EVALUATION OF SPERM CHROMATIN DAMAGE WITH TWO ROUTINE SPERM PROCESSING PROCEDURES USED FOR ASSISTED REPRODUCTION

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Introduction and Objectives: There is a growing concern regarding the potential detrimental effects of sperm processing on sperm DNA integrity. We examined the extent of DNA damage in infertile patients with abnormal semen characteristics using two sperm preparation methods, the results were compared with a population of healthy controls.

Methods: Semen samples were collected from 22 infertile men and 21 normal healthy male volunteers. These samples were processed by a 2-layer density gradient technique (ISolate) and the swim-up method. Sperm characteristics such as motility, production of reactive oxygen species (ROS) by chemiluminescence assay, and DNA damage by sperm chromatin structure assay (SCSA) were evaluated both before and after processing by each method as well as between the patients and donors. Values are expressed as median and 25%, 75% interquartile range.

Results: Patient samples before sperm preparation showed poor motility (P <0.0001), abnormal ROS (P <0.02), and a high amount of DNA damage [25.9 (21.3, 45.4)] compared to controls [19.4 (13.6, 25.15); p <0.02]. Both sperm preparation techniques were equally effective in improving sperm motility (P <0.0001) and lowering ROS levels (P <0.04). Semen samples prepared by the swim-up technique had significantly lower amounts of DNA damage compared to those prepared by Isolate (P <0.02); as well as to original unprocessed semen samples (P <0.01).

Conclusions: Semen samples processed by swim-up technique show minimal amounts of DNA damage compared to those prepared by density gradient media such as ISolate. Since DNA damage is linked to the potential risk of transmission of genetic anomalies to the offspring and according to the latest reports sperm DNA damage of >30% by SCSA technique is predictive of failure of fertilization by in vitro fertilization method. In view of our results, we conclude that laboratories using density gradient media in sperm preparation for assisted reproduction should monitor those patients who fail to fertilize in the presence of normal egg and semen quality. Perhaps in these patients, sperm chromatin damage may be an underlying cause of fertilization failure; and, therefore, these patients could be tested for sperm DNA damage and appropriately counseled about the poor outcome by IVF and offered alternate therapeutic options.