The role of sperm chromatine structure in couple's infertility and its sensitivity to dietary manipulation

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Context: Oxidative damage to sperm DNA can be largely repaired either in the spermatid and, following fertilization, in the zygote, whereas there are no known repair mechanisms if the chromatin structure is impaired. Dietary interventions aimed at supporting sperm nuclear maturation may be of help to the reproductive outcome.

Objective: To improve reproductive outcomes in male idiopathic infertility.

Methods/intervention: 84 male partners of couples with at least 2 ART failures (range 2-6, mean 2.4) and with a sperm DNA fragmentation index (DFI) and/or a sperm nuclear decondensation index (SDI) > 20% were recruited irrespective of their spermiogram (1 out of 4 normospermic) and of female factors (present in 28 out of 84). They took a 4 month nutritional support with indirect antioxidants in preparation of a new ART attempt. The support contained a methyl donor (folic acid) to feed transmethylation, a cysteine donor to feed GSH synthesis and all the rate limiting co-factors for the concerned enzymes (Vit. B2, B6, B12, zinc). The product of concern, CondensylTM, also contained small amounts of Vit. E and of quercetine and betalaines. The DFI, as a measure of oxidative molecular damage, was assessed by TUNEL and the SDI, as a measure of integrity of chromatin tertiary structure, was assessed by blue aniline staining both before and after the treatment.

Results: 18 out of 84 couples experienced a spontaneous pregnancy and a live birth before the time for the planned ART. The remaining 66 couples underwent ART (4 IUI; 18 IVF; 44 ICSI) resulting in 22 further clinical pregnancies and 15 live births. The positive pregnancy outcome (spontaneous, ART, all pregnancies) was strongly related to the improvement of the chromatin structure, i.e. the decrease of the SDI (p<0.000) while the DFI showed only a borderline correlation with ART pregnancies (p=0.046).

Conclusion: Nutritional support with indirect antioxidants (Condensyl) may improve the clinical outcomes in couples infertility due to a male factor. The strong correlation between the pregnancies and the SDI decrease supports a main role of the sperm chromatin architecture in male reproductive efficiency and in couples infertility.