



## When Friends Ask: Where Do You Get Your Protein?

If you don't know where you get your protein while following a plant-food-based diet, you're in good company. The Nutrition Committee of the American Heart Association, scientists from the Human Nutrition Research Center and Medical School at Tufts University, and registered dietitians, research nutritionists and physicians of Northwestern University, and the Harvard School of Public Health are just a few examples of "experts" you look to for advice who have the protein story wrong.<sup>1-4</sup> Consequences of their shortfall are as grave as a lifetime of sickness and obesity, and premature death, for innocent people. These professionals must be held ac-

### Wrong Statements from the Experts<sup>1-4</sup>

Although plant proteins form a large part of the human diet, most are deficient in 1 or more essential amino acids and are therefore regarded as incomplete proteins. (American Heart Association)

Plant protein sources, although good for certain essential amino acids, do not always offer all nine essential amino acids in a single given food. For example, legumes lack methionine, while grains lack lysine. (Tufts Human Nutrition Research Center)

Single plant protein foods usually are lower in protein quality than most animal proteins because they lack significant amounts of various essential amino acids. (Tufts University Medical School)

Other protein sources lack one or more amino acids that the body can't make from scratch or create by modifying another amino acid. Called incomplete proteins, these usually come from fruits, vegetables, grains, and nuts. (Harvard School of Public Health)

Plant sources of protein (grains, legumes, nuts, and seeds) generally do not contain sufficient amounts of one or more of the essential amino acids. Thus protein synthesis can occur only to the extent that the limiting amino acids are available. (Feinberg School of Medicine, Northwestern Univer-

countable.

### Ignorance Sickens and Kills People

Don't think it matters little if our public policy makers and educators remain ignorant about our nutritional needs. Misinformation leads to disastrous outcomes. People have serious health problems like heart disease, type-2 diabetes, multiple sclerosis, and inflammatory arthritis that can be easily resolved by a diet based solely on plant foods. However, advice to make this dietary change may be withheld from you or a family member because of the erroneous fear that such a diet will result in a greater catastrophe, like a nutritional collapse from protein deficiency.

Consider this scenario: Your loving husband of 35 years has a massive heart attack. He recovers and both of you pledge you will do anything—even eat cardboard—in order to avoid a repeat experience. On your first follow-up visit you tell your doctor that your family is going to follow a low-fat, vegan diet (all plant foods) from here on out. Your doctor says, "You can't do that; you will become protein deficient—plant foods are missing essential amino acids—you must eat meat and other high quality animal foods." Even though you vigorously explain meat, dairy, and eggs are the reasons you almost lost your husband, your doctor insists that you would be foolish to embark on such a course and defends that position with the writings of the Nutrition Committee of the American Heart Association.

## **The Nutrition Committee of the American Heart Association Has It Wrong**

In an October 2001 research paper published in the Heart Association's journal, *Circulation*, the Healthcare Professionals from the Nutrition Committee of the Council on Nutrition, Physical Activity, and Metabolism wrote, "Although plant proteins form a large part of the human diet, most are deficient in 1 or more essential amino acids and are therefore regarded as incomplete proteins."<sup>1</sup> My letter to the editor correcting this often quoted, but incorrect information, about the adequacy of amino acids found in plants was published in the June 2002 issue of *Circulation*.<sup>5</sup> Another letter from me in the November 2002 issue of *Circulation* demanded a correction.<sup>6</sup> But, the head of the nutrition committee, Barbara Howard, PhD, would not admit she was wrong and used research from the world's leading expert on protein, Professor Joe Millward, to defend her position.<sup>6</sup>

Joe Millward, PhD, Professor of Human Nutrition, University of Surrey (England), reviewed the published letters of disagreement between the American Heart Association (AHA) and myself, and wrote the following to me on July 10, 2003, "I thought I had made my position quite clear in my published papers. In an article I wrote for Encyclopedia of Nutrition (Millward DJ. 1998 Protein requirements. Encyclopedia of Nutrition. Academic Press pp 1661-1668) I said 'Contrary to general opinion, the distinction between dietary protein sources in terms of the nutritional superiority of animal over plant proteins is much more difficult to demonstrate and less relevant in human nutrition.' This is quite distinct from the AHA position which in my view is wrong."<sup>7</sup>

I informed the American Heart Association about Dr. Millward's position, but so far they have chosen to remain silent—and annually, 1.25 million people in the USA alone suffer with heart attacks—an often fatal condition entirely preventable by following a low-fat diet based solely on plant foods—all of which contain all of the essential amino acids in ideal amounts for humans.

