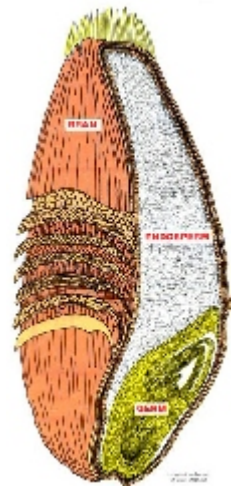


NUTRIENTS IN THE BODY: THEIR ROLES AND SOURCES

12 May 2004, 29 April 05, 1 May 06, 14 May 08, 1 May 09, 11 May 09, 30 Apr 10, 2 May 11
David B. Fankhauser, PhD

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

MACRO-NUTRIENTS:	carbohydrates	4.5	energy: polysacch = “time released,” simple sugars = “sugar rush”.
	protein	4.2	essential amino acids: protein synth in the body. Excess makes toxic NH ₃
	fats	9.0	rich energy source (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 vegs

VITAMINS: (p 1074) Mostly **coenzymes** required for enzyme activity. Two classes: water & oil soluble vitamins:

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

glucose catabolism:	Glycolysis:	NAD (niacin and adenine = B ₃ and B ₄) = hydrogen carrier (high energy)
	acetyl CoA synthesis:	NAD, pantothenate (in CoA), thiamine (B ₁) = required for decarboxylations
	Krebs cycle:	NAD, thiamine, FAD (riboflavin (B ₂) and adenine) = hydrogen carrier

VITAMIN C:

First time that diet was recognized as important to health:

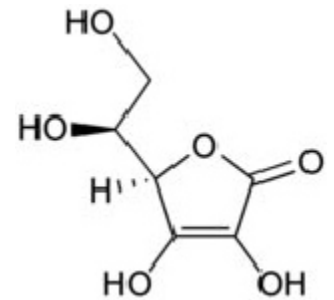
Scurvy (swollen, bleeding gums, losing teeth, weak bones, enlarged, painful joints)
Afflicted sailors at sea a long time. Hudson Bay explorers iced in, got scurvy.
Local Indians gave pine needles to chew and suck. Cured, and saved the explorers.
However, medical establishment scoffed when the “witch 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 (DGLV)**, citrus, fruits, especially red bell peppers

WATER SOLUBLE VITAMINS (All are “B” vitamins except for vitamin C.)

vitamin	ltr	sources	function	deficiency disease
Ascorbic acid	C	DGLV, citrus, fruits, esp red bell peppers. It is a labile vitamin, easily oxidized on exposure to air. Fresh fruits & veg have the most	synthesis of collagen, WBC production and functioning, antioxidant: neutralize oxidizing agents and free radicals: aging, carcinogenesis, etc.	Scurvy (swollen, bleeding gums, losing teeth, weak bones, enlarged, painful joints), fragile capillaries
Thiamine	B ₁	whole grains, DGLV, yeast, legumes	decarboxylation in catabolism	beriberi (“great weakness”)
Riboflavin	B ₂	dairy, meat, liver, eggs, DGLV	hydrogen carrier (FAD), electron transport	pellagra (“skin eruption”)
Niacin	B ₃	whole grains, Liver, meat, fish	hydrogen carrier (NAD ⁺)	glossitis, nervous disorders
Pantothenic acid	B ₅	most, yeast, liver, molasses, rice bran	Coenzyme A component	extremity tingling, depression
Pyridoxine	B ₆	whole grains, liver, legumes, meat,	amino acid metabolism (transamination, etc)	dermatitis
Folic acid		DGLV, liver, fruit, legumes	nucleic acid metabolism	anemia, spina bifida
cyanocobalamine	B ₁₂	animal products, bacteria in colon	RBC synthesis (erythropoeisis)	pernicious anemia

