Nutrients found naturally in semen include vitamins E, C, folate, zinc, selenium, carnitine and carotenoids [1]

**Dunaliella salina, lycopene and vitamin A**

Carotenoids especially betacarotene, vitamin A and lycopene have been shown to boost sperm parameters [2-5]
Dunaliella salina is a microalgae which is a naturally rich source of mixed carotenoids including lycopene [6]
Betacarotene, lycopene and vitamin A can reduce sperm DNA fragmentation and lipid peroxidation [1, 2]
Vitamin A is an essential nutrient for the maintenance of normal spermatogenesis [7, 8]
Animal studies have shown that vitamin A deficiency leads to sperm abnormalities and infertility [9-11]
Low levels of vitamins A and E have been associated with abnormal sperm parameters in men and anovulation in women [12]

**Vitamin E**

One study using 400mg of vitamin E with 225mcg of selenium over 3 months showed a significant improvement in sperm motility and a decrease in lipid peroxidation [13]
Low levels of vitamins A and E have been associated with abnormal sperm parameters in men and anovulation in women [12]
A meta-analysis showed an increase in mortality from taking high-dose vitamin E supplements defined as >400iu (268mg) per day [14]
This study demonstrated a pro-oxidant effect with supplementation of 500mg vitamin E daily over 6 weeks compared to placebo [15]
300mg vitamin E daily for 6 months improved sperm motility, increased fertilisation rates and decreased lipid peroxidation [16]
High levels of vitamin E may antagonise other fat soluble vitamins. 200mg daily is a therapeutic amount that should be safe long term.

Gamma-tocopherol has better anti-inflammatory properties than alpha-tocopherol and taking alpha tocopherol depletes gamma-tocopherol. Mixed tocopherols that are lower in alpha-tocopherol allow much higher levels of the other tocopherols which is how they occur in nature and have more effective antioxidant and anti-inflammatory activity [17] Since high levels of alpha-tocopherol dramatically deplete gamma-tocopherol the benefits of alpha tocopherol may be overshadowed by the adverse effects of a depletion of gamma-tocopherol.

This study showed 200mg vitamin E daily for at least 3 months was found to improve the IVF fertilisation rates [18]

**Vitamin C**

This study showed a significant increase in sperm count, motility and morphology from 2000mg of vitamin C daily over 2 months [19]

Some studies using less than 2000mg did not show an improvement, however the vitamin C was taken in isolation and it is reasonable to assume that a combination of nutrients such as those found in a multivitamin/mineral supplement would have a synergistic beneficial effect on sperm parameters as shown in these studies [20, 21]

One study showed that 200mg taken daily for more than 3 weeks was equivalent to taking 1000mg of vitamin C daily in terms of improvement of sperm parameters with the biggest improvement shown in sperm agglutination (the presence of sperm antibodies that stick together). After 2 months, several men in both treatment groups impregnated their wives compared to none in the placebo group [22]

**Alpha lipoic acid**

Alpha lipoic acid 600mg – significantly increased sperm count and motility [23]

Alpha lipoic acid recycles vitamins C, E, CoQ10 and glutathione – all essential nutrients for healthy sperm parameters [24]

Many animal studies have shown a reduction of oxidative stress in sperm in vitro with alpha lipoic acid (see Google Scholar for a list of references)

**Thyroid function**

Be aware of supplementing with l-carnitine, especially long term as it does interfere with thyroid function and is actually used in the treatment of hyperthyroidism [25, 26]
Hypothyroidism can affect spermatogenesis and the longer a man is hypothyroid, the more damage to the testes [27]. It adversely affects all sperm parameters – count, motility and morphology and affects erectile function [28].

Iodine, zinc and selenium are essential for healthy thyroid function and are often deficient in the diet.

**Folate and B12 supplementation**

Higher folate intake is associated with a lower incidence of sperm aneuploidy [29].

Folate and in particular B12 are significantly associated with a higher sperm count. The dose shown to be beneficial for sperm parameters in studies for B12 is 1000mcg to 6000mcg daily [30] [31].

One study using 1000mcg of B12 daily in men with a sperm count of less than 20 million/ml showed an increase to over 100 million/ml in 27% of men by the end of the study [32].

**Selenium**

In a 3-arm trial, 100mcg of selenium was compared with 100mcg of selenium, 1mg of vitamin A, 10mg of vitamin C and 15mg of vitamin E and in the third group a placebo. Both groups that contained selenium showed an improvement in sperm motility but not count [33].

**Zinc**

When serum zinc levels are low the risk of poor sperm parameters is higher [34].

Zinc is an essential mineral in male reproduction and aside from improving sperm parameters it also boosts testosterone [35].

66mg of zinc sulfate and 5mg of folic acid for 6 months was shown to significantly improve sperm parameters [36].

250mg of zinc sulfate twice daily for 3 months was shown to improve sperm quality, count, progressive motility, fertilising capacity and reduced antisperm antibodies [37].

Zinc citrate is a high quality form of zinc which is more easily absorbed than zinc sulfate therefore lower doses can be used to achieve therapeutic efficacy. 24mg of zinc daily should be sufficient without affecting copper levels.

The textbook “Human Reproductive Biology” by Lopez and Jones, recommends zinc and magnesium supplementation but doesn’t refer to any references.
Copper

When copper levels are higher than zinc, the risk of poor progressive motility is higher [34]

However, we should be careful about overdoing it with zinc supplementation as most men have copper levels at the lower end of normal due to lower oestrogen levels than women.

Fish oils

This systematic review showed that DHA supplementation had no effect on sperm parameters [1]

However, this study showed that infertile men have a lower concentration of omega-3 fatty acids in sperm than fertile men [38]

L-Carnitine

Studies have had mixed results with this nutrient, with one study showing no improvement in sperm motility [1]

Something to be aware of is that l-carnitine can interfere with thyroid function (see thyroid function) so it should only be used as a last resort and not as part of a standard preconception/fertility protocol.

References

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