

## Effect of MAPRE1 on Oocyte Maturation and Preimplantation Embryonic Development in Mice

Zhiming Han<sup>1</sup>; Yuanyuan Li<sup>1</sup>; Wenlong Lei<sup>1</sup>; Lei Guo<sup>2</sup>

1. State Key Laboratory of Stem Cell and Reproductive Biology, Institute of Zoology, Chinese Academy of Sciences, Beijing, China
2. Fertility Preservation Lab, Reproductive Medicine Center, Guangdong Second Provincial General Hospital, Guangzhou, China

Microtubules are assembled from heterodimers of  $\alpha$ - and  $\beta$ -tubulin into highly dynamic polymers essential for many intracellular processes. Microtubule-associated RP/EB family member 1 (MAPRE1), also termed EB1, is a member of microtubule plus-end-tracking protein (+TIP) family that plays a crucial role in regulating microtubule dynamics by binding growing microtubule ends and interacting with a network of +TIPs. In this study, we investigated the function of MAPRE1 during mouse oocyte maturation and preimplantation embryonic development. Immunofluorescence analysis revealed that MAPRE1 was distributed in the cytoplasm at germinal vesicle stage and along the spindle at metaphase I and metaphase II stages. The results of Western blotting analysis showed that MAPRE1 was consistently expressed from germinal vesicle stage to metaphase II stage. To investigate the function of MAPRE1, *Mapre1* was knocked down by microinjecting of *Mapre1* siRNA into germinal vesicle stage oocytes and zygotes respectively, and the effects were examined by Western blotting, immunofluorescence, live-cell imaging, etc., with at least three replicates per experiment. The results showed that *Mapre1* knockdown in germinal vesicle stage oocytes caused defects in spindle assembly, chromosome alignment, and kinetochore-microtubule attachment, which subsequently inhibited spindle assembly checkpoint silencing, cyclin B1 degradation, and the release of separase activity and ultimately led to failed anaphase entry and first polar body extrusion. *Mapre1* knockdown in zygotes resulted in most of *Mapre1*-depleted embryos arrested at 2-cell stage. This study demonstrated that MAPRE1 plays an important role during the oocyte maturation and early embryonic development in mice. This study was supported by the National Key Research and Development Program of China (2022YFC2702200) to Z.H.