



### Table of Contents:

Role of vitamin D for Prevention of Many Degenerative Diseases .....	1
A Review of The Literature .....	3
Worth Repeating .....	4
Colored Email Reports .....	4

Le bulletin Anamol est disponible en anglais et en français.  
Si la copie que vous recevez n'est pas dans la langue de votre choix, veuillez s.v.p. nous en aviser.

*I dedicate this newsletter to professionals who are interested to widen their scope of connection between Chemistry and Metabolism.*

*Dr. George M. Tamari*

## Role of Vitamin D for Prevention of Many Degenerative Diseases

During the first 2 years of life Vitamin D deficiency results in rickets. In adults, vitamin D deficiency can cause or exacerbate osteoporosis and induce osteomalacia. Vitamin D deficiency results in a decrease in the efficiency of intestinal calcium absorption, which results in a decrease in ionized blood calcium. The calcium sensor in the parathyroid glands respond by increasing the production of parathyroid hormone (PTH)<sup>1</sup> PTH interacts with its receptor on the osteoblast to increase the signal that induces preosteoclasts to become mature osteoclasts. The action of osteoclasts dissolving bone matrix and releasing +calcium into the extracellular space increases the porosity of the skeleton. PTH stimulates tubular reabsorption of calcium in the kidney, and at the same time also causes phosphorus loss into the urine. *It is this PTH-induced phosphaturia that causes the serum phosphorus levels to be low or low normal and causes elevated levels of calcium and magnesium in the hair tissue. This maybe an indirect indication of bone loss.* The subtle effect on serum phosphorus levels has serious consequences for the skeleton because there is and inadequate calcium x phosphorus product to sustain normal bone mineralization. Although, the osteoblasts are functioning normally and lay down the collagen

matrix, the calcium x phosphorus product is inadequate to mineralize the matrix properly. This result in the classic picture of osteomalacia, that is, widened osteoid seams on bone biopsy<sup>2</sup>

Osteoporosis does not cause bone pain. However, poorly mineralized bone, that is osteomalacia, can cause isolated or generalized aching in the bones as well as muscle weakness<sup>3-7</sup>. Recently, Plotnikoff and Quigley<sup>4</sup> reported that 163 patients 10 to 65 years of age who, presented to Minnesota Hospital with nonspecific muscle aches and bone pain more than 90% had severe vitamin D deficiency<sup>5</sup>. Typically patients with nonspecific muscle aches and pain and bone discomfort are given the diagnosis of fibromyalgia, myositis, or chronic fatigue syndrome <sup>7</sup>.

It was reported<sup>7</sup> that an African American woman with severe bone discomfort and muscle aches after correction of her vitamin D deficiency not only increased her bone density by almost 25% within 2 years but also experienced complete relief of her muscle aches and bone discomfort.

It has been demonstrated that vitamin D deficiency and living at higher latitudes increases the risk of development of colon, breast, prostate, ovarian and

*Continued on pg. 2*

## About Bone Loss and its detection

Cont'd

esophageal cancer<sup>15-27</sup>. Rostand's<sup>28</sup> study indicated that hypertensive patients who received ultraviolet B irradiation from a tanning bed for 3 months not only increased their blood level of 25(OH) D by more than 100% but also completely resolved their hypertension<sup>28</sup>, which may be a contributing factor in the pathogenesis of congestive heart failure<sup>29</sup>.

Vitamin D deficiency is common in all age groups<sup>30-36</sup>. This is part due to the fact that there is very little vitamin D in the diet and increased use of sunscreens and diminished outdoor activity also contribute to this problem. More than 90% of the human vitamin D requirement comes from casual exposure to sunlight. Wearing a sunscreen No. 8 reduces the ability of the skin to produce vitamin D by 95%<sup>37</sup>.

### How much vitamin D is safe to take?

In 1999, Reinhold Veith Ph.D. published an article re-examining the upper limits of vitamin D safety<sup>38</sup>. It was concluded that the often-mentioned upper limit of vitamin D safety, 2,000 IU daily, "is too low by at least 5-fold." Instead, they suggested that 10,000 IU daily might be a better safe upper limit. The same journal published a follow-up study in 2001 revisiting that recommendation<sup>39</sup>. This time the researchers concluded: "We consider 4,000 IU vitamin D3 to be safe (daily) intake" for adults.

