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REduced sperm quality and - quantity is associated with reduced testicular blood flow and high levels of diet dependent serum homocystine

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INTRODUCTION & OBJECTIVES: Homocysteine is considered as a risk factor for atherosclerosis, in particular for cardiovascular disease and placental vasculopathy. Besides suggested genotrophic factors, plasma homocystine levels are strongly influenced by diet. Furthermore, testicular blood flow is essential for sperm quality and quantity, as well as a high resistive index (RI) in testicular blood flow was found to be associated with pathological sperm parameters. The objective was to measure homocysteine levels in plasma and testicular blood flow from infertile men with pathological sperm count for unknown reasons. Furthermore, we evaluated sperm quality and quantity before and after therapy with a homocysteine lowering diet.

MATERIAL & METHODS: A total of 40 patients (mean age 34.3 years, range 21-44) with known risk factors for infertility and pathological sperm count were included in this pilot study. All subjects underwent complete andrological screening. Sperm samples were analyzed according to the WHO (1999) guidelines. Measurement of the testicular RI (normal range 0.45 - 0.59) was performed using a high-frequency Doppler ultrasound probe (10 MHz, Acuson Sequin 512). Three RI measurements were performed on each testicle at an intratesticular artery. Serum homocystine measurement (normal range 6.3 - 11.2 μmol/l) and semen analysis were performed before and after a three month treatment with a vitamin combination (Folic acid: 300 μg, Pyridoxine(Vit. B6): 3.0 mg, Cyanocobalamin (Vit. B12): 3.0 μg) once daily.

RESULTS: An elevated pre-therapeutic mean serum homocystine level (13.5 μmol/l) was found in this group of patients, as well as a reduced testicular blood flow expressed by an elevated mean RI (0.66). After three months therapy, patients demonstrated a significantly (p=0.0001) increased sperm count from 43.9 ML/ml (pre-therapy) to 55.1 ML/ml (post-therapy) and a significant (p=0.0001) increase in motility from 18.5% (pre-therapy) to 27.0% (post-therapy) of progressive sperm. The mean serum homocystine levels decreased to 9.0 μmol/l (p=0.0001) in 18 patients with a pre-therapeutic sperm count of less than 20 ML/ml a significant (p=0.0001) increase in sperm density from 4.6 x 10⁶ (pre-therapy) to 78.3 x 10⁶ ML/ml, post-therapy mean 33.8 ML/ml and a significant (p=0.0001) increase in quality (pre-therapy mean 18.5% progressive sperm, post-therapy 21.5% progressive sperm) was observed.

CONCLUSIONS: In accordance to histological studies serum homocystine levels seem to be a possible marker for reduced blood flow in the testis as well as in other organs. Furthermore, supplementation of homocystine lowering vitamins seems to lead to an increase of sperm quality and quantity, even in patients with severe pathological sperm count. Further studies in larger groups of patients are urgently needed to investigate the relationship between homocysteine, testicular blood flow, sperm quality/quantity and diet.

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Significance of pre-implantation genetic diagnosis in azoospermic patients

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INTRODUCTION & OBJECTIVES: Injections of sperm has been used to treat male infertility caused by obstructive and non-obstructive azoospermia. Some data show significantly lower pregnancy rate in couples where testicular spermatozoa from non-obstructive azoospermia were used. These results can be explained by higher aneuploidy rate in embryos. The group can benefit from Preimplantation Genetic Diagnosis for Aneuploidy Screening (PGD - AS) by blastomere analysis.

MATERIAL & METHODS: We conducted, therefore, a prospective study in period 05/2003 – 10/2004 offering all couples with non-obstructive azoospermic (NOA) partner IC SI in combination with PGD-AS. Our aim was to compare the aneuploidy rate of embryos and reproductive outcome in TESE group versus other PGD – AS groups (age, implantation failure, ...). In patient with a clinical diagnosis of NOA microsurgical TESE were performed. Larger seminiferous tubules (probably with active spermatogenesis) were selectively excised, microdissected and examined for presence of spermatozoa. Obtained sperm were frozen; the samples were thawed and used for IC SI in dependence of female partner's stimulation. Embryos reaching at least 5-cell stage on day 3 were biopsied. The individually biopsied blastomeres were spread onto slide. A two round FISH procedure allowing to detect chromosomes X, Y, 13, 16, 18, 21 and 22 was performed; at the last 6 cycles was add chromosome 15. A retrospective analysis involved 14 TESE - PGD cycles in patient with normal karyotype.

RESULTS: Altogether 109 embryos were analyzed in this group: 46.8% were euploid for detected chromosomes. Embryo transfer was performed in 90% of cases, pregnancy rate per cycle has reached 55%. That is almost twice higher than in other groups included to PGD. In control group (26 TESE cycles without PGD) the pregnancy rate per cycle is 23%.

CONCLUSIONS: The results clarify that non-obstructive azoospermic patients profit from PGD-AS and this method should become standard part of ART in this group.

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Automated measurement of total antioxidant capacity of seminal plasma

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INTRODUCTION & OBJECTIVES: There is a balance between oxidants and antioxidants in organism. While oxidants increase, antioxidants are consumed. If the antioxidants are not sufficient against the oxidants, the balance shifts to oxidants, consequently oxidative stress occurs, which play a role in the etiopathogenesis of more than 100 disorders. Although there are some measurement methods to evaluate total antioxidant capacity (TAC) of seminal plasma, none method is appropriate for automated measurement in routine laboratory except more recently developed method by Erel. In this study, we measured seminal TAC and compared with a most widely used commercial method, Randox -TAS, and oxidative and antioxidative parameters of seminal plasma.

MATERIAL & METHODS: TAC values of semen samples were measured by both Randex -TAS assay and the novel assay measuring direct TAC using ABTS radical cation. Individual antioxidative parameters of semen; thiol content, vitamin C, albumin, globulin, uric acid and bilirubin were also measured. Oxidative status of seminal plasma was evaluated by measuring total peroxide, malondialdehyde and lipid hydroperoxide levels. The relationships among the measured parameters were analyzed using correlation test.

RESULTS: There was a significant correlation between the novel automated TAC measurement method and Randex-TAS assay (r= 0.92, p<0.0001). Vitamin C showed a significant correlation with TAC (r=0.69, p<0.0001). There was a significant correlation between TAC and thiol content (r=0.45, p<0.0001). On the other hand, negative correlations were found between TAC and total peroxide (r=-0.23, p<0.04), malondialdehyde (r=-0.28, p=0.03) and lipid hydroperoxide (r=-0.26, p=0.04) were determined.

CONCLUSIONS: The more recently developed fully automated TAC measurement method specifically determines TAC of seminal plasma, and it can be readily used to measure TAC of seminal plasma in routine activities or investigations.