CDB SEMINAR

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Friday, June 25, 2010
16:00~17:00   C1F CDB Auditorium

Wnt signals during stem cell self-renewal and tissue repair

Summary

In many contexts, the self-renewal and differentiation of stem cells is influenced by signals from their environment, constituting a niche. It is postulated that stem cells compete for local growth factors in the niche, thereby maintaining a balance between the numbers of self-renewing and differentiated cells. A critical aspect of the niche model for stem cell regulation is that the availability of self-renewing factors is limited and that stem cells compete for these factors. Consequently, the expression, range and concentrations of the niche factors are critical importance.

We study the role of Wnt signaling and stem cells by purifying active Wnt proteins and applying them to cells and tissues, thereby being able to assess the consequences of Wnt signaling in a direct way. Wnt proteins are modified by lipid attachment, to make them hydrophobic in nature. We found that isolated Wnt proteins are active on a variety of stem cells, including neural, mammary and embryonic stem cells. In general, Wnt proteins act to maintain the undifferentiated state of stem cells, while other growth factors instruct the cells to proliferate. The combination of Wnts and those factors has allowed stem cells to clonally expand and propagate in an undifferentiated state for multiple passages. By subsequent in vivo transplantation, we find that the cells have retained their developmental potential.

During the diffusion and transport of the lipid-modified Wnt proteins between cells, the interaction with a novel Wnt binding protein, called SWIM, may be essential in maintaining the solubility of Wnt, at least in *Drosophila.*

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