

Nutritional Supplementation in Pregnancy

Introduction:

It goes without saying that Nutrition in Pregnancy is vitally important for the developing fetus. Dietary requirements are increased substantially in a pregnant woman, and if she does not have enough in the way of proteins, vitamins and minerals in her own body stores, then her baby could be compromised. It has been clearly established that Pregnant women in Australia are not meeting their daily requirements. There are many reasons for this not least of which is the fast pace and busy nature of life today that leans people towards convenience foods..

So what is adequate nutrition in pregnancy? This can be a difficult question to answer but there are some guidelines in the RDI's (Recommended Dietary Intake). Food is not only made up of Carbohydrates, Fat and Protein. It is also made up of Vitamins and Minerals which are also necessary and vital to the function of the body and its organs.

Pregnant and lactating women have nutritional requirements that generally exceed those of the rest of the population. The recommended dietary intakes (RDI) of most essential nutrients are higher for pregnant and lactating women. Most of the increased nutrient needs go to nourish the growing foetus, the placenta and the expanded maternal blood volume.

However, data from the Australian Bureau of Statistics (ABS)¹ show that pregnant women may have an intake of some vitamins and minerals far below the RDI. According to the survey, intakes of vitamins A, B1, B2, folate and vitamin C, and the minerals calcium, magnesium and zinc were less than the RDI. Inadequate intakes of micronutrients from the diet have been correlated with an increase in the number of premature deliveries and a decrease in birth weight. In an American study of low-income women by Scholl et al², women who took vitamin and mineral supplements during the first two trimesters had a two-fold decrease in pre-term deliveries and a seven-fold decrease in low birth weight deliveries (when supplemented during the first trimester).

In addition, there may be more global benefits of optimising nutrition during the perinatal period There are now several studies that show that the weight and size of the baby at birth (after correcting for the size of the parent) are predictive of later health outcomes. In essence the research tells us that the smaller the baby the more chance that the child will grow to be susceptible to diabetes and heart disease. It is thought that the size of the infant is influenced by the flow of nutrients from the mother to the growing foetus, and that this in turn can be influenced by the nutritional state of the mother.

How can women achieve their RDI for all nutrients?

Several studies demonstrate that despite becoming pregnant most women do not change their diets in response to changing dietary needs. This is also supported by the results of the 1995 National Dietary Survey where the intakes of specific nutrients for all women sampled were similar to those reported by pregnant women. Many women take supplements during pregnancy to complement their dietary intake and it is likely that only through some form of supplementation will women be able to meet their RDI. Supplementation during pregnancy and breast-feeding can offset some of the nutritional deficiencies during this time of increased nutrient demand. The most important nutrients in maternal and infant nutrition include essential fatty acids, iron, folate, calcium and iodine.

Folate And Neural Tube Defects (NTDS)

The protective effect of folate against NTDs was suggested more than 30 years ago³, and results from prevention trials were first published 22 years ago. In 1993 Australia's National Health and Medical Research Council advised that women with a close family history of NTDs should take a supplement of 5mg folate per day periconceptionally, and low risk women should take 0.5mg (500mcg) daily.

While the RDI for pregnant and lactating women is 400mcg (twice that of non-pregnant women), the ABS survey showed a mean dietary intake of just 240mcg daily.

NTDs such as spina bifida arise from failure of the neural tube to close (this normally happens in the first month of pregnancy).

Many women will not know they are pregnant until **after** the first month, so it is important that medical authorities continue to publicise the benefit of periconceptional folate.

Essential Fatty Acids - The role of DHA

Essential fatty acids of the omega-3 and omega-6 series have achieved vitamin-like status over the last few years. While the ideal ratio of omega-6 to omega-3 fatty acids found in nature is 1 to 1, a modern diet has a ratio of more than 10 to 1. This imbalance can be corrected by supplementing with omega-3 fatty acids which are found in cold water fish, flaxseed and dark green vegetables; they came into prominence in the 1980s for their ability to lower triglycerides. Their major components are long chain polyunsaturated fatty acids (LCFAs) called eicosapentanoic acid (EPA) and docosahexaenoic acid (DHA). DHA is a major component of brain lipids and is essential for development of the brain and vision in the foetus.

