CDB SEMINAR

Speaker: Makoto Asashima

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Title: "Structure and Function Analysis of In Vitro-Induced Organs in the Vertebrate Development"

Date:	**Wednesday, March 3**
Time:	**16:00 -17:00**
Place:	**7th floor Conference Room of Building A,CDB**

Summary:

We have successfully induced the formation of 17 different organs *in vitro* from animal caps (undifferentiated or multipotent cells) of *Xenopus* blastulae and 6 different organs from mice ES cells (Embryonic Stem cell). For the *Xenopus* embryo, we subsequently have attempted to transplant these *in vitro*-generated organs into embryos to determine their functional capacity. In three different experiments we induced the formation of a pronephros, eye-ball and beating heart from animal caps variously treated with activin and retinoic acid, and then transplanted these organs into an embryo in which the corresponding rudiment organ had been removed. Results depended on the organs, timing and transplantation positions, but in the case of the eye, the transplanted organ clearly became functional.

To determine whether the transplanted in vitro-generated eye was functional, we labeled the egg red using Texas Red dextran-amine or the embryo green by ectopic expression of green fluorescent protein. Then eye formation was induced, and after 3 further days of culture the labeled eye was transplanted into *Xenopus* embryos in which the presumptive eye had been removed. Within one month of transplantation, histology and electron microscopy showed that nerves from the ectopic eye had innervated the host brain. Over 3 months, tadpoles with the ectopic transplanted eyes developed to young frogs, and the eyes were observed to react to light and other stimuli. These transcription experiments have done with other *in vitro*-induced organs such as pronephros (kidney) and beating heart. The transplanted organs can function in host embryos like as normal their organs.

To expand these basic data, we have tried to use the mice ES cells. After the treatment of specific inducing factors, we have succeeded to make several kinds of organs *in vitro*, such as heart muscle, smooth muscle, adipocyte, neural cells, gut, pancreas and so on, from mice ES cells. We have examined these *in vitro*–induced organs from the structural and functional views.

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