

The Localization and Function of p38 α Mitogen-Activated Protein Kinase (MAPK) in Rat Oocytes

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Abstract : Background: P38 α MAPK, which is a member of the canonical MAPK family, is activated in response to various extracellular stresses and plays a role in multiple cellular processes. It is well known that p38 α MAPK play vital roles in oocyte maturation, but the localization and functional roles of p38 α MAPK during the meiotic maturation of rat oocytes remain unknown. Study Design: In this study, western-blot and immunofluorescent staining were used to investigate the expression and subcellular localization of p38 α MAPK during the meiotic maturation of rat oocytes. SB203580, a specific inhibitor of p38 α MAPK, was used to study the roles of p38 α MAPK in the meiotic cell cycle of rat oocytes. Results: The results found that p38 α MAPK phosphorylation (p-p38 α MAPK, indicative of p38 α MAPK activation) was low at the germinal vesicle (GV) stage, increased 3 h after germinal vesicle breakdown (GVBD), and maintained its maximum at MI (metaphase I) or M II (metaphase II). The p-p38 α MAPK mainly accumulated in the germinal vesicle and had no obvious expression in the nucleus. From GVBD to M II, p-p38 α MAPK was distributed in the cytoplasm around either the chromosomes or the spindle. We used SB203580, an inhibitor of p38 α MAPK, to investigate the possible functional role of p38 α MAPK during rat oocyte meiotic maturation. Treatment of GV stage oocytes with 20 μ M SB203580 blocked p-p38 α MAPK activity, and the spindles appeared abnormal. Additionally, the rate of GVBD after 3h of culture with 20 μ M SB203580 (58.8%) was significantly inhibited compared with the control (82.5%, $p < 0.05$), and the polar body extrusion rate after 12 h of culture with SB203580 was also significantly decreased compared with the control (40.1 vs. 73.3%, $p < 0.05$). Conclusions: These data indicate that p38 α MAPK may play a vital role in rat oocyte meiotic maturation.

Keywords : meiotic maturation, oocyte, p38 α MAPK, spindle

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