MITOCHONDRIA DNA QUANTIFICATION IS NOT FEASIBLE AS A BIOMARKER FOR HUMAN EMBRYO IMPLANTATION POTENTIAL

Lee, Yi-Xuan[1,2]; Chen, Chi-Huang[1,3]; Tzeng, Chii-Ruey[4]

[1]Division of Infertility, Department of Obstetrics and Gynecology, Taipei Medical University Hospital, Taipei Medical University, Taipei, Taiwan., [2]Graduate Institute of Clinical Medicine, Taipei Medical University, Taipei, Taiwan, [3]Department of Obstetrics and Gynecology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan., [4]Division of Infertility, Department of Obstetrics and Gynecology, Taipei Medical University Hospital, Taipei Medical University, Taipei, Taiwan

Objective: To evaluate the feasibility of adjusted mitochondrial DNA (mtDNA) quantification in human embryos as a biomarker for implantation potential.Design: double-blinded, retrospective analysis.Patients: Totally 1148 embryos derived from 298 infertile couples were collected. The DNA from either blastomeres (n=99) or trophectoderm biopsy (n=1049) were amplified and subjected to ploidy analysis with NGS. Results: The adjusted mtDNA quantification was obtained and then subjected to mathematical analysis by adding correction factors tailored to its gender and chromosomal composition. The results other than euploid and aneuploidy were excluded. The adjusted mtDNA quantification followed a non-normal distribution in both types of the embryos. The adjusted mtDNA quantification showed significant higher in aneuploid trophectoderm cells than in euploid (euploidy n=431, aneuploidy n=261; median: 0.001 vs. 0.00089, p=0.0014), but not in blastomeres (euploidy n=24, aneuploidy n=15; median: 0.004 vs. 0.0046, p=0.27). Both types of embryos derived from different maternal age groups had comparable adjusted mtDNA quantities. Viable embryos did not contain significant difference of adjusted mtDNA quantities compared with nonviable embryos (implanted n=70, 35.71%, non-implanted n=112, 57.14%; median: 0.00095 vs. 0.00087, p=0.25) in 196 transferred blastocysts. The blastocysts identified to have normal adjusted mtDNA level was 98.4% (681/692). Among them, the euploid and aneuploid blastocysts contained adjusted mtDNA level above the threshold were 1.39% (6/431) and 1.53% (4/261), respectively. However, only one euploid blastocysts in the 196 embryos transferred contained adjusted mtDNA level above this threshold. Therefore, the predictive value of adjusted mtDNA quantification in blastocysts did not of statistically significance.Conclusion(s): Adjusted mtDNA quantification is significantly lower in the euploid blastocysts than aneuploid blastocysts. However, no statistically difference regarding to blastomeres ploidy status and in embryos stratified by maternal age and implantation outcome. Based on the current evidences, adopting the mtDNA quantification as a biomarker for human embryo implantation potential is not feasible.