Vitamin A
Most versatile of the fat soluble vitamins

Functions:
1. Promotes good night vision and normal vision.
   a. Cornea.
   b. Retina of eye.
2. Promotes cell differentiation.
3. Promotes growth and reproduction.

2001 Recommendations: RE (retinol equivalent)
RAE (Retinol Activity Equivalent)

1 mcg retinol = RAE
12 mcg beta carotene = RAE
24 mcg other carotene = RAE

1. 900 mcg/RAE men
2. 700 mcg/RAE women
Upper Limit: 3000 RAE

International units (old unit of measure) 1 RE = 3.33 IU
3000 mcg or RAE = 10,000 IU
.3 mcg RAE = 1 IU
Deficiency:
- Night blindness
- Xerophthalmia
- Keratinization
- Cell membrane integrity lost
- Infectious disease

Toxicity: As little as 5x the RDA
Upper Limit (UL) = 10,000 IU (3000 RAE)
- Birth defects
- Retin-A

Foods:
Liver, fish liver oils, egg yolk, milk and butter.
Rich yellow, deep orange fruits & vegetables.
Fortified nonfat milk.
Vitamin D - Calciferol.

Different from others, our body synthesizes. Not essential.
1. D3 = Synthesized from sunlight.
2. Provitamin D – animals

Roles in the body.
1. Promotes bone mineralization.
2. Raises blood concentration of Calcium and phosphorus

Deficiency:
1. rickets
2. osteomalacia

Toxic: THE MOST TOXIC at 4-5x the DRI.

Sources: Egg yolk, liver and fatty fish, fortified milk. Sunlight.
**Vitamin E (α Tocopherol)**

Function: antioxidant
1. Protects PUFA
2. Protects Vitamin A
3. Protects LDL from oxidation
4. Protects RBC cell membranes (perioxidation)
5. Protects lungs
6. Immune system

Deficiency: Rare
- Neuromuscular dysfunction
- Erythrocyte hemolysis

Toxicity: Rare. Upper limit: 1000 mg

DRI 2000-RDA: 15 mg in adults (α tocopherol)

Food: Oils, wheat germ, sweet potato, liver, Green leafy vegetables, nuts, seeds.
**Good Sources of Vitamin E**  
*(α Tocopherol)*

<table>
<thead>
<tr>
<th>Oils: 1 tablespoon, 120 kcal</th>
<th>mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola oil</td>
<td>2.4</td>
</tr>
<tr>
<td>Corn oil</td>
<td>2.0</td>
</tr>
<tr>
<td>Olive oil</td>
<td>2.01</td>
</tr>
<tr>
<td>Peanut</td>
<td>2.2</td>
</tr>
<tr>
<td>Safflower</td>
<td>4.8</td>
</tr>
<tr>
<td>Soybean</td>
<td>1.3</td>
</tr>
<tr>
<td>Sunflower</td>
<td>5.8</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Vegetables:</th>
<th>mg</th>
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<tbody>
<tr>
<td>Broccoli – 1 spear</td>
<td>2.6</td>
</tr>
<tr>
<td>Swiss Chard, 1 c.</td>
<td>3.31</td>
</tr>
<tr>
<td>Turnip Greens, 1 c.</td>
<td>4.36</td>
</tr>
<tr>
<td>Avocado, 1</td>
<td>3.4</td>
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<tr>
<td>Peanuts, dry roast, ½ c.</td>
<td>7.5</td>
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</tbody>
</table>
**Vitamin K**

Forms:
- a. phylloquinone - plants
- b. menaquinone - animal tissue
- c. menadione - synthetic form

Functions:
1. Functions in blood clotting

Deficiency:
- Hemorrhagic disease
- Skeletal weakness

Toxic: rare

2000 AI: 90 ug women/ 120 ug men

Sources: ½ synthesized by bacteria in gut
½ milk, eggs, liver, green leafy, cabbage-type vegetables.
Food or supplements?

Top food antioxidants come from fruits & vegetables.

1. pomegranates, berries and citrus.
2. kale, spinach, Brussels sprouts
3. millet & oats
4. pinto beans and soybeans
5. walnuts