第 12 回 ASPIRE
O69
オーストラリア　アデレード、2023.0907-10

DECLINE IN MITOCHONDRIAL FUNCTION OF HUMAN EMBRYO WITH MATERNAL AGING

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Background and Aims: Female fertility declines with age, due to increased chromosomal aneuploidy and possible reduced mitochondrial function in the embryo.
Method: We outlined how mitochondrial function in human embryos, as predicted from oxygen consumption rate (OCR) measurements, changes in pre-implantation stage, and what factors, particularly maternal age, affect mitochondrial function in embryos.
Results: The structure of the mitochondrial inner membrane and its respiratory function developed with embryo development, while the copy number of mitochondrial DNA per specimen was transiently reduced compared to that of the oocyte. The undifferentiated state of the inner cell mass cells appears to be associated with a low OCR. In contrast, the copy number of mitochondrial DNA increased in trophoblast cells and mitochondrial aerobic metabolism increased.
The OCRs at morulae stage decreased with maternal age, but there was no relationship between maternal age and the copy number of mitochondrial DNA at any stages. The higher oxygen spent at the morula stage; the shorter time was needed for development to the mid-stage blastocyst.
Conclusion: The mitochondrial respiratory function of human embryos developed along with embryonic growth. Mitochondrial function at morula stage declined with their maternal age and reduced mitochondrial function decreased the rate of development from morula to blastocyst.