A constant supply of DHA during lactation is also important, given that the maternal blood DHA levels drop by around 30% after birth. Dr Bob Gibson and Dr Maria Makrides from the Flinders Medical Centre Department of Paediatrics and Child Health measured visual acuity in 2 groups of infants who received either a DHA supplemented formula feed or a placebo⁴. They showed that the DHA-fed infants maintained blood levels of DHA and had faster development of visual acuity over the 30-week study.

Sodium, which occurs in excess in the diet and for which there is no increased requirement during pregnancy and lactation, is not included. Similarly there is no increased need for potassium (although a small amount is present as the iodide salt in the Blackmores's formula).

Calcium, magnesium and phosphorus are all present in the Blackmore's capsule, but it is not possible to achieve RDI levels for them in a multivitamin and mineral complex with just 2 capsules daily.

Vitamin A - essential for reproduction, growth, vision and development of the embryo and the foetus. Present as natural mixed carotenoids from the alga *Dunaliella salina*, which consists predominantly of beta-carotene (pro-vitamin A) together with; lycopene, lutein and zeaxanthin. **It is important** to understand that although Liver is a good source of Vitamin A, Liver should **not** be taken in pregnancy because of a 20 to 30 fold increase in the amount of Vitamin A which can be harmful to the fetus.

Vitamin B - B1, B2, B3, B16 and B12 are present as part of the B complex of vitamins, which are required for the release of energy from food. The increased energy requirement during pregnancy and lactation is associated with an increased requirement for B vitamins. While the level of pyridoxine (B6) in the formula is the RDI, the amount required for the prevention of the nausea of morning sickness is usually much higher - 25mg or more - and would need to be obtained separately. During pregnancy the blood volume of the mother expands to accommodate the extra supply of nutrients to the foetus - there is consequently a need for extra cyanocobalamin (B12), which is also required for healthy blood.

Folate/Folic Acid - is important for neural tube development and prevention of brain and spinal defects, which affect almost two in every thousand pregnancies. Also important for formation of haemoglobin. Two capsules provide 400mcg folate.

Vitamin C - is involved in healthy nerve function due to its role in the formation of neurotransmitters.

Vitamin E - protects lipid membranes and red blood cells. Is a strong antioxidant and helps prevent the oxidative breakdown of beta-carotene and long chain fatty acids. A deficiency in vitamin E is associated with low birth weight.

DHA - essential for brain and vision development. There is no RDI for DHA, however, according to Dr Bob Gibson, a daily dose of between 200 and 400mg normalises plasma levels of DHA.⁵

Iron - the amount of iron allowed for sale over the counter is governed by poison regulations. At 10mg elemental iron daily, the formula contains the maximum allowable for open sale, but it is less than the RDI of 22-36mg for pregnant women. Iron needs increase markedly during pregnancy, and vitamin C increases the absorption of iron. Vegetarians are at greater risk of iron deficiency during pregnancy.

Calcium - essential for development of bones and teeth. Increased intake is necessary during pregnancy and lactation to minimise maternal bone demineralisation - up to 7% of calcium stored in maternal bones can be lost to the developing foetus. This continues after birth, with up to 700mg of calcium secreted daily during lactation. This can have important consequences for the mother. An American study⁶ showed that women who received calcium supplements during pregnancy had half the incidence of post-natal blues as those who did not.

Magnesium - strengthens connective tissue, regulates muscle response and is essential for transmissions within the nervous system.

Zinc - plays a role in many enzyme systems and is necessary for growth, particularly during first and second trimesters. Zinc deficiency is associated with pre-term delivery and low birth weight.

Iodine - present as potassium iodide. Iodine is part of the system that maintains overall metabolic rate, the development of the central nervous system, and growth. It is very important that **Iodised Salt** is purchased and used in cooking as this is one of the main sources of Iodine. Another excellent source is saltwater fish.

