Characterization of store-operated Ca^{2+} entry in mouse eggs

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In fertilized mammalian eggs, long-lasting oscillations in the concentration of cytoplasmic Ca^{2+} are generated by periodic releases of Ca^{2+} from the intracellular stores. The entry of Ca^{2+} from outside is also required to maintain Ca^{2+} oscillations, but the nature and regulatory mechanisms of Ca^{2+} entry pathways in mammalian eggs are poorly characterized. We have previously shown that the rate of Ca^{2+} entry increased transiently and repetitively after each Ca^{2+} oscillation at fertilization, suggesting the functional coupling between Ca^{2+} release and entry. In the present study, we examined the effects of the endoplasmic reticulum (ER) Ca^{2+}-ATPase blockers, thapsigargin (Tg) and BHQ, on Mn^{2+} entry in mouse eggs, to investigate the store-operated Ca^{2+} entry (SOCE), which is activated by the depletion of Ca^{2+} from the ER. Although the treatments with either Tg or BHQ decreased the ER Ca^{2+} content, the rate of Mn^{2+} entry was enhanced only in the eggs treated with Tg, not in those with BHQ. Furthermore BHQ suppressed the rate of Mn^{2+} entry enhanced in Tg-treated eggs, suggesting its inhibitory effect on SOCE in mouse eggs. The possible mechanisms of coupling between Ca^{2+} release and entry will be discussed.