

A Role of Tissue Transglutaminase in the Germinal Vesicle Breakdown of Mouse Oocytes

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We have investigated the novel function of tissue transglutaminase (tTG) in the germinal vesicle breakdown (GVBD) of mouse oocyte. tTG was identified in ooplasm and germinal vesicle by immunostaining assay. Spontaneous maturation of the oocytes elevated in situ activity of tTG by over 2.5 fold at 3 hr, which was determined by a confocal microscopic assay. However, incubation with monodansylcadaverine (MDC), a tTG inhibitor, blocked the activation of tTG. The possible role of tTG in GVBD was investigated by the use of two tTG inhibitors, MDC and cystamine. MDC largely inhibited the GVBD by a concentration dependent manner. GV-stage oocytes were matured to the GVBD stage by 78% at 3 hr in BWW culture medium. However, in the oocytes incubated with MDC for 3 hr, the GVBD rates were 43 and 11% by 50 and 100 mM, respectively. MDC also blocked the entry of 70 kDa TRITC-dextran from the ooplasm to the compartment of germinal vesicle, indicating a possible inhibition of nuclear pore disassembly by MDC. The role of tTG in GVBD was further investigated by microinjection with cystamine. The control oocytes, injected with DPBS, showed about 80 % of GVBD at 3 hr. But the oocytes injected with cystamine showed 15% of GVBD at 3 hr and a little higher rate at 6 hr. In addition, the inhibition of GVBD maturation by MDC was reversible by washing. These results suggested that tTG was involved in the early event of mouse oocyte maturation

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