Abstracts / Reproductive Toxicology 80 (2018) 25–34

Potential role of p53 protein as a novel biomarker of sperm quality, able to predict the success of ART techniques. EcoFoodFertility Project

Luigi Montano1,*, Salvatore Raimondo2, Maria Cira Gentile2, Tiziana Tiziana Notari3, Liana Bosco4, Tommaso Gentile2

1 Andrology Unit of the “S. Francesco d’Assisi” Hospital, Local Health Authority (ASL) Salerno, EcoFoodFertility Project Coordination Unit, Oliveto Citra (SA), Italy
2 Seminology Unit Gentile Research Centre, Gragnano (NA), Italy
3 Gynecology Embryology Andrology - Reproductive Medicine Unit of Check Up Polydagnostic Center, Salerno, Italy
4 Department of Biological, Chemistry and Pharmaceutical Sciences and Technologies. University of Palermo, Italy

Introduction: Protein p53 is well known as “The guardian of genome”; it changes its concentration in human spermatozoa DNA in relation to the damage of the latter. It has been suggested that the role of the p53 ancestral gene was to ensure the integrity of the genomic germline and the fidelity of the development process. The aim of this study is to evaluate if different concentrations of p53 protein in human spermatozoa could influence embryo quality and pregnancy rate and possibly representing a potential predictive marker of sperm quality for successful fertilization.

Methods: From July 2013 to June 2017 we have examined retrospectively 79 couples with 2–5 years of infertility history. Males had an average age of 27 ± 7.5 years, sperm concentration of 33.8 ± 6.2 mil/ml, progressive motility of 41.4 ± 8.3 and a typical morphology of 16.5 ± 3.5 according to Kruger’s method. We have divided the couples on the basis of p53 levels: Group A: 0.35–1.65 ng/mil (21 males); Group B: 1.66–3.57 ng/mil (32 males); Group C: 3.58–14.53 ng/mil (26 males). We have evaluated the number of embryos at stage of 6–8 cells, obtained at the third day of embryo development, in these three different group. In order to evaluate the concentration of p53 protein, we first proceeded to a DNA extraction with forensic method and then to a quantification p53 protein with ELISA-immunoenzymatic assay, expressed in ng/million of spermatozoon.

Results: We have observed different percentage of embryo development at stage of 6–8 cells in the third day and different pregnancy rate (PR). Group A: 101 embryos at 6-8 cells/ 147 total number of obtained embryos in this group (68.4%) and PR = 52.38%; Group B: 128/240 (53.5%); PR = 37.50%; Group C: 79/216 (36.1%); PR = 7.69%. These results support the hypothesis that an high concentration of p53 in human sperm DNA is associated to a low percentage of embryos able to reach the stage of 6-8 cells in the third day of development and also to a lower pregnancy rate. So p53 levels can be considered as a predictive value to embryo development and pregnancy rate.

Conclusions: Protein p53 is a sequence-specific transcription factor that responds to a wide variety of stress signals (environmental insults and bad lifestyle) as we are investigating within the ecofoodfertility project. Particularly quantitative research of p53 could be considered as a novel biomarker of sperm quality, able to predict the success of ART techniques, and could open a new road for infertility diagnosis.

https://doi.org/10.1016/j.reprotox.2018.06.059