Do the environmental pollutants affect the mitochondrial copy number in human blastocysts?

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Objective

Growing evidence are now indicating that mitochondria can be targeted organelles of these pollutants. So the objective is to evaluate the effect of specific pollutants in the final mitochondria copy number.

Design

Prospective study of cases and controls evaluating the effect of the presence of two common pollutants in the embryo culture media

Materials and Methods

A total of 117 human embryos donated for research were included. Experiment consisted in groups of embryos exposed to Benzene at 256-512*10 -5 ppm (B, n=54) and Limonene at 87.5-226*10^{-5}ppm (L, n=41) that were compared with a control group (C, n=11). Embryos were cultured from day 3 (D3) up to day 6 (D6) of development. Embryos that reached the blastocyst stage were analyzed for the mitochondrial copy number. To calculate the mtDNA score (MitoScore) by NGS, the number of reads mapping to the mitochondrial genome is divided by the number of reads mapping to the nuclear genome to allow normalization of each batch and therefore reducing variability during NGS experiments as make the calculation independent of number of cells obtained in each biopsy.Mitochondrial copy number values are presented as medians. Statistical analysis was performed by non-parametric test Kruskal Wallis. *p* values <.05 were considered statistically significant.

Results

This is the first study addressing this specific subject. It has been seen that the environmental pollutants affect not only the embryo development but also their chromosomic content. However, neither the presence of B and L affected the mitochondrial copy number compared to the C group (B: 18,73, [13-66]; L: 20.52 [14-49]; C: 17.53 [15-37]) respectively.

Conclusions

Despite the mitochondria may be a vulnerable organelle to environmental aggressions, it seems that when exposed to 10^{-5} parts per million concentrations of B and L, the embryos mitochondrial copy number were not affected.

Support

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