CDB SEMINAR

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Thursday, March 8, 2007

16:00~17:00 C1F CDB Auditorium

Nucleocytoplasmic protein transport, its diversity and cell differentiation

Summary

In eukaryotic cells, cell functions are maintained and regulated through the continuous traffic of various proteins between the cell nucleus and the cytoplasm. The nuclear import of proteins is mediated by specific amino acid sequences, which are referred to as nuclear localization signals (NLSs). The scheme of the molecular mechanism of nuclear protein import has been clearly elucidated. Typically, the nuclear import of the classical basic-type NLS-containing cargoes is initiated by the formation of a cargo-containing complex, which has targeting activity to the nuclear pore complex (NPC) components and is composed of two essential factors, importin α and importin β. Other key molecule is a Ras-related small GTPase Ran. Nuclear RanGTP dissociates the complex, thus releasing the cargo from the carrier molecules. We have elucidated that a variety of transport pathways simultaneously exist in cells: 1) importin α/β/Ran-dependent, 2) importin α-independent and importin β/Ran-dependent, and 3) importin β/Ran-independent pathways. Furthermore, we have recently demonstrated that the nuclear protein import system is involved in various functions of cell physiology. Especially, we found that the expression of importin-α subtypes is strictly regulated during neural differentiation of mouse ES cells and that the switching of importin-α subtype expression is required for neural differentiation. Moreover, we showed that reproducing the switching of importin-α subtype expression in undifferentiated ES cells induced neural differentiation in the presence of LIF and serum. These results indicate that the importin-α subtype switching has a strong impact on cell differentiation.

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