## **Plants--the Original Sources of Protein and Amino Acids**

Proteins are made from chains of 20 different amino acids that connect together in varying sequences—similar to how all the words in a dictionary are made from the same 26 letters. Plants (and microorganisms) can synthesize all of the individual amino acids that are used to build proteins, but animals cannot. There are 8 amino acids that people cannot make and thus, these must be obtained from our diets—they are referred to as "essential."

After we eat our foods, stomach acids and intestinal enzymes digest the proteins into individual amino acids. These components are then absorbed through the intestinal walls into the bloodstream. After entering the body's cells, these amino acids are reassembled into proteins. Proteins function as structural materials which build the scaffoldings that maintain cell shapes, enzymes which catalyze biochemical reactions, and hormones which signal messages between cells—to name only a few of their vital roles.

Since plants are made up of structurally sound cells with enzymes and hormones, they are by nature rich sources of proteins. In fact, so rich are plants that they can meet the protein needs of the earth's largest animals: elephants, hippopotamuses, giraffes, and cows. You would be correct to deduce that the protein needs of relatively small humans can easily be met by plants.

## **People Require Very Little Protein**

The World Health Organization (WHO) recommends that men and women obtain 5% of their calories as protein. This would mean 38 grams of protein for a man burning 3000 calories a day and 29 grams for a woman using 2300 calories a day. This quantity of protein is impossible to avoid when daily calorie needs are met by unrefined starches and vegetables. For example, rice alone would provide 71 grams of highly useable protein and white potatoes would provide 64 grams of protein.<sup>8</sup>

<b>WHO Recommendations:</b> (With a wide safety margin)	
Men:	5%
Women:	5%
Pregnant:	6%
<b>Percent of Calories of Proteins<sup>16</sup> (Selected Foods)</b>	
<b>Food</b>	<b>% Protein</b>
<b>Grains &amp; Flours:</b>	
Cornmeal	9
Brown Rice	9
Oatmeal	15
White Rice	7
Whole Wheat Flour	16
White Flour	11
<b>Starchy Vegetables</b>	
Black Beans	27
Cassava	10
Corn	11
Kidney Beans	27
Peas	28
Potato	8
Sweet Potato	7
<b>Green Vegetables</b>	
Asparagus	42
Broccoli	42
Carrots	10
Lettuce	40
Onions	32
Mushrooms	12
Spinach	51
<b>Animal Foods</b>	
Beef	53
Chicken	46
Pork	29
Salmon	43
Whole Milk	21
Skim Milk	39
Human Milk	5
Cheddar Cheese	25
Cottage Cheese	68
Egg	32

Our greatest time of growth—thus, the time of our greatest need for protein—is during our first 2 years of life—we double in size. At this vigorous developmental stage our ideal food is human milk, which is 5% protein. Compare this need to food choices that should be made as adults—when we are not growing. Rice is 8% protein, corn 11%, oatmeal 15%, and beans 27%.<sup>8</sup> Thus protein deficiency is impossible when calorie needs are met by eating unprocessed starches and vegetables.

The healthy active lives of hundreds of millions of people laboring in Asia, Africa, and Central and South America on diets with less than half the amount of protein eaten by Americans and Europeans prove that the popular understanding of our protein needs is seriously flawed.

**Faulty Observations Lead to High Protein Recommendations**

People commonly believe: the more protein consumed the better. This faulty thinking dates back to the late 1800s, and was established without any real scientific research. An assumption was made that people who could afford to do so would instinctively select a diet containing the right amount of protein. After observing the diets of laborers, soldiers, and workers in Western Europe and the USA, recommendations of 100 and 189 grams of protein a day were established.<sup>9</sup> People’s innate ability to select a proper diet is disproved by the present day popularity of burger joints, donut shops, and pizza parlors.

Further confusion about our protein needs came from studies of the nutritional needs of animals. For example, Mendel and Osborne in 1913 reported rats grew better on animal, than on vegetable, sources of protein. A direct consequence of their studies resulted in meat, eggs, and dairy foods being classified as *superior*, or "Class A" protein sources and vegetable proteins designated as *inferior*, or "Class B" proteins.<sup>9</sup> Seems no one considered that rats are not people. One obvious difference in their nutritional needs is rat milk is 11 times more concentrated in protein than is human breast milk. The extra protein supports this animal’s rapid growth to adult size in 5 months; while humans take 17 years to fully mature.

The recent popularity of high protein diets has further popularized the fallacy that “more protein is good for you.” True, high protein diets, like Atkins, will make you sick enough to lose your appetite and temporarily lose weight, but this fact should not be extrapolated to mean high protein is healthy—in fact, the opposite is true.

