SUNLIGHT & VITAMIN D

- **Sunlight *in moderation* is beneficial**, and is necessary for Vitamin D photosynthesis in the skin. Sunlight is also important to set circadian rhythms (our 'biological clocks'), and may be important for synthesis of other substances needed by the body such as natural pain relieving & mood elevator substances.
- **Vitamin D is essential for health:**
  - For healthy bones and muscles.
  - For a healthy immune system, possibly reducing the risk of autoimmune diseases such as Juvenile onset Diabetes (IDDM 1) and Multiple Sclerosis.
  - May reduce risk of cancers such as Colon and possibly other cancers.
  - For proper function of many other tissues and organs, such as the heart and blood vessels, liver, nervous system and others.
- **Vitamin D sources:**
  - **Sunlight:** The *best* way to get adequate Vitamin D is to have *moderate* sunlight exposure in the warmer months (from March to October) when the sun is high enough in midday (at least 40 degrees above horizon). For most people with medium-light skin who gradually tan but sometimes burn (Skin Type 3), ~ 15 – 30 minutes on an area equivalent to the arms, legs and upper chest most days of the week is adequate. If you are dark skinned, this may need to be about twice as long, and if you have very fair skin or burn easily, or in intense sunlight (like on a beach), this may be shorter, like 10 - 15 minutes. Technically, the correct dose of daily sunlight should be exposure of ¼ of your total skin area for about ¼ of the amount of time that would cause a slight pinking of the skin at least 3 days/week. Must be direct sunlight – sunscreen, clothes or being behind plastic or glass virtually eliminates proper Vitamin D photosynthesis.
  - **Dietary sources:** Oily fish, fortified milk, orange juice and other foods.
  - **Supplementation (Especially important from October to March)**
    - D**3** (Cholecalciferol) is superior to D2 (Ergocalciferol)
    - ☐ In sunlight deprived: **1000 – 2000 Units/Day** Note: Optimal Vit. D level probably = 30 – 60 ng/mL (At least > 20 ng/mL)
- **At risk for Vit. D deficiency**: Indoors lifestyle, Traditional long sleeve clothes, Darker skin, Elderly (☐ skin synthesis by 75% or ¼ of normal), Obesity (locks up Vit. D in fat cells), Liver/ Kidney disease (impairs proper metabolism), Malabsorbtion syndromes, Medications such as anticonvulsants, Low diet or supplement sources.
- ☐ **Vitamin D deficiency treatment** (Take these ONLY if your doctor directs you to do so): 5,000 units D_3 daily for ~ 3 months (or 50,000 units <u>weekly</u> (*not* daily) X 8 doses), then recheck a Vitamin D level. Sometimes another course or two is needed.
- **Sunlight & skin cancer:**
  - *Excess* sunlight (like excess of almost anything) is definitely bad for your skin and should be avoided. Sunburns, especially those suffered in childhood, may increase lifetime risk of skin cancer, including the deadly melanoma. On the other hand, the moderate amounts of sunlight recommended above are likely fully compatible with health.
- **Other instructions:**

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FAQ's on Vitamin D

1) **Q**: Is sunlight really necessary to obtain adequate Vitamin D? Why not just take a Multivitamin or drink milk or some other dietary source?
   A: Photosynthesis from sunlight is superior to any dietary source because:
   i) Dietary sources are scarce & usually inadequate (e.g., to get adequate Vit. D just from milk, one would have to drink 10 or more cups per day!). Most multivitamins have 400 I.U., which is inadequate for many people.
   ii) Sunlight replenishes Vitamin D much more effectively and for longer than any dietary source, and does so in a self-regulated manner.
   iii) Skin photosynthesis may produce other related necessary substances not found in dietary or supplement sources.
   iv) The amount of sunlight needed is very modest and is unlikely to cause a significant increase in skin cancer in the vast majority of people. In fact, there is some evidence that *moderate* sun exposure may actually *decrease* risk of melanoma (this is not proven, but at least it doesn't seem to increase risk).
   v) Remember, must be *direct* sunlight – not thru windows/clothes/sunscreen.

2) **Q**: Your recommendations for Vitamin D in sunlight-deprived people seem high – I thought the Adequate Intake (AI) was 200 - 400 I.U./day for most adults. Why do you suggest 1000 – 2000 I.U.?
   A: The AI of 200 - 400 I.U. for most adults was set in 1997 when little was known about the 'non-classical' functions of Vitamin D such as immune self-tolerance and cancer prevention. More current research suggests that higher doses are needed (though the optimal dose at this time is uncertain). Even studies of bone health consistently show that higher doses (such as 800 I.U./d) are more effective to decrease fracture risk and falls. 1000 – 2000 I.U./d is well within the safe range & allows optimal blood levels in most people. Even higher doses are occasionally needed, but do not take these without instruction from your physician.

3) **Q**: Some lab reports' reference lower limit of normal for 25 (OH) Vitamin D is ~20 ng/mL, yet you state that < 30 is sub-optimal. Why the discrepancy?
   A: There is controversy on what a normal level is. There is evidence that ~ 30 ng/mL or greater may be *optimal* for health.

4) **Terms & Conversions**:
   a) **25 (OH) D (Calcidiol)**: the *storage* form of vitamin D & the best test of Vit. D nutrition in almost all cases. Exact optimal levels are unknown but are probably about 30 to 60 ng/mL. Up to 100 ng/mL is safe. Toxicity at > 150 ng/mL.
   b) **1, 25 (OH)$_2$. D (Calcitriol):** the *activated* form. Testing generally *not* useful to assess Vit. D nutrition, because it is under tight regulatory control & thus remains relatively constant despite Vit. D deficiency, & has a very short half life.
   c) **One mcg (40 I.U.) per day of Vitamin D(3) (Cholecalciferol) increases circulating 25(OH)D by about 1 nmol/L (0.4 ng/mL).**