



# Preconception

Although half the pregnancies in the United States are unplanned, preconception can be viewed as a time to build nutritional reserves. This is a particularly opportune time for a healthier lifestyle and better dietary behaviors. Any supplementation should be limited to nutrient intakes that are safe during the first trimester of pregnancy. Indeed, by the time mom knows that she is pregnant; the embryo is likely to be several days, if not weeks, old. The embryo is most sensitive to environmental changes during early pregnancy. Supplementation must therefore be restrained during this period.

Most couples have a strong desire to have children, the latest survey of Australian women reported that 71.4% of women want one or two children and 19.2% wish for three or more children, leaving 9.3% of women not wanting children.<sup>15</sup> Unfortunately, almost a quarter of couples experience fertility issues. Infertility is the inability to conceive after attempting to become pregnant for 12 or more months. Forty to fifty percent of the difficulties are related to women, 30% are related to men, 20 to 30% are combinations of factors affecting both partners, and 15% of infertility is of unknown cause. Female reproductive physiology is far more complex than men's, which makes the preconception period an excellent opportunity to provide nutrients to support female reproductive function. Depending on their age, 7- 28% of women experience reproductive difficulties.<sup>16</sup>

Body weight and body composition influence fertility. For instance, the Frisch hypothesis postulates that menarche will not occur until at least 17% of body weight is fat.<sup>17</sup> Weight variations lead to abnormal reproductive ability in women. Women who over exercise or lose the equivalent of 10 to 15% of their normal body weight tend to become amenorrheic (absence of menstruation). Overweight women are also prone to amenorrhea.<sup>18</sup> It is not surprising that weight influences fertility; the increased metabolic

requirements of pregnancy require sufficient energy reserves for successful outcomes. Furthermore, infant birth weights are correlated to survival and birth weights are also correlated to maternal weight at conception.<sup>19</sup> Maternal weight is not only important for conception but also for a successful pregnancy.

The anguish of infertility can be alleviated by several nutrients shown to be beneficial for those who are not able to conceive. Just as appropriate energy stores are necessary for normal reproduction, so are stores for other essential nutrients. Any nutritional inadequacies during this precarious period may preclude new beginnings. Nutritional support was shown to improve fertility in women with reproductive difficulties. In a double-blinded placebo controlled study, 15 women trying unsuccessfully to conceive received dietary supplementation while another 15 women received a placebo. Thirty-three percent of the women receiving the dietary supplement were pregnant within three months while none of the women in the placebo group conceived.<sup>20</sup>

## Nutrients with significant benefits related to successful conception include:

### Vitamin B12

Vitamin B12 deficiency leads to pernicious anemia, which in turns leads to infertility in men and women. Normal reproductive function returns after supplementation. It appears that a deficiency in vitamin B12 leads to higher homocysteine levels and hypercoaguability, which may lead to fetal loss.<sup>21</sup>

### Folate

Folate deficiency may be the reason behind some cases of infertility. In case reports, three infertile celiac disease patients showing signs of folate deficiency all became pregnant after folate supplementation.<sup>22</sup> In animal models, diets deficient in folic acid reduce fetal implantation in the uterus by 50% while increasing pregnancy loss,<sup>23</sup> congenital defects and growth retardation.<sup>24</sup>

### Selenium

In males, selenium deficiency is linked to decreased testosterone biosynthesis. In animals, deficiencies lead to abnormal and immobile sperm.<sup>25</sup> The role of selenium in female reproduction may be related to the enzyme glutathione peroxidase, a powerful antioxidant that protects cellular membranes from oxidation.<sup>26</sup>

## Zinc

Second essential trace element in importance after iron, zinc is needed for fetal development and dietary needs during pregnancy are heightened. Zinc is required for spermatogenesis and oogenesis, which explains why 40% of infertile women in a French study were deficient in zinc.<sup>27</sup>

