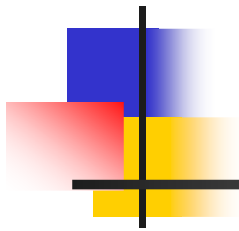


Vitamin D Deficiency in Clinical Practice



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With thanks for some slides to:
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Ontario Patient Testing Options

- Most patients will have to pay for testing
- OHIP covers – Osteoporosis, Rickets, Malabsorption Syndromes, Renal Disease, patients on meds that affect vitamin D metabolism
- Patient Funded Options:
 1. Option 1 – GrassrootsHealth D Action program \$65 US
 2. Option 2 – pay Ontario lab fee - \$30 - 50



Vitamin D: An Absolute Requirement for Healthy Living

Everyone should have his or her vitamin D level checked at least once a year (infants through the elderly). Below are conditions that have been associated with vitamin D levels:



Vitamin D Level

- **< 25 nmol/L = Severely Deficient**
- < 37.5 nmol/L = Risk of rickets
- < 60 nmol/L = 75% greater risk of colon cancer



Vitamin D Level

- **<75 nmol/L = Deficient**
 - Increased calcium loss from bones, osteoporosis
 - Poor wound healing
 - Increased muscle pain
 - Increased joint and back pain
 - Greater risk of depression



Vitamin D Level

- Increased diabetes
- Increased schizophrenia
- Increased migraines
- Increased autoimmune disease (lupus, scleroderma)
- Increased allergies
- Increased preeclampsia
- Increased inflammation



Vitamin D Level

- **<125 nmol/L = Suboptimal levels**
 - Twice the risk of heart attack
 - Increased high blood pressure
 - Three times the risk of multiple sclerosis



Vitamin D Level

- **125 – 200 nmol/L = Optimal levels**
 - reduction in breast cancer, decreased risk of all solid cancers
 - Slowing of cancer growth in patients with cancer
- **>250 nmol/L = Increased risk of toxic symptoms (hypercalcemia)**



Vitamin D Facts

- ***How much is enough?***
 - The intake required for optimal serum levels varies from one individual to another and depends on season, sun exposure, genes, age and BMI.
 - Clinical experience demonstrates little correlation between serum level achieved and supplementation.
 - Daily supplementation with 1000 IU to 10,000 IU needed to raise serum levels into the cancer protective range.



Vitamin D Risk Analysis

Quiz

1. Your ethnic background is half or more than half African, Indian, Southeast Asian, Latin American or Arabic or if you have skin type 4, 5, or 6 – (see Sun Exposure Times chart below). (3 points)
- 2.. Your body mass index (BMI) is 30 or greater. (3 points)



Vitamin D Risk Analysis Quiz

3. You are a breast-fed infant who is not on vitamin or formula supplements. (3 points)
4. You have fatigue or recurring muscle, bone, or joint pain. (2 points)
5. You are fifty years or older. (2 points)



Vitamin D Risk Analysis

Quiz

6. You live outside the thirty-fifth parallel north or south of the equator. (North of Atlanta, GA) (2 points)
7. You wear sunscreen of SPF 8 or greater before you go outdoors. (2 points)



Vitamin D Risk Analysis Quiz

8. You rarely (fewer than 3 times a week) spend time outdoors between 11:00 a.m. and 4:00 p.m. (2 points)

Total Score = _____



Vitamin D Risk Analysis Quiz

Scoring for each section:

- 0 - 2 points = Low Risk
- 3 - 5 points = High Risk
- >5 points = Very High Risk



Skin Types

- 1 Always burn, never tan
- 2 Burn easily, rarely tan
- 3 Occasionally burn, slowly tan
- 4 Rarely burn, rapidly tan
- 5-6 Never burn, always dark



Sun Exposure times required making Vitamin D

	UV 0-1	UV 3-5	UV 6-7	UV 8-10	UV 11+
■ Type 1 (No D)	10 - 15	5 - 10	2 - 8	1 - 5	
■ Type 2 (No D)	15 - 20	10 - 15	5 - 10	2 - 8	
■ Type 3 (No D)	20 - 30	15 - 20	10 - 15	5 - 10	
■ Type 4 (No D)	30 - 40	20 - 30	15 - 20	10 - 15	
■ Type 5/6 (No D)	40 - 60	30 - 40	20 - 30	15 - 20	



Sun Exposure times required making Vitamin D

- Look up the UV index at www.weather.com
Refer to the above chart and find your UVI (UV Index) on the top row. Follow this down and across to your skin type. The number of minutes of exposure without sunscreen at least three times a week will provide you with adequate vitamin D production to maintain a normal blood level.
- This is based on 50 to 75% skin exposure (shorts, T-shirt, or swimsuit).



Vitamin D Facts:

- 1. To make any vitamin D, you need a UV index of about 4 or greater. Look up your local UV index at www.weather.com. A tanning bed is equivalent to a UV index of 7 - 8,
- 2. Dark skinned people need about seven times as much sunlight as fair-skinned people to manufacture the necessary amount of vitamin D



Vitamin D Facts:

- 3. Vitamin D deficiency is more common in women, people of color, obese people, older people and breast-fed infants.
- 4. Vitamin D is a unique hormone that belongs to a group called the steroid hormone family. Its favorite partnerships are with vitamin A, thyroid hormone and variations of growth hormone.