**The Truth Has Been Known for More than a Century**

In 1903, the head of Yale’s department of biochemistry,

Professor Russell Henry Chittenden, reported profound health benefits gained by cutting popular recommendations for protein held at his time by half to two-thirds (from 150 grams to 50 grams daily). His research included detailed dietary histories and laboratory studies of his subjects.<sup>9</sup>

In the 1940s, William Rose performed experiments on people which found daily minimum protein needs to be about 20 grams a day. Further research on men found single plant foods consumed in an amount sufficient to meet daily needs easily met these human requirements for all 8 essential amino acids.<sup>9</sup> (A more detailed discussion of the history of protein recommendations is found in my December 2003 newsletter article: A Brief History of Protein: Passion, Social Bigotry, and Enlightenment.)

The results of Dr. Rose's studies are summarized in the following chart, under "minimum requirements". From the chart, it is clear that vegetable foods contain more than enough of all the amino acids essential for humans.<sup>10</sup>

<i>(grams per day)</i> Amino Acids	Rose's Minimum Requirement	Rose's Recommend Requirement	Corn	Brown rice	Oatmeal flakes	Wheat flour	White beans	Potatoes	Sweet potatoes
<b>Tryptophan</b>	.25	.50	.66	.71	1.4	1.4	1.8	.8	.8
<b>Phenylalaline</b>	.28	.56	6.13	3.1	5.8	5.9	10.9	3.6	2.5
<b>Leucine</b>	1.10	2.20	12.0	5.5	8.1	8.0	17.0	4.1	2.6
<b>Isoleucine</b>	.7	1.4	4.1	3.0	5.6	5.2	11.3	3.6	2.2
<b>Lysine</b>	.8	1.6	4.1	2.5	4.0	3.2	14.7	4.4	2.1
<b>Vailine</b>	.8	1.6	6.8	4.5	6.4	5.5	12.1	4.4	3.4
<b>Methionine</b>	.11	.22	2.1	1.1	1.6	1.8	2.0	1.0	.8
<b>Threonine</b>	.5	1.0	4.5	2.5	3.6	3.5	8.5	3.4	2.1
<b>Total Protein</b>	20	37 (WHO)	109	64	108	120	198	82	45

**You Don't Need Beans or to "Combine" Your Foods**

<i>(grams per day)</i> Amino Acids	Taro	Asparagus	Broccoli	Tomatoes	Pumpkin	Beef Club Steak	Egg	Milk
<b>Tryptophan</b>	1.0	3.9	3.8	1.4	1.5	3.1	3.8	2.3
<b>Phenylalaline</b>	3.0	10.2	12.2	4.3	3.0	11.2	13.9	7.7
<b>Leucine</b>	5.2	14.6	16.5	6.1	6.0	22.4	21.	15.9
<b>Isoleucine</b>	3.0	11.9	12.8	4.4	4.3	14.3	15.7	10.3
<b>Lysine</b>	3.4	15.5	14.8	6.3	5.5	23.9	15.3	12.5
<b>Vailine</b>	3.5	16.0	17.3	4.2	4.3	15.1	17.7	11.7
<b>Methionine</b>	.6	5.0	5.1	1.1	1.0	6.8	7.4	3.9
<b>Threonine</b>	2.7	9.9	12.5	4.9	2.7	12.1	12.	7.4
<b>Total Protein</b>	58	330	338	150	115	276	238	160

Many investigators have measured the capacity of plant foods to satisfy protein needs. Their findings show that children and adults thrive on diets based on single or combined starches, and grow healthy and strong.<sup>10</sup> Furthermore, no improvement has been found from mixing plant foods or supplementing them with amino acid mixtures to make the combined amino acid pattern look more like that of flesh, milk, or eggs. In fact, supplementing a food with an amino acid in order to conform to a contrived reference standard can create amino acid imbalances. For example, young children fed diets based on wheat or corn and supplemented with the amino acids tryptophan and methionine in order to conform to the standard requirements set by the Food and Agriculture Organization of the United Nations (FAO) developed negative responses in terms of nitrogen balance (the body's utilization of protein).<sup>10</sup>

People who are worried about getting sufficient protein will sometimes ask me if they can still follow the McDougall Diet if they do not like beans. From the chart above, you will notice that any single starch or vegetable will provide in excess of our needs for total protein and essential amino acids—thus there is no reason to rely on beans or make any efforts to food combine different plant foods to improve on Nature's own marvelous creations.

