THE ROLE OF CREATINE KINASE AND HYPOOSMOTIC SWELLING IN FRESH AND CRYOPRESERVED SAMPLES FROM INFERTILE PATIENTS

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Damage to the sperm membrane occurs during the freeze-thaw process resulting in poor sperm motion and functional characteristics. The purpose of this study was to determine whether sperm cell damage and changes in functional characteristics that occur during the freeze-thaw process are related to a reduction in sperm cell metabolism as indicated by creatine kinase (CK) level. Also, we assessed the value of the hypoosmotic swelling test (HOS) as a test of sperm viability in frozen samples. Semen specimens were obtained from 10 normal healthy volunteers and 19 infertile men. Each ejaculate was divided into two aliquots. One aliquot of fresh sample was used to measure CK activity using a kit and sperm viability with the HOS test. The second aliquot was cryopreserved with TEST-yolk buffer. After 24 hours, samples were thawed and cryoprotective medium was removed. Levels of CK and sperm viability were assessed in thawed specimens and compared with prefreeze values. In the pre-freeze samples, CK levels (median and interquartile values) in donors was 0.01 (0.01 to 0.05) units/10⁸ sperm and 0.06 (0.04 to 0.24) units/10⁸ sperm in patients, respectively, (P = 0.003). In the post-thaw specimens, donors and infertile men had a CK levels of 0.01 (0.01 to 0.04) units/10⁸ sperm and 0.06 (0.03 to 0.15) units/10⁸ sperm, respectively, (P = 0.002). Percentage change from pre-freeze to post-thaw in the donors was not significantly different. However, the percentage change from pre-freeze to post-thaw was significant in the patient group (median and interquartile values) (-7.32 [-15 to 0.0]) (P = 0.01). The HOS test was not significantly different between donors and patients both in pre-freeze and post-thaw specimens. HOS is not a good indicator of sperm viability in cryopreserved samples. Spermatozoa from infertile men may be more susceptible to cryopreservation-induced damage as indicated by a reduced CK level. This may be due to the loss of cytoplasm during removal of cryoprotectant before processing the specimen for CK activity. [Supported by a research grant from the Cleveland Clinic Foundation.]