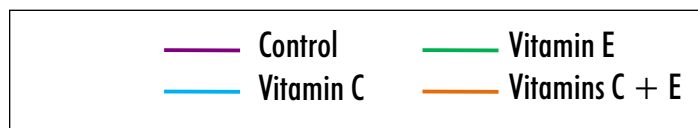
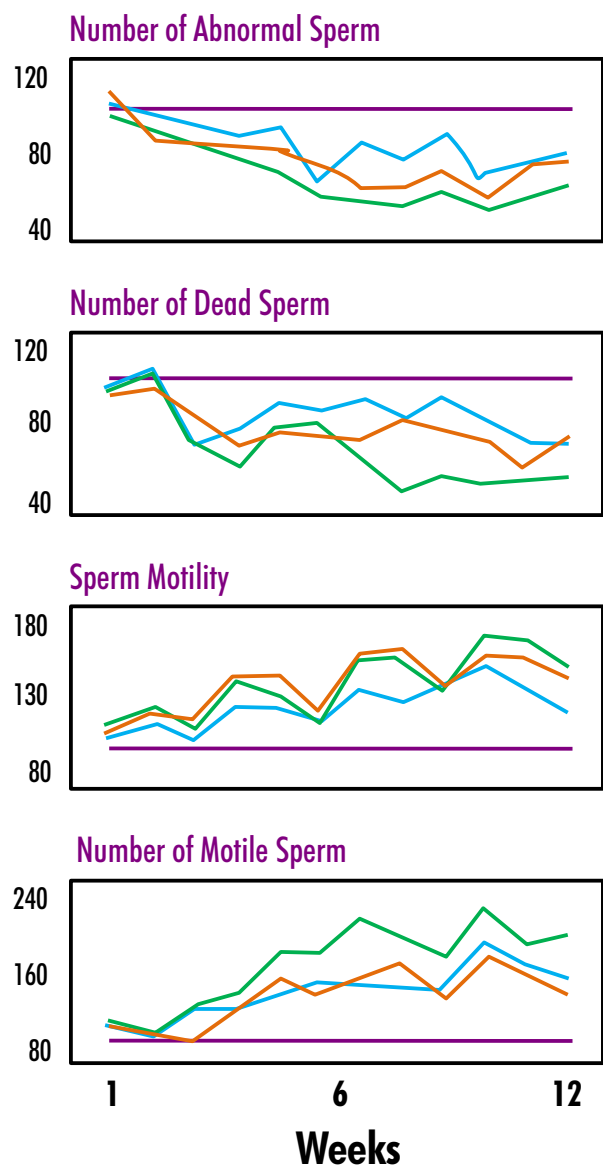
## Oxidative Stress and Reproduction

In health, antioxidants and pro-oxidants should always remain balanced in our body. If this delicate equilibrium is upset, serious consequences may be experienced especially in couples wanting to conceive. Increases in reactive oxygen species may affect both the fertilization and implantation of eggs.<sup>28-29</sup> Oxidative stress may also be related to pathologies which themselves lead to reproductive difficulties and female reproductive tract pathologies such as endometriosis and pre-eclampsia.<sup>30-31</sup> Although more research is needed to uncover the extent and the implications of excessive oxidative stress or insufficient antioxidant defenses in cases of infertility, increasing evidence suggests that free radicals may be at fault in female reproductive difficulties.



Antioxidants, such as vitamin C and vitamin E, may be important nutrients for the treatment and prevention of infertility. In the human body, vitamin C concentrations are highest in the pituitary, adrenals, testes and ovaries.<sup>32</sup> In males, vitamin C deficiency has been linked to low sperm counts and reduced sperm motility. Not surprisingly, vitamin C and vitamin E supplementation improves sperm quality (see Graphs 3 to 6).<sup>33</sup> In women, high concentrations of vitamin C in the ovaries may support rapid follicular growth, collagen synthesis and the development of the corpus luteum (necessary for fetal implantation).<sup>34</sup> Large amounts of vitamin C are required during pregnancy, and it was suggested in 1973 that all pregnant women should be supplementing their diet with at least 500 mg of vitamin C.<sup>35</sup> Current recommended daily intakes for vitamin C are 80 mg per day with the upper tolerable level set at 2000 mg.

Sperm Characteristics (% of control)



Graphs 3-6. Changes in total abnormal and dead sperm, sperm motility index and total motile sperm during treatment of rabbits with Vitamin C, Vitamin E and their combination.