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**Dietary Sources of Vitamin D**

- Cod liver oil
- Salmon
- Mackerel
- Tuna fish
- Sardines
- Milk (vitamin D fortified)
- Margarine (fortified)
- Fortified cereals
- Egg yolk
- Liver (beef)
- Cheese

Source: [National Institutes of Health](#)

**The Nebraska Challenge – Getting Closer Every Day**

In September, we announced a \$50,000 challenge grant for Nebraska that would match new contributions, dollar for dollar, in order to fund statewide DVD distribution and teacher training. Since that time, donations totaling \$42,300 have been received toward that end. This amazing generosity exhibited by individuals around the country will help build a healthier, brighter future for Nebraska's students and their future children.

Of course, this is no time to rest. Another \$7,700 is needed to fully match the challenge grant and another \$33,229 is needed to reach the campaign goal of \$160,229 for the entire state. If you want to help bring prenatal development-based education to Nebraska, we encourage you to please send a gift now.

**Did You Know?**

- Vitamin D is not a vitamin. It's actually a hormone made by the body that can also be obtained in the diet.
- Breastmilk contains very little vitamin D, so it is advised that breastfed infants be given supplements.
- Excess Vitamin D is stored in the liver. These reserves can meet the body's needs for several months.
- Sunscreen with spf > 8 completely blocks vitamin D production in the skin.

**Our Next Issue**

The next issue of The Insider will be published in January 2008.

We wish everyone a wonderful, safe, and healthy holiday season.

**Greetings**

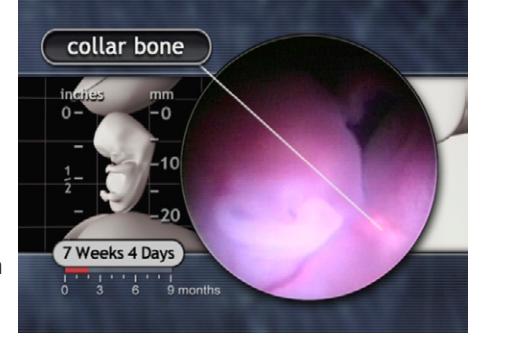
This month we present Part 3 in our series explaining the link between prenatal health and lifelong health.

As you will see, obtaining adequate vitamin D and calcium in our diets is a very wise thing to do before, during, and after pregnancy.

**Vitamin D: What You Should Know**

Developing healthy bones requires the presence of plenty of the right ingredients (such as calcium, phosphate, magnesium, copper, vitamin D, etc.) and the absence of environmental poisons (such as tobacco, alcohol, lead, cadmium, etc.). Even then, perfect development is not guaranteed.

Bone formation begins four to six weeks after fertilization with the appearance of soft connective tissue and/or cartilage. These tissues are eventually transformed into rigid bone by combining proteins such as collagen with minerals such as calcium and phosphate.



The process of forming bone is called ossification. It begins in the collar bones and jaw bones around 6½ weeks after fertilization.<sup>[1]</sup> By about 10 weeks, ossification is underway in most bones.<sup>[2]</sup> In specific portions of some bones, ossification begins during the teenage years.

The presence of vitamin D is crucial for normal bone development and health throughout life. Bones need it to incorporate calcium and phosphate. It also facilitates calcium and phosphate absorption from the intestines and limits the loss of calcium in the urine.<sup>[3]</sup> During pregnancy, vitamin D greatly enhances each mother's ability to absorb calcium from her diet,<sup>[4]</sup> thus protecting her bones from losing the large amounts of calcium needed by the baby.

Mothers who lack adequate vitamin D tend to give birth to smaller babies with a lower birth weight and lower bone mass.<sup>[5]</sup> These kids tend to develop bones with reduced mineral content<sup>[6]</sup> and face a higher risk of osteoporosis later in life. Osteoporosis is a disease where bone mineral content and density are significantly reduced, resulting in weak bones that are prone to fracture with minor injury. This is a major issue in women's health.

