

Gamma (γ) Tubulin Reorganization during Bovine Fertilization and Parthenogenesis

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γ - tubulin is an essential, invariant constitutive centrosomal protein, which plays key roles in microtubule patterning and defining the microtubule intrinsic polarity . Although γ -tubulin was also present in cattle oocytes and zygotes, no details have been provided on its recruitment and localization to date. In this study, we determined γ -tubulin distribution chronologically in conjunction with microtubule dynamics during fertilization and parthenogenesis, with a view to understanding the molecular basis of zygotic centrosome reconstitution in cattle. In unfertilized bovine oocytes, γ -tubulin was identified in the cytoplasm, mainly in the cortex and concentrated in the spindle of metaphase chromatin. Following sperm penetration, γ -tubulin in the cytoplasm was recruited by a sperm component, probably to organize the sperm aster. During pronuclear apposition, γ -tubulin was localized as spots at the polarities of the spindle. γ -tubulin spots were observed in blastomeres of embryos cleaved in vitro. Following electrical stimulation, γ -tubulin and microtubule matrix were noted in oocyte cortex, which seem to position the pronucleus into oocyte center. In the late pronuclear stage, considerably less γ -tubulin and microtubules were detected in the cytoplasm. At the mitotic metaphase of parthenotes, γ -tubulin was recruited to the condensed chromatin and concentrated in the spindle. The γ -tubulin spots were not detected until the 8-cell stage of parthenotes. This suggests that maternal γ -tubulin is recruited by a sperm component to reconstitute the zygotic centrosome. In the absence of sperm components, the cell cycle-related assembly of γ -tubulin organizes microtubule nucleation for positioning the pronucleus and spindle protein of mitotic metaphase during the first cell cycle of bovine parthenotes.

Key words) *γ -tubulin, microtubule, centrosome, fertilization, parthenogenesis*