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Oral Presentations

O-24

Oxidative stress-dependent toxicity of dextran-coated superparamagnetic iron oxide nanoparticles on mouse embryo produced by in vitro fertilization

Alaee S[1], Bakhtari A[1], Nazari S[1], Kargar-Abarghouei E[2], Mirzaei E[3].

1. *Department of Reproductive Biology, School of Advanced Medical Sciences and Technologies, Shiraz University of Medical Sciences, Shiraz, Iran.*
2. *Department of Anatomy, Faculty of Medicine, Hormozgan University of Medical Sciences, Bandar Abbas, Iran.*
3. *Department of Medical Nanotechnology, School of Advanced Medical Sciences and Technologies, Shiraz University of Medical Sciences, Shiraz, Iran.*

Email: sanaz620@gmail.com

Background: Superparamagnetic iron oxide nanoparticles (SPIONs) are capable to penetrate the placenta. Also, small nanoparticles can cross the blood-testis barrier and aggregate in the testes. Thus, SPIONs might have adverse impacts on reproduction systems.

Objective: The influence of adding dextran-coated SPIONs (D-SPIONs) into the fertilization medium was investigated in a dose-dependent manner on gene expression of oxidative stress enzymes in the resultant blastocysts in a mouse model.

Materials and Methods: Mature oocytes were collected from superovulated female BALB/c mice and randomly divided into three groups (0, 50, and 250 µg/ml of D-SPIONs). These concentrations were mixed into fertilization medium as control, low, and high dose groups, respectively. The toxic effects of D-SPIONs on murine in vitro fertilization (IVF) were investigated by developmental competence and alterations in gene expression of antioxidant enzymes were assessed for glutathione peroxidase 1, superoxide dismutase 1, and catalase in the blastocysts derived from IVF. Data were analyzed by one-way ANOVA followed by Tukey's multiple comparison test (SPSS 20) and presented as mean ± standard deviation.

Results: Mature oocytes were collected from superovulated female BALB/c mice and randomly divided into three groups (0, 50, and 250 µg/ml of D-SPIONs). These concentrations were mixed into fertilization medium as control, low, and high dose groups, respectively. The toxic effects of D-SPIONs on murine IVF were investigated by developmental competence and alterations in gene expression of antioxidant enzymes were assessed for glutathione peroxidase 1, superoxide dismutase 1, and catalase in the blastocysts derived from IVF. Data were analyzed by one-way ANOVA followed by Tukey's multiple comparison test (SPSS 20) and presented as mean ± standard deviation.

Conclusion: Our results may suggest that increasing these antioxidant enzyme genes, as reactive oxygen species scavengers, meaningfully promoted overtime to protect the resultant blastocysts from oxidative damage. Despite considerable usage of D-SPIONs in numerous fields of science and technology, this study presented extensive worries about their toxicity towards IVF. Therefore, it is important to perform further studies to detect the potential risks of this nanoparticle in various areas of nanotechnology.

Key words: *Blastocyst, Catalase, Developmental competence, Oxidatiove stress.*

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