Deleted mitochondrial DNA in human luteinized granulosa cells

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Abstract

The rearrangement of mitochondrial DNA in luteinized granulosa cells was determined in order to evaluate the fertilization capacity of oocytes and the development of embryos. Multiple deletions of mtDNA were found in luteinized granulosa cells from in vitro fertilization (IVF) patients. The 4977-base pair (bp) deletion was the most frequent deletion found in human granulosa cells. No significant difference was noted between mtDNA deletions of granulosa cells based on the fertilization capacity of oocytes and the development of embryos. To determine the relationship of proportions of mtDNA rearrangements with the aging process, granulosa cells were grouped into three different cohorts according to maternal age: younger than 32 years, between 32 and 37 years, and older than 37 years. No statistical correlation was noted between patient age and the frequency of occurrence of multiple mtDNA deletions. However, an increase in granulosa cell apoptosis was associated with an increase in mtDNA deletions. Accumulation of mtDNA deletions may contribute to mitochondrial dysfunction and impaired ATP production. We concluded that the accumulation of rearranged mtDNA in granulosa cells might not interfere with fertilization of human oocytes and further embryonic development; it was, however, associated with apoptosis processes.