## References:

1. Brown EM, Pollak M, Seidman CE, et al. Calcium-ion-sensing cell-surface receptors. *N Engl J Med* 1995;333:234-240
2. Holick MF. Vitamin D: the underappreciated D-lightful hormone that is important for skeletal and cellular health. *Curr Opin Endocrinol Diabetes* 2002;9:87-98
3. Gloth FM III, Lindsay JM, Zelesnick LB, et al. Can vitamin D deficiency produce an unusual pain syndrome? *Arch Intern Med* 1991;151:1662-1664.
4. Plotnikoff GA, Quegly JM. Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. *Mayo Clin Proc* 2003;78:1463-1470
5. Glerup H, Mikkelsen K, Poulsen I et al., Commonly recommended daily intake of vitamin D is not sufficient if sunlight exposure is limited. *J Intern Med* 2000;247:260-268
6. Holick MF. Vitamin D deficiency: what a pain it is. *Mayo Clin Proc* 2003;78:1457-1459
7. Malabanan AO, Turner AK, Holick MF. Severe generalized bone pain and osteoporosis in a premenopausal black female: effect of vitamin D replacement. *J Clin Densitometr* 1998;1:201-204
8. Veldman CM, Cantorna MT, Deluca HF. Expression of 1,25-dihydroxy D3 Receptor in the immune system *Biochemistry and Biophysics*, 2000;374:334-338.
9. Krall EA, Sahyoun N, Tannenbaum S, Dallal GE, Dawson-Hughes B. Effect of vitamin D intake on seasonal variation of parathyroid secretion in postmenopausal women *New England J Med* 1989;321: 1777-1783.
10. Brot C, Vetergaard P, Kolthoff N, Gram J, Heman AP, Sørensen OH. Vitamin D status and its adequacy in perimenopausal women: relationship to dietary intake, sun exposure and serum parathyroid hormone. *British J Nutr.* 2001
11. Parfitt A & M. Osteomalacia and related disorders. In L.V Avioli, SM Krane, eds. *Metabolic Bone Diseases and Clinical Disorders Academic Press* 1998:327-386
12. Lips P. Vitamin D deficiency and secondary hyperparathyroidism in the elderly: consequences for bone loss and fracture implications. *Endocrine Reviews*, 2001;22:477-501
13. Zehndere D, Bland R, Williams MC, McNinch RW, Howie AJ, Steward. PM, Hewison M. Extrarenal expression of hydroxyvitamin d3-1-alpha-Hydroxylase. *J Clin Endocrin & Metabolism* 2001; 86: 888-894
14. Tangpricha V, Flanagan JN, Whittlach LW, Tseng CC, Chen TC, Holt PR, Lipkin MS, Holick MF. 25-Hydroxylase in normal and malignant colon Tissue. *Lancet*, 2001;357:1673-1674.
15. Glerup H, Middelsen K, Poulsen L, Hass E, Overbeck S, Thomsen J, Charles P, Edriksen EF. Commonly recognized intake of vitamin D is not sufficient if sunlight exposure is limited. *J Internal Med* 2000;247:260-268.
16. Iqbal SJ, Kaddam I, Wassif W, Nichol F, Walls J. Continuing clinically severe vitamin D deficiency in Asians. *Postgraduate Med J* 1994;70:708-714
17. Iqbal SJ, Featherstone S, Kaddam IMS, Mortimer J, Manning D. Family screening is effective in picking up vitamin D deficient subjects. *J Human Nutrition & Dietetics* 2001;14:371-376
18. Bischoff HA, Stahelin HN, Dick W at al. Effects of vitamin D and calcium supplementation on falls: a randomized controlled trial. *J Bone Min Res* 2003;18:343
19. Stumpf WE, Sar M, Reid FA et al. Target cells for 1,25-dihydroxyvitamin D3 in intestinal tract, stomach, kidney, skin, pituitary, and parathyroid. *Science* 1979;206:1188-1190
20. Tanaka H, Abe E, Myaura C, et al 1,25-Dihydroxycholecalciferol and human Myeloid leukemia cell line (HL-60): the presence of cytosol receptor and Induction of differentiation. *Biochem J* 1982;204:713-719

