Postovulatory Aging *in vitro* Leads to Maturation Promoting Factor Destabilization and Abortive Spontaneous Egg Activation in Rat

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Abstract—*In mammals, freshly ovulated eggs are generally arrested at metaphase-II (M-II) stage of meiotic cell cycle and possess first polar body (PB-I). Culture of these eggs in vitro leads to postovulatory aging-induced abortive spontaneous egg activation (SEA). The morphological, biochemical and molecular changes during postovulatory aging-induced abortive SEA remains poorly understood. Hence, the present study was designed to investigate morphological, biochemical and molecular changes during postovulatory egg aging in vitro. For this purpose, eggs collected after 14 h of post hCG surge were cultured for 1, 2, 3, 5 and 7 h in vitro. The morphological changes, percentage of abortive SEA, phosphorylation status of Cdk1, levels of cyclin B1 , Wee-1 kinase, Emi2, APC/C and MAD2 were analyzed. Data of the present study suggest that postovulatory aging triggered initiation of second polar body extrusion, a morphological feature of abortive SEA in a time-dependent manner. Postovulatory egg aging in vitro increased Wee 1 kinase as wells Thr-14/Tyr-15 phosphorylated Cdk1 levels, while Thr-161 phosphorylated Cdk1 and cyclin B1 levels were significantly reduced. The Emi2 level was reduced but APC/C and MAD2 levels were first increased significantly and then decreased during in vitro egg aging. These results suggest that increased Wee 1 kinase level modulated specific phosphorylation status of Cdk1 that could have resulted in the dissociation of MPF heterodimer. At the same time, decreased Emi2 triggered APC/C activation, which induced cyclin B1 degradation thereby MPF destabilization. The destabilized MPF results postovulatory aging-induced abortive SEA in rat eggs cultured in vitro.*

Keywords*: Postovulatory aging, abortive SEA, Wee 1, Cdk1/ cyclin B1, Emi2/APC/C.*