PRESENTATION SUMMARY

Oocyte Proteomics: Tools for Identifying New Contraceptive Targets in the Oocyte and Early Embryo

John C. Herr

Note: Due to illness, Dr. Herr was unable to give this presentation during the symposium. We have included his notes here for your reference.

This presentation will review proteomic strategies for identifying previously unknown egg proteins and their encoding genes that are suitable for contraceptive drug development. A novel 19 kDa RNA binding protein named MOEP19 will be presented. The localization of this protein in the oocyte and early embryo suggests that the mammalian oocyte is pre-patterned and that this pre-patterning persists in zygotes and early embryos through the morula stage.

The MOEP19 protein was first detected in primordial follicles and accumulated during oogenesis as oocytes expanded but showed no evidence of being translated in ovulated eggs, indicating MOEP19 is a maternal effect gene. MOEP 19 localized in the ovulated egg and early zygote as a symmetrical spherical cortical domain underlying the oolemma, basilar to the zone of cortical granules. In blastomers of 2, 4 and 8 cell embryos, MOEP 19 remained restricted to a cortical cytoplasmic crescent and did not redistribute into regions underlying cell contacts. In morulae, MOEP19 remained at the apex of outer, polarized blastomeres and was undetectable in blastomeres of the inner cell mass.

In early blastocysts, MOEP19 localized diffusely throughout the cytoplasm of both mural and polar trophectoderm and the inner cell mass, and its concentration declined. MOEP19 disappeared in expanded, late blastocysts from all but a single cell. The persistence during early development of the egg's MOEP 19 cortical domain as a cortical crescent in blastomeres suggests an intrinsic pre-patterning in the egg that is related to the apical-baso-lateral polarity of cells in the embryo and may be analogous to the domains of cortical cytoplasm (crescents) that segregate following fertilization in invertebrates and lower vertebrates.

Although the RNAs bound to MOEP19 are presently unknown, we predict that the MOEP19 domain directs RNAs essential for normal embryonic development to specific locations in the oocyte and early embryo. The region of ooplasm associated with the MOEP19 domain is hypothesized to contain information critical for subsequent development – a theory that suggests preservation of the MOEP19 domain in procedures such as cloning by nuclear transfer and in other manipulations of the mammalian egg may be important for developmental success. Novel genes such as MOEP19 that are restricted to the oocyte and early embryo offer targets for contraception.

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References

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