Vitamin D Facts:

- 5. You can only make vitamin D from April 15 to September 30 at the latitude of Toronto. This means we have just 48 days per year to make vitamin D
- 6. Sunscreen with SPF of 8 blocks almost 98% of UVB rays, which make it practically impossible to make vitamin D if you wear sunscreen.



Vitamin D Facts:

- 7. Most modern glass technology blocks UVB light (windows)
- 8. Diet contributes very little to seasonal fluctuations in vitamin D levels.



Safety of Vitamin D

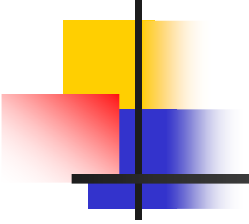
- NOAEL = No Adverse Event Level
- 4000 IU/day (Institute of Medicine, 2010)
- 3000 IU/day for children
- Expert opinion: 10,000 IU+ is safe
- Toxicity is exceedingly rare

#	Age	Origin	Years in Switzerland	Veil	Pain Complaints
1	52	Bosnia	11	yes	Ribs/neck/low back(LB)
2	57	Afghan.	3	yes	Thighs, LB; weakness
3	27	Somalia	10	yes	LB; occas midB/rib
4	30	Albania	6	no	LB, pelvic
5	42	Somalia	4	yes	Back/knee/shoulder
6	43	Bosnia	4	yes	Back/diffuse bone pain
7	45	Somalia	10	yes	Diffuse back/LL; fatigue
8	63	Somalia	3.5	yes	Back/diffuse LL pain
9	20	Ethiopia	6.5	no	LB/LL/scapular
10	51	Bosnia	1	yes	Lower limb pain
11	62	Bosnia	6	yes	Lower right limb

#	Pain Complaints	'Diagnosis'
1	Ribs/neck/low back(LB)	Somatoform Disorder
2	Thighs, LB; weakness	Weakness/unknown origin
3	LB; occas midB/rib	LBP/functional component
4	LB, pelvic	Somatoform Disorder?
5	Back/knee/shoulder	Knees; arthritis
6	Back/diffuse bone pain	Back pain
7	Diffuse back/LL;fatigue	Somatoform Disorder
8	Back/diffuse LL	Chronic back pain
9	LB/LL/scapular	Mechanical BP
10	Lower Limb	Restless Legs/polyneur/unexp.
11	Lower right limb	Atyp. sciatalgia/osteomalacia

#	Diagnosis	25(OH)D3 nmol/L
1	Somatoform Disorder	16.0
2	Weakness/unknown origin	7.7
3	LBP/functional component	10.5
4	Somatoform ?	11.5
5	Knees; arthritis	13.5
6	Back pain	9.2
7	Somatoform Disorder	4.5
8	Chronic back pain	10.7
9	Mechanical Back Pain	6.2
10	Restless Legs/polyneur/unexplained	13.7
11	Atypical sciatica/osteomalacia	16.2

	Duration of Symptoms	Time to respond to treatment (months)	25(OH)D3 nmol/L	Calcium nmol/L
1	3 years	3	16.0	2.28
2	6 months	3	7.7	2.08
3	5 years	1	10.5	
4	2 years	3	11.5	2.34
5	3 years	2	13.5	2.23
6	2.25 years	2	9.2	2.05
7	1 year	1	4.5	2.11
8	15 years	2	10.7	2.19
9	2 years	7	6.2	2.14
10	1 year	2	13.7	2.24
11	2 months	2	16.2	2.24



How much vitamin D3 is required to raise 25(OH)D into optimum range?

- Requirements are completely individual
- Based on blood levels of 25(OH)D
- Health Canada recommendations too low to achieve even 75 nmol/L for most people
- Most people in Toronto need 4000 IU in the winter to keep levels in optimum range
- Northern Ontarians will require more for longer part of the year
- Some need 10,000 IU+



Rechecking Your Vitamin D Level

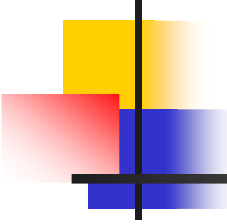
- It is recommended that you recheck your vitamin D level within 3 months after starting supplementation, depending on your medical and health condition.
- Other lab tests for calcium, phosphorus and parathyroid hormone level (PTH) may be done during the recheck.



Editorial:

Goodwin PJ. J Clin Oncol 27(13):2117-9, 2009

“The unpredictable relationship between vitamin D intake and blood levels makes it difficult to recommend a standard supplement dose and supports incorporating measurements of blood levels into recommendations.”



Very low 25(OH)D can be the cause of physical impairment

It is important for physicians to be able to make the diagnosis of hypovitaminosis D in cases of chronic illness and disability that otherwise defy diagnosis.



De-listing 25(OH)D tests discriminates against:

- Dark skinned individuals
- Individuals with genetically-determined difficulty in absorption of vitamin D
- The poor



Take Home Messages

- Vitamin D supplementation is essential
- Ideally based on 25OHD3 levels
- Most individuals in Toronto require 4000 IU daily in winter, year round if avoiding midday sun
- Some require much larger doses
- Children can take 3000 IU daily (I.O.M.)
- Vitamin D is safe