21. Chen TC, Holick MF. Vitamin D and prostate cancer prevention and Treatment. *Trends Endocrinol Metabol* 2003;14:423-430
22. Tsoukas CD, Provvedine DM, Manolagas SC. 1,25-Dihydroxyvitamin D3 A novel immuno-regulatory hormone. *Science* 1984;221:1438-1440
23. Mathieu C, Adorini L. The coming of age of 1,25-dihydroxyvitamin D3 analogs as immunomodulatory agents. *Trends Mol Med* 2002;8:174-179
24. Li Y, Kong J, Wel M, et al. 1,25-Dihydroxyvitamin D3 is a negative endocrine regulator of the rennin-angiotensin system. *J Clin Invest* 2002;110:229-238.
25. Garland CF, Garland FC, Shaw EK, et al. Serum 25-hydroxyvitamin D and colon cancer: eight-year prospective study. *Lancet* 1989;1:1176-1178
26. Hanchette CL, Schwartz GG. Geographic patterns of prostate cancer Mortality. *Cancer* 1992;70:2861-2869
27. Grant WB. An estimate of premature cancer mortality in the US due to inadequate doses of solar ultraviolet-B radiation. *Cancer* 2002;70:2861-2869.
28. Rostand SG. Ultraviolet light may contribute to geographic and racial blood pressure differences. *Hypertension* 1979;30:150-156.
29. Zittermann A, Schleithoff SS, Tenderich G et al. Low vitamin D status: a contributing factor in the pathogenesis of congestive heart failure? *J Am Coll Cardiol* 2003;41:105-112.
30. Malabanan A, Veronikis IE, Holick MF. Redefining vitamin D insufficiency *Lancet* 1998;351:805-806
31. Heaney RP, Dowell MS, Hale CA, et al. Calcium absorption varies within the reference range for serum 25-hydroxyvitamin D. *J Am Coll Nutr* 2003;22:142-146.
32. Tangpricha V, Koutkia P, Rieke SM, et al. Fortification of orange juice with vitamin D: a novel approach to enhance vitamin D nutritional health. *Am J Clin Nutr* 2003;77:1478-1483
33. Tangpricha V, Pearce EN, Chen TC, et al. Vitamin D insufficiency among free-living healthy young adults. *Am J Med* 2002;112:659-668
34. Gordon CM, DePeter KC, Estherann G et al. Prevalence of vitamin D deficiency among healthy adolescents. *Endocrine Soc Meeting* 2003;21-22:87
35. Sullivan SS, Rosen CJ, Chen TC, et al. Seasonal changes on serum 25(OH)D in adolescent girls in Maine. *ASBMR Annual Meeting* 2003;M470;104
36. Jones G, Dwyer T. Bone mass in prepubertal children: gender differences and the role of physical activity and sunlight exposure. *J Clin Endocrinol Metab* 1998;83:4274-4279
37. Matsuoka LY, Ide L, Wortsman J et al. Chronic sunscreen use decreases circulating concentrations of 25-hydroxyvitamin D: a preliminary study. *Arch Dermatol* 1988;124:1802-1804
38. Veith R. Vitamin D supplementation, 25-hydroxyvitamin D concentrations, and safety. *Am J Clin Nutr* 1999;69:842-856
39. Veith R, Chan P-Cr, MacFarlane GD. Efficacy and safety of vitamin D3 intake exceeding the lowest adverse effect level. *Am J Clin Nutr* 2001;71:288-294.

---

## Literature Review

---

### Vitamin D deficiency: A global perspective

Vitamin D is essential for the maintenance of good health. Its sources can be skin production and diet intake. Most humans depend on sunlight exposure (UVB 290-315 nm) to satisfy their requirements for vitamin D. Solar ultraviolet B photons are absorbed by the skin, leading to transformation of 7-dehydrocholesterol into vitamin D3 (cholecalciferol). Season, latitude, time of day, skin pigmentation, aging, sunscreen use, all influence the cutaneous production of vitamin D3. Vitamin D deficiency not only causes rickets among children but also precipitates and exacerbates osteoporosis among adults and causes the painful bone disease osteomalacia. Vitamin D deficiency has been associated with increased risk for other morbidities such as cardiovascular disease, type 1 and type 2 diabetes mellitus and cancer, especially of the colon and prostate. The prevalence of hypovitaminosis D is considerable even in low latitudes and should be taken into account in the evaluation of postmenopausal and male osteoporosis. Although severe vitamin D deficiency leading to rickets or osteomalacia is rare in Brazil, there is accumulating evidence of the frequent occurrence of subclinical vitamin D deficiency, especially in elderly people.