Severe vitamin D deficiency is the most common cause of rickets in children and osteomalacia in adults. Children with rickets have weak, soft bones that are often deformed (bowed legs are common) and easily fractured. They may experience bone pain, muscle weakness, and muscle spasms. Symptoms usually resolve by supplying adequate vitamin D, calcium, and phosphate.<sup>[7]</sup> Likewise, adults who suffer from osteomalacia also have soft bones and experience bone pain, muscle weakness, and bony fractures.<sup>[8]</sup>

Having enough vitamin D during pregnancy and early childhood appears to significantly reduce the risk of Type 1 diabetes<sup>[9]</sup> and facilitate normal development of the nervous system and immune system.

**Sources of Vitamin D**

Our bodies get an inactive form of vitamin D from dietary sources [see other side] or dietary supplements and by producing it in our skin following exposure to the UV-B component of sunlight. This inactive vitamin D is modified in the liver and then the kidney to make a number of different active forms.<sup>[10]</sup>



How much sun exposure will produce enough vitamin D? The answer varies. First of all, the UV-B rays of sunlight are not delivered to the earth's surface unless the sun is high in the sky. Many locations at higher latitudes pass through entire seasons where UV-B rays are simply not present and no vitamin D can be obtained through sunlight. In case you are wondering, tanning booths should not be considered a viable solution for vitamin D deficiency.

Some authors advise that fair-skinned people require approximately 15 to 20 minutes of UV-B sunlight exposure to their face and hands daily.<sup>[11]</sup> Individuals with more melanin in their skin (as evidenced by darker complexions) require more sun exposure for an equivalent effect. Individuals living in climates above a latitude of 37 degrees or those who cover all of their skin with clothing or routinely use sunscreen are very unlikely to receive the sun exposure needed to produce adequate Vitamin D.

The risk of skin cancer increases with sun exposure as does the likelihood of prematurely aged skin. To prevent these complications while still gaining some vitamin D from the sun, some clinicians recommend applying sunscreen after 15 minutes of sun exposure.<sup>[12]</sup> A good alternative is to obtain your entire vitamin D requirement from diet and supplements and leave the sun out of the equation.



**How Common are Low Vitamin D Levels?**

Alarming percentages of people with low vitamin D levels have been reported in all latitudes, all ages, and including women who are pregnant. A study<sup>[12]</sup> of 400 pregnant women [200 African American and 200 white] and their newborns in Pittsburgh was published earlier this year. The results are astounding.

**% of Pregnant African American and White Women and Their Newborns With Low Vitamin D Levels**

Vit. D Levels	Pregnant Women		Newborns	
	AA	White	AA	White
Low	54.1%	42.1%	46.8%	56.4%
Very Low	29.2%	5.0%	45.6%	9.7%
Totals	83.1%	47.1%	92.4%	66.1%

AA = African American

The overall high prevalence, the racial disparities, and the long-term implications of this study are staggering. Even more troubling is that more than 90% of these pregnant mothers were taking prenatal vitamins.

The pregnant women and newborns in this study are not alone. Low vitamin D levels are common in certain populations in the US, Europe, Asia, Africa (one of the five most common diseases among children), the Middle East<sup>[13]</sup> and many other places. Some populations suffer seasonal deficiencies in late winter and spring due to reduced sun exposure.<sup>[14]</sup> Others experience chronic low levels

**There's More Than Bones at Stake**

Inadequate vitamin D reportedly increases the risk of type 1 diabetes, schizophrenia, rheumatoid arthritis, multiple sclerosis, and cancer (of the colon, breast, pancreas, prostate, and ovary), and lowers resistance to a variety of infections including tuberculosis.<sup>[3]</sup>

**Do You Need More Vitamin D?**

The best way to find out if you need more vitamin D is to ask your doctor for a simple blood test. Too much vitamin D can also be dangerous, so please do not guess about whether or not you have enough.

Like all things related to your health, please check with your doctor before proceeding with any drastic changes in diet, supplements, etc.

**Conclusions**

We have barely scratched the surface of the extensive vitamin D knowledge base. Clearly, adequate levels of vitamin D are needed throughout the human life cycle.

The process of building strong bones and healthy bodies before birth relies, in part, on adequate maternal vitamin D and calcium supplies during pregnancy. As is so often the case, it is best for young people to have adequate vitamin D levels before pregnancy begins. The consequences of inadequate vitamin D are serious, but the benefits of adequate supplies are considerable and lifelong.

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