

# Effectiveness of L-Carnitine, L-Acetyl-Carnitine and N-Acetyl-Cysteine in Male Idiopathic Asthenozoospermia

## Introduction

- Around 50% of infertility cases in childless couples are due to male factors, and about 44% of infertile men have idiopathic infertility, characterised by unclear pathogenesis and no evidence-based treatment.
- LC supports sperm energy metabolism and motility, with higher LC and LAC levels linked to improved sperm function.
- NAC acts as a potent antioxidant, improving sperm motility and concentration, enhancing the acrosome reaction and reducing ROS and DNA oxidation.

## Objective

- To assess the effectiveness of LC/LAC and NAC in improving sperm parameters in men with idiopathic asthenozoospermia.

## Study details

A meta-analysis was conducted in accordance with the PRISMA guidelines.



### Inclusion criteria

- Men with idiopathic male infertility treated with LC/LAC or NAC



### Total studies analysed

- Seven randomised controlled trials with 621 patients

## Results



### LC/LAC vs placebo

- Sperm motility ↑ 9.48% ( $p = 0.03$ )
- Normal morphology ↑ 4.89% ( $p = 0.006$ )
- Sperm concentration ↑ 11.17 million/mL ( $p = 0.25$ )
- Ejaculated volume ↑ 0.13 mL ( $p = 0.25$ )



### NAC vs placebo

- Sperm motility ↑ 4.69% ( $p < 0.00001$ )
- Normal morphology ↑ 1.68% ( $p = 0.0002$ )
- Sperm concentration ↑ 3.8 million/mL ( $p < 0.00001$ )
- Ejaculated volume ↑ 0.69 mL ( $p = 0.002$ )

## Sperm motility

- LC/LAC did not show a significant effect on sperm concentration (Figure 1).

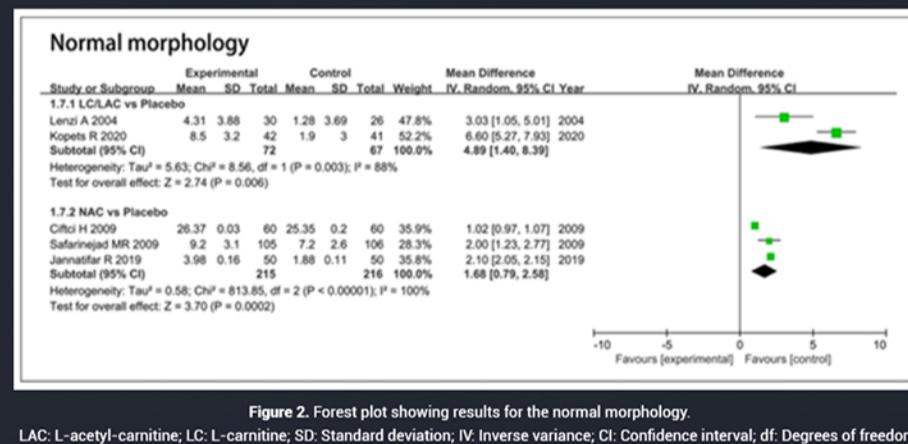


Figure 1. Forest plot showing results for the sperm motility.

LAC: L-acetyl-carnitine; LC: L-carnitine; SD: Standard deviation; IV: Inverse variance; CI: Confidence interval; df: Degrees of freedom.

## Normal morphology

- Both supplements led to significant improvements in sperm morphology (Figure 2).

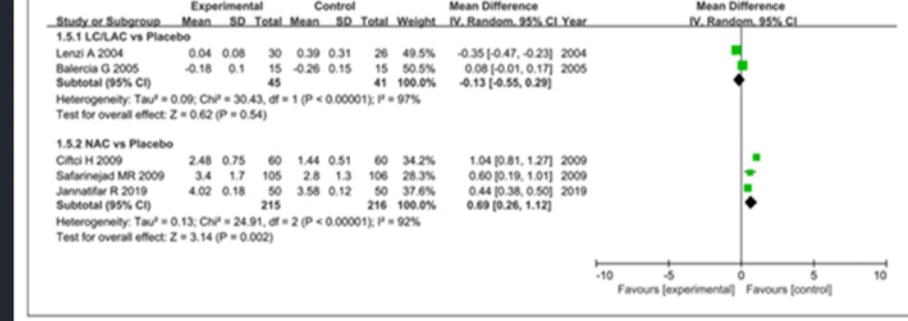


Figure 2. Forest plot showing results for the normal morphology.

LAC: L-acetyl-carnitine; LC: L-carnitine; SD: Standard deviation; IV: Inverse variance; CI: Confidence interval; df: Degrees of freedom.

## Sperm concentration and ejaculate volume

- NAC showed a significant increase in sperm concentration and ejaculate volume (Figure 3).

- LC/LAC did not show significant effects on sperm concentration.

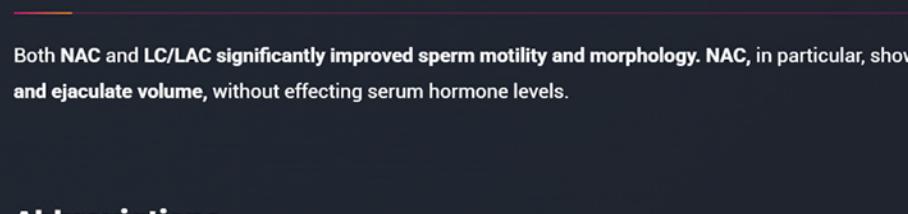


Figure 3. Forest plot showing results for the ejaculate volume.

LAC: L-acetyl-carnitine; LC: L-carnitine; SD: Standard deviation; IV: Inverse variance; CI: Confidence interval; df: Degrees of freedom.

## NAC on serum hormones

- No significant difference was observed in the levels of testosterone, luteinising hormone, follicle-stimulating hormone and prolactin.

## Conclusion

Both NAC and LC/LAC significantly improved sperm motility and morphology. NAC, in particular, showed a notable effect on sperm concentration and ejaculate volume, without affecting serum hormone levels.

## Abbreviations

LAC: L-acetyl-carnitine; LC: L-carnitine; NAC: N-acetyl-cysteine; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

## Reference

Wei Q, Zhou Z, Cui Y, et al. A meta-analysis of the efficacy of L-carnitine/L-acetyl-carnitine or N-acetyl-cysteine in men with idiopathic asthenozoospermia. *Am J Mens Health*. 2021;15(2):557-583. doi:10.1177/15579883211011371. Link for download: <https://journals.sagepub.com/doi/pdf/10.1177/15579883211011371>