Bandeira F, Griz L, Dreyer P, Eufrazino C, Bandeira C, Freese E. Division of Endocrinology, Agamenon Magalhaes Hospital, Dilab Laboratories, Department of Medicine, University of Pernambuco, Recife, PE, Brazil. fbone@hotmail.com.br

*Arg Bras Endocrinol Metabo* 2006;50:640-6

### Vitamin D: Important for Prevention of Osteoporosis, Cardiovascular Heart Disease, Type 1 Diabetes, Autoimmune Diseases, and Some Cancers

Vitamin D is very important for overall health and well-being. A major source of vitamin D comes from exposure to sunlight. Measurement of 25-

# Literature Review

Cont'd

hydroxyvitamin D in the blood and not 1,25-dihydroxyvitamin D is used to determine vitamin D status. A blood level of 25-hydroxyvitamin D of at least 20 ng/mL is considered to be vitamin D sufficient. Vitamin D deficiency increases the risk of many common cancers, multiple sclerosis, rheumatoid arthritis, hypertension, cardiovascular heart disease, and type I diabetes.

Michael F. Holick, *South Med J* 2005; 98:1074-1077

## Hyperparathyroidism in deficiency rickets. Changes after vitamin therapy

The study concerned 16 cases of deficiency rickets observed over 3 years. The level of serum parathyroid (IPTH) hormone was always increased in the late stages of rickets, but was normal in 3 cases of early rickets with hypocalcaemia and monophosphataemia. There was no statistical correlation between the level of IPTH and monophosphataemia. There was no statistical correlation between the level of IPTH and calcaemia. After vitamin D-therapy, the levels of IPTH returned to normal in 5 to 21 days in most cases. No obvious difference was noted in this evolution between children treated by vitamin D2 and 25 OH D. The excretion of urinary cyclic adenosine monophosphate decreases in parallel with blood IPTH.

Mallet E, Bousnina S, Tron P, Basuyau JP, Brunelle P, de Menibus CH. PMID: 201225 [PubMed - indexed for MEDLINE]

## Colored Email Reports

Since January 2002, our *Hair Analysis Reports* have been printed out in colors. With the growing requests for e-mail reporting, the importance of a colored first page became an issue. As a response to the wishes of the large number of Health Professionals, starting Spring 2006, we'll be able to provide you with **COLOURED FIRST PAGES** identical to our office copies.

If you want to receive your results by e-mail, please e-mail or fax us your email address.

**Please note:** We will send e-mail to doctors only. - No patient's e-mail addresses please.

## Worth Repeating...

Though we have experienced considerable improvement during the past two years, there is still some measure of the same difficulties. Therefore we find necessary to reprint the information with some additional requests and suggestions:

- Write patient's name on the sample envelope.
- Results are printed on the language of the requisition form. Please indicate if the report wanted in any other language.
- Requests for free supply should be indicated on the bottom of the same form.
- We have to ask our new customers to send in a copy of your letterhead or business card, as Anamol Laboratories does not deal with the public.
- It is not necessary to issue an individual cheque to each sample in the same shipment.
- Please indicate form of payment by checking the appropriate space.
- Change of address or phone number should be highlighted.
- Please advise us if there is any change in your credit card number.

## Services:

- Educational Seminars
- Technical Literature
- Individual Consultation
- Hair Tissue Mineral Analysis
- Urine Mineral Analysis
- Water Mineral Analysis

## Anamol Laboratories Ltd.



83 Citation Drive, Unit #9  
Concord Ontario, L4K 2Z6  
www.anamol.com  
anamol@bellnet.ca  
Tel. 905-660-1225  
1-888 254 4840  
FAX 905 660-1955

This newsletter is produced by Anamol Laboratories as a service to its clients.

© 2007, Anamol Laboratories  
Concord, Ontario, Canada