Immunological Approach to *Drosophila* Embryogenesis. A Somatic Cell Specific Antigen in *Drosophila* Embryos

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In *Drosophila*, if a monoclonal antibody (MAb) of a certain protein is obtained, it is possible to isolate the gene encoding the protein, furthermore, comprehending a gene enables one to learn the function of the encoded protein by analysing deletion mutants at the locus of the gene. We took this advantage of *Drosophila* to find maternal cytoplasmic factors active in regulation of early embryonic development. We have generated MAbs against *Drosophila* ovaries (Maruo and Okada, 1987).

One of the MAbs, E7-10, was found of react with an antigen in oocyte cytoplasm. The distribution of the antigen was surveyed immunocytochemically with the MAb on polyester wax sections of ovaries, embryos and first instar larvae (Fig. 1). During oogenesis, E7-10 antigen first appeared in nurse cell cytoplasm at mid-vitellogenic stages, transported to the oocyte, and showed an even distribution throughout the cytoplasm of mature oocytes. The antigen was recognizable throughout cytoplasm of freshly laid eggs, gathering in cytoplasm of every energid at later stages. At the blastoderm stage, this antigen accumulated in the cytoplasm of the basal region of the somatic cells, and was also seen in the surface region of the central yolk mass. In the blastoderm and organogenesis stages, the antigen was found in all somatic cells, and then it gradually decreased to disappear from cytoplasm of all somatic cells by the end of embryogenesis. The antigen was found neither in pole cells nor in primordial germ cells in the embryonic and larval gonads. No antigen was detected in adult tissues except for ovaries.

We characterized this antigen using immunoblot analyses. Immunoblotting after two-dimensional gel separation of the sample from pre-blastoderm embryos resolved the antigen into two series of isoforms that differ in charge and electrophoretic mobility. The low molecular weight group (LMG) and the high molecular weight group (HMG) were found between 40 and 50 kd in the basic region of the gel. At least 7 distinct spots different in charge could be

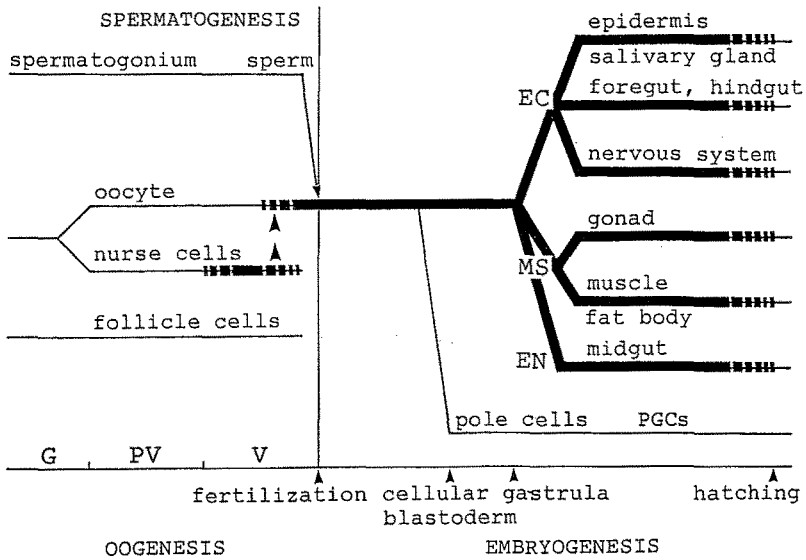

Fig. 1 The summary of stage and tissue specificity of E7-10 antigen. The stage sequence at the bottom of the figure represents the major events during gametogenesis and embryogenesis. Thin lines represent tissues that are negative, and solid lines represent tissues that are positive. G: germarium stages, PV: previtellogenic stages, V: vitellogenic stages, EC: ectoderm, MS: mesoderm, EN: endoderm.

detected in LMG and HMG respectively. The negatively charged isoforms of the antigen were demonstrated to be the result of phosphorylation at multiple sites (data not shown).

In summary, E7-10 antigen is a maternal cytoplasmic factor specifically accumulated into oocyte cytoplasm, and is segregated to all somatic cells but not to germ line cells in the embryos. Phosphorylation may regulate the functions of the antigen in the somatic cells during embryogenesis.

References

Maruo, F. and M. Okada (1987) *Cell Differ.*, **20**, 45-54.