REFERENCES:

1. Blackmores: http://www.blackmores.com.au/news/news_detail.asp?art=323
2. National Nutrition Survey 1995;
3. Scholl TO, Lediger ML, Bendich A et al. Use of multivitamin/mineral prenatal supplements: influence on the outcome of pregnancy. *AmJEpidemiol* 1997; 146 (2): 134-141;
4. Hibbard LS, Smithells RW. Folic acid metabolism and human embryopathy. *Lancet* 1965; 1:1254;
5. Gibson R, Makrides M et al. Are Long-Chain Polyunsaturated Fatty Acids Essential Nutrients in Infancy? *The Lancet* Vol. 345 June 10 1995;
6. Gibson R, Should Pregnant Women Eat More Fish? *Perspectives in Food and Nutrition*, Issue 6, March 1997, Burson - Marsteller;
7. McCarron D et al. *Australian Doctor*, 3rd July 1998: 45.

BLACKMORES PREGNANCY AND LACTATION

ELEVIT

Active Ingredients Per Blackmore Capsule	Dose	One Elevit tablet contains	
		Gluten free and No Lactose	
		VITAMINS	
Omega-3		Thiamine nitrate (B1)	
Fish oil - natural (Tuna oil)	500 mg	Riboflavine (B2)	1.8 mg
containing omega-3 marine		Nicotinamide (B3)	19 mg
triglycerides 160mg as:	125mg	Pyridoxine hydrochloride (B6)	2.6 mg
Docosahexaenoic acid (DHA)		Cyanocobalamin (B12)	4 mcg
Eicosapentaenoic acid (EPA)	25mg	Ascorbic Acid (C)	100 mcg
9 VITAMINS		Cholecalciferol (D)	500IU 12.5mcg
Vitamin B1 (Thiamine nitrate)	500 mcg	Tocopherol (E)	15 mg
Vitamin B2 (Riboflavin)	750 mcg	Calcium pantothenate (B5)	10 mg
Nicotinamide	7.5 mg	Biotin (B8)	200 mcg
Vitamin B6 (Pyridoxine hydrochloride)	750 mcg	Folic acid (B9)	800 mcg
Vitamin B12 (Cyanocobalamin)	1.5 mcg		
Folic acid	200 mcg	MINERALS AND TRACE ELEMENTS	
Vitamin E (d-alpha-Tocopherol 3.5 mg)	5.2 IU	Calcium	125 mg
Vitamin C (Ascorbic acid)	30 mg	Magnesium	100 mg
Mixed carotenoids (as Dunaliella salina)	2.88mg	Phosphorus	125 mg
(natural source) extract equiv.		Iron (as ferrous fumarate 183 mg)	60 mg
to fresh cell 72mg)		Zinc	7.5 mg
6 MINERALS		Copper	1 mg
Calcium*	59mg	Manganese	1 mg
Phosphorus* (as Ca H ₂ PO ₄ anhydrous 200mg)	45.6mg		
Magnesium (as magnesium oxide - heavy 49.8mg)	30mg		
Iron (as ferrous fumarate 15.7mg)	5mg		
Zinc (as zinc sulfate monohydrate 22.2mg)	8mg		
Iodine (as potassium iodide 98mcg)	75mcg		

RECOMMENDED DIETARY INTAKES (RDI'S)

RDI's for Women (Expressed as mean daily intake)	Women		
	19-54 yrs	Pregnant (extra)	Lactating (extra)
Vitamin A (µg retinol equivalents)	750	0	450
Riboflavin (mg)	1.2	0.3	0.5
Niacin (mg niacin equivalents)	13	2	5
Vitamin B-6 (mg)	0.9-1.4	0.1	+0.7-0.8
Total folate (µg)	200	200	150
Vitamin B-12 (mg)	2	1	0.5
Vitamin C (mg)	30	30	45
Vitamin E (mg alpha tocopherol equivalents)	7	0	2.5
Zinc (mg)	12	4	6
Iron (mg)	12-16	+10-20	0
Iodine (µg)	120	30	50
Magnesium (mg)	270	30	70
Calcium (mg)	800	300	400
Phosphorus (mg)	1000	200	200
Selenium (µg)	70	10	15
Sodium (mmol)	40-100	0	0