An American physician wrote, "Quackery kills a large number of U.S. citizens each year than all the diseases it pretends to cure." One might expect that this commentary of the times was written yesterday, but it wasn’t. It appeared in an 1861 issue of *National Quarterly Review*. Today, we are still inundated with health misinformation, quackery, gimmicks, Laetriles, and the latest rage—vitamin megadoses.

What do we have to know in order to give our patients intelligent advice when they come to us with what they’ve read in the lay press or what they heard on a TV talk show? What we have to know is, what vitamins are, what they can do and what they can’t do.

First, the definition of a vitamin. It’s an organic molecule not made in the human body and required in small amounts to sustain normal metabolism. Notice that there are three exceptions to this definition. On adequate exposure to sunlight you can make vitamin D in your skin. Of course, D is really a hormone, but that’s a different subject. The vitamin niacin can also be synthesized in humans to significant degree from the amino acid tryptophane, and intestinal bacteria make significant amounts of vitamin K. Crucial to the definition of a vitamin is that lack of it produces a specific deficiency syndrome, and supplying it cures that deficiency.

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Vitamins can function in two ways—as vitamins and chemicals. The fat soluble vitamins function as regulators of specific metabolic activity; the water soluble vitamins function as coenzymes. The fact that they function as coenzymes is fundamental to understanding why the term megavitamin therapy is a misnomer by definition. The vitamin coenzymes come in from food, seek out the cells that need them, are taken into the cell, and combine with a protein already present. The protein is called an apoenzyme. The vitamin coenzyme coming in from outside attaches to the apoenzyme within the cell to form a holoenzyme (or enzyme, for short). It is this which serves the catalytic function that all coenzymes serve. So, it is not the vitamin by itself, but only when combined with its apoenzyme within the cell that it becomes capable of vitamin function. The quantity of apoenzyme any cell can make per unit time is limited, as is the capacity of any cell to make any other protein per unit time. That limited capacity is saturated at levels of vitamin roughly in the range of the recommended dietary allowance (RDA). Since the protein apoenzyme is saturated by a level of vitamin in the range of the RDA, it is obvious that any excess coming in cannot possibly serve a vitamin function. The concept of megavitamin therapy is predicated on total failure to understand the basic biochemical concept just stated.

Vitamins can also serve chemical functions. That is what they do when present in an excess over and above the amount that can saturate the apoenzyme. The excess will serve whatever function vitamins can perform as chemicals. The most classic example is the reduction action of vitamins C and E. Both can do harm as strong reducing agents when present in excess quantity. Vitamin C, being water soluble, will go to areas where the milieu is water, and E, being fat soluble, will go to areas where the milieu is fat. If there are excesses, they will present excessive reducing action in those areas.

**NUTRITION—FACTS AND FALLACIES**

The key to understanding good nutrition for the layman is very simple. The layman reads a lot of nutritional garbage in some monthly magazines and newspapers which confuses him into thinking that he has to know exactly what vitamin A does, and exactly what magnesium does, so on and so forth. This is all nonsense. The layman doesn’t have to know the intricacies of the value of each specific nutrient any more than to be a good driver it’s necessary to know how a carburetor functions. One doesn’t need to know the machinery of a motor to be a good driver. Running the human machine, also, from a nutritional point of view, is very simple.

Many years ago, the U.S. Department of Agriculture decided the way to simplify nutrition for laymen was to break nutrition down into food