ADJUSTMENT OF REDOX POTENTIAL IN THE CULTURE MEDIA EQUIVALENT TO THE REDOX POTENTIAL IN FOLLICULAR FLUID IMPROVES IN VITRO EMBRYO DEVELOPMENT AND BLASTOCYST FORMATION

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Objective
To evaluate if an adjustment in the redox potential of an embryo culture media, similar to the redox potential in the follicular fluid of donor oocytes, could improve the embryo development and blastocyst formation of tripronucleated (3PN) zygotes from infertile patients.

Design
Prospective cohort study.

Materials and Methods
This study was performed from November 2017 to March 2018. Oxidation reduction potential (ORP) was measured in culture medium (Global total, Life Global Group, USA) and in follicular fluid from 10 oocyte donors using the MiOXSYS System (Aytu BioScience, Englewood, USA). The ORP in culture medium was adjusted to the overall levels seen in follicular fluid of oocyte donors (86.0 mV) by adding ascorbic acid to the culture medium. A total of 218, 3PN zygotes (abnormally fertilized after in vitro insemination of infertile patients) were divided into two groups: 117, 3PN zygotes were cultured in medium with adjusted ORP (Group 1) and 101, 3PN embryos cultured in the regular medium (Group 2). The mean patient’s age, the percentage of good quality embryos at day 2, and expanded and cavitated blastocysts formation rate at day 5 and day 6 of development were compared. Analysis was performed using the Mann-Whitney test.

Results
The mean ORP values in the embryo culture media were significantly (p<0.0001) higher compared to those in follicular fluid of oocyte donors (225±3.1 mV vs. 86.0±14.8 mV). ORP in donor follicular fluid was significantly (p<0.0001) lower than in patients (86.0±14.8 mV vs 100.8±17.5 mV). The mean percentage of good quality embryos at day 2 and the percentage of total blastocysts formation were borderline significant (p=0.0641) but significantly (p=0.0064) higher in group 1 vs group 2: (65.35% vs 48.7%) and (76.5% vs 50.4%), respectively. No differences were found between the patient’s age (33.92 ± 6.22 vs 35.16±3.97 years).

Conclusions
We report for the first time that in vitro culture of 3PN zygotes from infertile patients developing in physiological levels of ORP results in higher embryo development and blastocyst formation rates.