

## Abstract for oral presentation

### **COMBINATION OF MITOCHONDRIOTROPIC COMPOUNDS, ACETYL-L-CARNITINE AND L-CARNITINE FOR IMPROVING SPERM QUALITY IN PATIENTS**

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Infertility affects upto 15% of all couples trying to and in almost half of these cases, male infertility is the sole or a contributing factor. The most common cause of male infertility is related to sperm quality. This occurs in oligoasthenoteratozoospermia (OAT), the condition in which sperm concentration, and proportion of morphologically normal sperm and as well as the proportion of motile sperm are all lower than the normal WHO reference values.

Many studies have suggested that the sperm quality parameters can be improved by therapy with antioxidant such as vitamin C, vitamin E, glutathione. As well as by mitochondriotropic agents such as L-carnitine (L-C) and acetyl-L-carnitine (ALC). L-C plays a role in cell metabolism, acting as a shuttle of the activated long-chain fatty acids into the mitochondria, where beta-oxidation takes place. There is evidence that initiation of sperm motility is related to an increase of L-C in the epididymal lumen, and ALC in sperm cells. The carnitines may also protect the cell membrane against oxidative stress and damage.

Many clinical trials have shown beneficial effects of L-C and ALC in specific cases of male infertility. The combined L-C and ALC treatment in a controlled study of efficacy was effective in increasing sperm motility, especially in groups with lower baseline levels (Lenzi et al., 2004). An increase in pregnancy rate was also found. Similar effects on sperm parameters and pregnancy was also found in the study of Cavallini et al 2004. Further the study of Balercia (2005) showed the importance of the combination of the two carnitines since the greatest improvement of forward motility was found with LC plus ALC compared with LC only or ALC alone. Indeed, there are more than 11 Clinical trials which have shown efficacy of administering L-C and/or ALC to males with various forms of idiopathic infertility.

Studies are emerging showing that there are various treatments such as carnitines (L-C plus ALC), folate, follicle stimulating hormone, melatonin, that are able to reduce aneuploidies in various cell types including sperm cells (Cavallini (2012). The frequency of high levels of aneuploidy is inversely correlated with sperm count and progressive motility in infertile men (Vendrell et al., 1999; Vegetti et al., 2000). Studies also show that lower sperm aneuploidy frequency is associated with high pregnancy rates in ICSI programmes (Burello et al., 2003, Cavallini et al., 2012).

In conclusion therapy with carnitines and other antioxidant compounds can reduce sperm aneuploidy levels and improve the results of sperm quality and fertility potential. The carnitines and other antioxidant substances have anti-mutagenic protective capacity against genotoxic damage induced by various environmental insults e.g. exposure to X-rays or toxins, and can be utilized to reduce biological damage and therefore aneuploidy in various cells, especially sperm cells that are vital for optimal fertilization and pregnancy.

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口头报告摘要

## 靶向线粒体化合物（乙酰左卡尼汀和左卡尼汀）的联合治疗提高患者精子质量

波兰 比得哥什 男科学会议

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不孕不育影响高达 15% 的夫妇，几乎一半的病例中，男性不育是唯一的或其中之一的因素。男性不育最常见的原因是与精子质量有关。常见于少弱畸精子症患者，在这种疾病状态下，精子浓度、形态正常的精子比例和有活力的精子比例低于 WHO 的正常参考值。

许多研究表明，精子质量参数能够通过抗氧化剂（如维生素 C、维生素 E 和谷胱甘肽）治疗得到改善。也可以通过靶向线粒体药物，如左卡尼汀、乙酰左卡尼汀得到改善。左卡尼汀在细胞代谢中起重要作用，它作为唯一载体将活化的长链脂肪酸运入  $\beta$  氧化的场所——线粒体。有证据表明，精子活力的启动与附睾腔中左卡尼汀浓度增加以及精子细胞中乙酰左卡尼汀的增加有关。卡尼汀也可以保护精子细胞膜免受氧化应激和损伤。

许多临床试验显示左卡尼汀和乙酰左卡尼汀在男性不育具体病例中的获益效果。在一项疗效的对照研究中，左卡尼汀和乙酰左卡尼汀的组合治疗能有效提高精子活力，尤其是对低于基线水平组效果更明显(Lenzi et al., 2004)。同时出现怀孕率的增加。2004 年，Cavallini 等人的研究也发现了左卡尼汀和乙酰左卡尼汀对精子参数和怀孕的类似作用效果。Balercia 于 2005 年的进一步研究显示了左卡尼汀和乙酰左卡尼汀联合治疗的重要性，因为两种药物合用比单用左卡尼汀或乙酰左卡尼汀对精子向前移动能力的改善作用更强。实际上，有超过 11 项临床研究证实使用左卡尼汀和/或乙酰左卡尼汀能有效治疗各种形式的特发性不育症。

出现的研究显示，各种治疗，如卡尼汀系列（左卡尼汀加乙酰左卡尼汀）、叶酸、粗卵泡激素、褪黑激素能减少包括精子细胞在内的各种类型细胞的非整倍性 (Cavallini (2012)。高水平的异倍体率与男性不育患者精子数量和前进运动精子数呈负相关 (Vendrell et al., 1999; Vegetti et al., 2000)。研究也显示在接受胞浆内精子注射技术 (ICSI) 治疗的患者中，更低的精子异倍体率与高怀孕率有关(Burello et al., 2003, Cavallini et al., 2012)。

综上所述，用卡尼汀系列药物和其他抗氧化化合物治疗能减少精子异倍体水平，提高精子质量和生育能力。卡尼汀系列药物和其他抗氧化剂具有抗突变的保护能力，对抗由环境损伤（如暴露于 X 射线或毒素）引起的基因毒性，能用于减少生物损伤和各种细胞，尤其是精子细胞的异倍体性，这一点对优生优育是至关重要的。