as the "segmenter"; Sato et al., *Development*, 2002), and that this inductive action involves Notch signaling. Studies in mouse have shown that the *MesP2* gene, which encodes a bHLH transcription factor, is critical to this morphological segmentation. However, it remains unknown how the MesP2 and Notch signals lead to morphological changes at the segmentation boundaries. To decipher the molecular mechanisms underlying fissure formation, we have focused on *cMeso-1*, a chicken homolog of *MesP2*, and downstream genes.
Using a segmentation assay in which an interface of gene activity is ectopically made in a non-segmenting region, we found that *cMeso-1* is sufficient to induce an ectopic fissure and that this action is concomitant with the activation of Notch signaling. Notch activation in turn results in Eph-ephrin signaling between the anterior and posterior border cells. Interestingly, the reverse signal by ephrins in the anterior border cells is sufficient to induce a fissure; the EphA4-signal is dispensable. Thus, ephrin-reverse signaling plays a role in the initiation of morphological changes during segmentation.

2. "Behavior of *piwi*-expressing cells during oligochaete(Annelid) regeneration suggests a conserved relationship in the interaction between primordial germ cells and somatic gonads"

< Ryosuke Tadokoro >

During the early development of sexually reproductive animals, including both invertebrate and vertebrate species, primordial germ cells (PGCs) are segregated from somatic tissues. Later in development, PGCs migrate to the gonadal regions where somatic and germ cells meet to make a functional gonad. We present evidence that this characteristic behavior of primordial germ (like) cells is also seen during regeneration using *Enchytraeus japonensis*, an oligochaete worm. *E. japonensis* propagates both asexually (by fission) and sexually, and can be experimentally induced to switch from an asexual to a sexual reproductive mode.
The *piwi* family genes are involved in generation and/or maintenance of germ cells in a wide variety of creatures including animals and plants. In asexually growing worms, *piwi*-positive cells are observed as an aggregate in the 7th and 8th segments of the anterior region (head), and scattered as a single cell through the trunk region. During the course of experimental sexualization, the *piwi*-positive regions in the head expand and become restricted to the germ cells in the developing gonads. We next examined a behavior of *piwi*-positive cells during regeneration. At 2 days after amputation (dpa), an increasing population of *piwi*-positive cells is found in the area posterior to the amputation site (pre-existing tissue). At 3 dpa these cells begin to migrate and enter the regenerating tissue, which has already formed the fundamental structure of the head. Ultimately the *piwi*-positive cells settle in the 7th and 8th segments (prospective gonadal regions) in the newly formed head. Thus, unlike most of the somatically growing blastema, *piwi*-positive cells stay in the pre-existing tissue for a while before they start migration. We discuss the potentially conserved mechanism underlying the relationship between PGCs and somatic gonads.