**CONTRIBUTIONS OF VITAMIN D TO GOOD HEALTH**

**SKIN + UV LIGHT**

Vitamin D₃ → LIVER → 25(OH)D₃ → 1,25(OH)₂D₃ → KIDNEY

**DIET**

25(OH)D-1α-hydroxylase

**PARACRINE** (at least 10 cell types)

**VITAMIN D DEFICIENCY ASSOCIATED DISEASES**

- Cancer
  - Prostate, breast, colon cancer (prevention)
  - Leukemia(s) (treatment)
- Rickets, Osteomalacia, Osteoporosis
- Increased prevalence of infection; e.g. tuberculosis
- Increased autoimmune diseases; e.g. type 1 diabetes, multiple sclerosis, inflammatory bowel disease, psoriasis
- Impaired glucose tolerance and type-II diabetes
- High renin hypertension; increased cardiovascular risk factor; increased thrombogenesis.
- Muscle myopathy; increased falls
- Vitamin D deficiency in utero may contribute to developmental problems

**PHYSIOLOGICAL SYSTEMS**

- **ALL CELLS**
  - Cell cycle regulation
  - Cell proliferation inhibition
- **CALCITROIC HOMEOSTASIS**
  - Intestinal calcium absorption & Bone remodeling
- **IMMUNE SYSTEM**
  - Innate
    - Stimulate synthesis of antimicrobial peptides
  - Adaptive
    - Dendritic and T-cell function
- **PANCREAS β Cells**
  - Facilitate insulin secretion
- **HEART & CARDIOVASCULAR**
  - Renin-angiotensin regulation, Coagulation, fibrinolysis, heart muscle function
- **MUSCLE**
  - Promote normal skeletal muscle development; improve muscle strength
- **BRAIN**
  - In progress
    - Brain has VDR & 1α-Hydroxylase

**COMMENTS**

- Vitamin D itself is biologically inactive. It is a precursor of 1α,25(OH)₂D₃.
- Serum 25(OH)D₃ is a marker of vitamin D nutritional status. Its concentration should be 30–60 ng/ml.
- 1α,25(OH)₂D₃ is not a vitamin, but is a steroid hormone that produces biological responses via binding to its receptor (VDR) in at least 37 tissues.

**SERUM 25(OH)D**

<table>
<thead>
<tr>
<th>ng/ml</th>
<th>nmoles/L</th>
<th>Nutritional Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>&lt;12</td>
<td>Severe D deficiency</td>
</tr>
<tr>
<td>5-10</td>
<td>12-25</td>
<td>D deficiency</td>
</tr>
<tr>
<td>10-20</td>
<td>25-50</td>
<td>D insufficiency</td>
</tr>
<tr>
<td>20-30</td>
<td>50-75</td>
<td>Marginal D status</td>
</tr>
<tr>
<td>30-60</td>
<td>75-150</td>
<td>Vitamin D sufficiency</td>
</tr>
<tr>
<td>&gt;150</td>
<td>&gt;375</td>
<td>Risk for toxicity</td>
</tr>
</tbody>
</table>

New evidence indicates that vitamin D₃ intake should be in the range of 2000 – 4000 IU/day. Everyone should have their serum 25(OH)D levels determined at least once yearly. Vitamin D₃ soft gel capsules (1000 or 2000 IU), Codes 1452 or 1463, can be obtained from the J.R.Carlson Laboratories or other vendors. More vitamin D-related health information is available at both the GrassrootsHealth web site [http://www.grassrootshealth.net/] and the Vitamin D Workshop website [http://vitamind.ucr.edu/]

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Further Information