HIGH SEMINAL OXIDATION REDUCTION POTENTIAL IN CRYOPRESERVED SEMEN FROM INFERTILE MEN IS A MARKER OF POOR POST-THAW SPERM QUALITY

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INTRODUCTION:
Sperm cryopreservation is considered the most valuable and used way to preserve male reproductive function. However, sperm cryopreservation is usually associated with deleterious effects on human spermatogenesis leading to decreased cryosurvival rates (CSR). It has been demonstrated that cryopreservation can provide or increase reactive oxygen species (ROS) production in semen samples.

OBJECTIVES:
The objectives of this study were to assess levels of oxidation reduction potential (ORP) in cryopreserved semen of infertile men, and to determine their relationship to post-thaw sperm parameters.

MATERIALS AND METHODS:
The study included semen samples obtained from 28 infertile men during routine infertility work-up. Standard seminal analysis was performed according to the WHO guidelines (5th edition, 2010). Semen samples with abnormalities, sperm concentration < 1 million/ml or leukocytospermia were excluded.

Measurement of oxidation reduction potential (ORP):
Oxidation-reduction potential was measured using a novel galvanostatic-based technology: MOXYSYS System; Ayla Biosciences, Englewood, CO, USA. MOXYSYS System measures static ORP (sORP), which is a “snapshot” of the current balance of the redox system. A higher ORP level indicates an importance in the activity of all available antioxidants relative to all available oxidants in the seminal ejaculate as a state of oxidative stress. Briefly, a 35µL sample suspension was loaded on the sample port of the disposable-MOXYSYS sensor. The sensor was inserted in the MOXYSYS analyzer. Recorded ORP values were adjusted and expressed as mV/mole electron.

Sperm cryopreservation:
Aliquots of 0.5 ml semen were cryopreserved using slow-freezing technique. One week later, frozen samples were thawed at 37°C, and examined for post-thaw percent of total motility, percent of progressive motility, total motile sperm (TMS) counts and ORP levels. Cryosurvival rate was calculated according to the equation: CSR = post-thaw TMS/pre-thaw TMS X 100.

RESULTS:

- Post-thaw percent of total motility (28.5%, 48.5%), percent of progressive motility (34.5%, 28.5%) and TMS counts (6.65 X 10⁶, 2.1 X 10⁶) were significantly lower than pre-thaw values.
- Percent of hibernation (95.5%, 65.5%) and percent of progressive motility (34.5%, 28.5%) were significantly lower than pre-thaw values (P<0.05).
- The median percentage of ORP was 10.5 ± 6.3.
- A significant (P=0.02) negative correlation was found between post-thaw TMS and ORP (r = -0.47).

CONCLUSIONS:
Sperm cryopreservation in infertile men was associated with high seminal ORP and sperm motility and reduced CSR.

- Sperm cryopreservation may be related to high seminal ORP generated during freeze-thaw process.
- Future efforts should be directed towards evaluation in order to improve sperm recovery following cryopreservation.