NUTRIENTS IN THE BODY: THEIR ROLES AND SOURCES

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Sadava 8th: 1068-1075 “foodstuff” Kcal/g functions

MACRONUTRIENTS: carbohydrates 4.5 energy (polysacch, “time released.” simple sugars absorbed quickly.)
protein 4.2 essential amino acids (protein synth in the body. Excess makes toxins
fats 9.0 energy (some essential fatty acids required)

MICRONUTRIENTS: MINERALS and VITAMINS (p 1073)

MINERALS Ca++ bones, teeth, blood clotting, muscle function dairy, DGLV, legumes
P bones, teeth, buffer, nucleotide synthesis dairy, meat, whole grains
Fe hemoglobin, electron transport, enzyme cofactor meat, eggs, DGLV, whole grains
Mg enzyme cofactor, ATP energetics, DNA synthesis DGLV, whole grains
Mn enzyme cofactor Nuts, whole grains, fruits veggies

VITAMINS: (p 1074) Mostly coenzymes required for enzyme activity. Divided into water and oil soluble vitamins.

WATER SOLUBLE VITAMINS (B vitamins): Most are coenzymes for catabolism of glucose, some for N metabolism

VITAMIN C:
First time that diet was recognized as important to health:
Scurvy (swollen, bleeding gums, losing teeth, weak bones, enlarged, painful joints)
Afflicted sailors at sea a long time. Hudson Bay explorers iced in, got scurvy.
Local Indians gave pine needles, cured, and saved the explorers.
However, medical establishment scoffed when the “witch doctor’s” cure was reported.

James Lind, British phys’n, 1752, publish study: scurvy could be cured by limes and lemons: scurbutic sailors: regular rations to both, gave citrus fruit to ½, they were cured.

VIT C FUNCTIONS:
required for synthesis of collagen low C: poor wound healing, bleeding gums, etc
WBC production and functioning low C increases susceptibility to infection
reducing agent (antioxidant) Destroys free radicals (a cause of aging, carcinogenesis, etc)
It is therefore one of the “anti-cancer”, anti-aging vitamins.

Vitamin C is labile vitamin, easily oxidized on exposure to air. Fresh fruits & veg have most
RDA: 30-75 mg/day...
Linus Pauling noted that baboons consume 20 g Vitamin C per day in the diet of leaves
He suggests our requirement to be closer to 6-8 g, need more under stress
sources of vitamin C: dark green leafy vegetables, citrus, fruits, especially red bell peppers

WATER SOLUBLE VITAMINS (All are “B” vitamins except for vitamin C.)
(DGLV = dark green leafy vegetables)

<table>
<thead>
<tr>
<th>vitamin</th>
<th>Btr</th>
<th>sources</th>
<th>function</th>
<th>deficiency disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascorbic acid</td>
<td>C</td>
<td>DGLV, citrus, fruits, esp red bell peppers. It is a labile vitamin, easily oxidized on exposure to air. Fresh fruits &amp; veg have the most</td>
<td>synthesis of collagen, WBC production and functioning, antioxidant: neutralize oxidizing agents and free radicals: aging, carcinogenesis, etc.)</td>
<td>Scurvy (swollen, bleeding gums, losing teeth, weak bones, enlarged, painful joints), fragile capillaries</td>
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<tr>
<td>Thiamine</td>
<td>B1</td>
<td>whole grains, DGLV, yeast, legumes</td>
<td>decarboxylation in catabolism</td>
<td>beriberi</td>
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<tr>
<td>Riboflavin</td>
<td>B2</td>
<td>dairy, meat, liver, eggs, DGLV</td>
<td>hydrogen carrier (FAD), electron transport</td>
<td>pellagra</td>
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<tr>
<td>Niacin</td>
<td>B3</td>
<td>whole grains, Liver, meat, fish</td>
<td>hydrogen carrier (NAD+)</td>
<td>glossitis, nervous disorders</td>
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<tr>
<td>Pantothenic acid</td>
<td>B5</td>
<td>most, yeast, liver, molasses, rice bran</td>
<td>Coenzyme A component</td>
<td>extremity tingling, depression</td>
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<tr>
<td>Pyridoxine</td>
<td>B6</td>
<td>whole grains, liver, legumes, meat,</td>
<td>amino acid metabolism (transamination etc)</td>
<td>dermatitis</td>
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<tr>
<td>Folic acid</td>
<td>DGLV, liver, fruit, legumes,</td>
<td>nucleic acid metabolism</td>
<td>anemia, spina bifida</td>
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<tr>
<td>cyanocobalamin</td>
<td>B12</td>
<td>animal products, bacteria in colon</td>
<td>RBC synthesis (erythropoiesis)</td>
<td>pernicious anemia</td>
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