

Decreased expression of mitochondrial genes in human unfertilized oocytes and arrested embryos

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Abstract

OBJECTIVE: To evaluate the relationship between mitochondrial gene expression of oocytes/embryos and their fertilizability in unfertilized oocytes, arrested embryos, and tripronucleate zygotes, because both nuclear and cytoplasmic factors contribute to oocyte activation, fertilization, and subsequent development. **DESIGN:** Prospective laboratory research. **SETTING:** In vitro fertilization (IVF) laboratory in a university hospital. **PATIENT(S):** Seventy-five unfertilized oocytes, 45 arrested embryos, and 24 tripronucleate (3PN) embryos from 45 female patients undergoing IVF. **INTERVENTION(S):** Analysis of mitochondrial gene expression by semiquantitative reverse transcription polymerase chain reaction (RT-PCR). **MAIN OUTCOME MEASURE(S):** Comparison of the expression levels of mitochondrial genes including ND2, CO I, CO II, ATPase 6, CO III, ND3, ND6, and Cyt b in three groups. **RESULT(S):** Significantly decreased transcription levels were expressed in unfertilized oocytes and arrested embryos. The average expression levels of the eight determined genes compared with the control (GAPDH) was 4.4 +/- 0.7, 6.4 +/- 1.1, and 13.2 +/- 1.1 in unfertilized oocytes, arrested embryos, and 3PN embryos, respectively. Significantly decreased expressions of the ATPase 6, CO III, and ND3 genes were detected from samples with 4977-bp common deletion in the mitochondrial DNA (mtDNA) compared with the non-deletion group. **CONCLUSION(S):** The present study is the first report to present globally decreased mitochondrial gene expression levels in human compromised oocytes and embryos. These data support the notion that the down-regulation of mitochondrial RNA by defective oxidative phosphorylation genes possibly affects oocyte quality including fertilization and further embryo development.