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Neurosteroids have been known to be synthesized in the central and peripheral nervous systems. In past years, many investigators participated in elucidation of the regulatory mechanism involved in postnatal brain development, especially, concerning developmental and regional specific expression of steroidogenic enzymes. Now, it is well accepted that the steroidogenic acute regulatory protein (StAR) plays essential roles and consists major rate limiting step in steroidogenesis. However, there is yet no evidence about StAR mRNA expression in developing brain. Thus, in this study, we firstly revealed changes of the expression pattern of StAR mRNA in several brain areas where other steroidogenic enzymes mainly expressed. As a result, the pattern of StAR mRNA expression was mainly changed in hypothalamus, hippocampus and cerebellum. We also detected variations of StAR expression according to their own developmental stages in the peripheral steroidogenic organs, adrenal glands and gonads. These results implicated that StAR might have a role in the neuronal cell growth and differentiation in the rat brain development likewise other steroidogenic enzymes.

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Effects of Ethanol on the Onset of Female Rat Puberty

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The present study was undertaken to examine the effects of ethanol on the hypothalamus-pituitary-gonad reproductive

neuroendocrine axis during prepubertal and onset of puberty in the immature female rat. From day 25, each rat began receiving either a control saline or ethanol. Animals were sacrificed on day 27 and 32, and their ovaries and blood were collected. In the present results, ethanol treatment significantly decreased serum luteinizing hormone contents at both time points. Uterine weights of ethanol-treated group were significantly lighter than control group at early time point, while there was no noticeable discrepancy at late time point. Viginal openings, a marker of onset of puberty, also clearly delayed in ethanol-treated group. Using an in situ hybridization histochemistry, we determined the expression of mRNAs encoding StAR. Ovaries from ethanol-treated rats showed a suppressed expression of StAR mRNA. These results demonstrate that ethanol affect the reproductive activity at the level of brain thereby disturb the prepubertal ovarian function and onset of puberty, at least in part, through the inhibition of ovarian StAR gene expression.

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Control of Self-incompatibility by CO₂ Gas Treatment in *Brassica campestris*: Structural Alteration of Papillae Surface and Differential Gene Expression upon CO₂ Gas Treatment

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Chinese cabbage (*Brassica campestris*), one of the major vegetable crops in Korea, is controlled by self-incompatibility in the reproduction process. To maintain inbred lines of the crop plant, a method in that high CO₂ gas is treated to the pistils to break the self-incompatibility and thereby self-pollens can successfully make germination and fertilization has been widely used in seed companies. This study shows structural alteration of papillae cell surface during the self-incompatibility breakage by CO₂ gas treatment that eventually allows self-pollens to germinate. Also, in order to understand what the CO₂ gas causes to the papillae cell at molecular level, differential gene expressions of the pistil treated with the CO₂ gas was investigated by DDRT-PCR and reverse northern hybridization experiments. These results suggested that the breakage of self-incompatible reaction caused by CO₂ gas treatment is not only done by the structural alteration of papillae cell wall but also done by gene products that are positively and/or negatively regulated by the environmental stimulation.

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Regeneration of Protoplast from Disintegrated Cells of the Marine Green Alga *Chaetomorpha aerea*

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When injured, the protoplasm come out from the multi-nucleate cell of a green alga *Chaetomorpha aerea* can generate numerous new cells spontaneously. Cell organelles aggregated in seawater and became surrounded with a gelatinous envelope within 20 minutes. On average, 200

protoplasts were produced from 1 ul of cytoplasm and about 15% of them survived. The total membrane surface area of individual cells was estimated by image analysis of intact cells and the protoplasts regenerated from the extruded protoplasm. About 22 % of the original cell membrane was recycled to make new protoplast membrane. Fluorescein diacetate staining showed an esterase activity inside a protoplast that increased over time. DAPI staining showed irregular distribution of nuclei, suggesting that each cell organelle was initially come out independently. Development of protoplast membrane was pH dependent and the optimum pH was 8, the pH of seawater. About 50% of regenerated cells developed a reproductive cell, aplanospore, in two weeks. The released aplanospore divided into 8 cells and each of them became a motile gamete with two flagella. This is first report on protoplast regeneration from disintegrated cell fractions of multi-cellular system.

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Expression of Cold-Stress-inducible cDNA Clone Isolated from Potato (*Solanum tuberosum* L.) tuber cDNA Library

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Stress-induced proteins play a definite role in protecting plants from possible damages by drought, extreme temperatures, and flooding. Cold storage of potato tubers at 4°C was associated with the accumulation of several cold-induced transcripts. A cDNA clone encoding cold-inducible protein was isolated from a cDNA library prepared from tubers of *Solanum tuberosum* L. cv Superior.