



CDB SEMINAR

Peter Walter Andrews

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Monday, May 22

15:00~16:00 A7F CDB Conference Room

Culture adaptation and self renewal of human embryonic stem cells

Summary

The propensity of human embryonic stem (ES) cells to differentiate spontaneously presents one of the most significant problems to be overcome before potential applications for these extraordinary cells can be realized. Typical human ES cell cultures contain a mixture of undifferentiated stem cells and their differentiated derivatives with a wide range of phenotypes. Although we are beginning to understand the environmental cues and the signaling pathways that control the decision a stem cell must make between self renewal and differentiation, our current knowledge is still fragmentary. Nevertheless, we and others are making some progress towards developing defined culture conditions that permit maintenance of undifferentiated human ES cell cultures, with minimal differentiation, in the absence of feeder cells. At the same time, it is evident that culture of ES cells in 'sub-optimal' culture conditions exposes them to strong selective pressure for those genetic changes that promote self-renewal at the expense of differentiation, or cell death through apoptosis. It is clear that there is a 'balance' between genotypic and environmental factors that control the behavior of ES cells. A consequence of this is the adaptive genetic changes that occur in ES cells in culture are often the same as those that occur in embryonal carcinoma (EC) cells, their malignant counterparts, in teratocarcinomas. In both situations, cells with a greater propensity for self-renewal will possess a selective advantage. Understanding the nature of the genetic changes that are selected during culture adaptation may therefore give insights into the control systems and hence signaling pathways that direct the self renewal of these pluripotent stem cells. At the same time, culture adaptation of ES cells in culture may also provide an unusual insight into the mechanisms that drive cancer progression.

Host:

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