### **Potatoes Alone Suffice**

Many populations, for example people in rural Poland and Russia at the turn of the 19<sup>th</sup> century, have lived in very good health doing extremely hard work with the white potato serving as their primary source of nutrition. One landmark experiment carried out in 1925 on two healthy adults, a man 25 years old and a woman 28 years old had them live on a diet primarily of white potatoes for 6 months. (A few additional items of little nutritional value except for empty calories—pure fats, a few fruits, coffee, and tea—were added to their diet.)<sup>11</sup> The report stated, "They did not tire of the uniform potato diet and there was no craving for change." Even though they were both physically active (especially the man) they were described as, "...in good health on a diet in which the nitrogen (protein) was practically solely derived from the potato."

The potato is such a great source of nutrition that it can supply all of the essential protein and amino acids for young children in times of food shortage. Eleven Peruvian children, ages 8 months to 35 months, recovering from malnutrition, were fed diets where all of the protein and 75% of the calories came from potatoes. (Soybean-cottonseed oils and pure simple sugars, neither of which contains protein, vitamins, or minerals, provided some of the extra calories.)<sup>12</sup> Researchers found that this simple potato diet provided all the protein and essential amino acids to meet the needs of growing and small children.

### **Excess Protein Causes Diseases of Over-nutrition**

Unlike fat, protein cannot be stored. When it is consumed in excess of our needs, protein is broken down mostly by the liver, and partly by the kidneys and muscles. Consumption in excess of our needs overworks the liver and kidneys, and can cause accumulation of toxic protein byproducts.

Proteins are made of amino acids, and are, therefore, acidic by nature. Animal proteins are abundant in sulfur-containing amino acids which break down into very powerful sulfuric acid. These kinds of amino acids are abundant in hard cheese, red meat, poultry, seafood, and eggs, and their acids must be neutralized by buffers found in the bones. The bones dissolve to release the buffering materials; eventually resulting in a condition of weakened bones, known as osteoporosis. Released bone materials often settle and coalesce in the kidney system, causing kidney stones. Fruits and vegetables are largely alkaline, preserving bone health and preventing kidney stones.<sup>13</sup> (A more detailed discussion of the health consequences from excess protein is found in my January 2004 newsletter article: Protein Overload.)

Diseases of over-nutrition are directly connected to planet health, too. Recommendations to eat animal foods for protein have resulted in an environmental catastrophe. Livestock produces 18% of the greenhouse gases; these food-animals occupy 26 percent of the ice-free surface of the Earth and 33 percent

of the total arable land is used to produce their food. One telling tragedy is they account for the deforestation of 70 percent of Amazon rainforests, which act as the "lungs of the Earth."<sup>14</sup> (A more detailed discussion of the environmental damage from livestock is found in my December 2006 newsletter article: *An Inconvenient Truth: We Are Eating Our Planet To Death.*)

### **Protein Deficiency Is Really Food Deficiency**

How many cases of the so-called "protein deficiency state," kwashiorkor, have you seen? I have never seen a case, even though I have known thousands of people on a plant-food based diet. How about those starving children in Africa? The picture one often sees of stick-thin children with swollen bellies in famine areas of Asia or Africa is actually one of starvation and is more accurately described as "calorie deficiency."<sup>10</sup> When these children come under medical supervision, they are nourished back to health with their local diets of corn, wheat, rice, and/or beans. Children recovering from starvation grow up to 18 times faster than usual and require a higher protein content to provide for their catch-up in development—and plant foods easily provide this extra amount of protein.<sup>10</sup> Even very-low protein starchy root crops, such as cassava root, are sufficient enough in nutrients, including protein, to keep people healthy.<sup>15</sup>

### **Starving People Die of Fat, Not Protein, Deficiency**

In 1981, 10 Irish prisoners from the Republican Army (IRA) went on a hunger strike. Nine out of 10 of these men died between 57 and 73 days (mean of 61.6 days) of starvation after losing about 40% of their body weights (the remaining striker died of complications of a gunshot wound).<sup>16,17</sup> This experience gave doctors a chance to observe first hand the metabolic changes that occur during starvation. Protein stores were generally protected during starvation, with most of the energy to stay alive being derived from the men's fat stores. It was estimated that the hunger strikers had lost up to 94% of their body-fat levels, but only 19% of their body-protein levels at the time of death.<sup>16</sup> They died when they ran out of fat. Since fat is more critical than protein, people should be asking, "Where do you get your fat (on any diet)?"

Since Nature designed her plant foods complete, with abundant amounts of fat, protein, carbohydrates, vitamins and minerals, "Where you get a specific nutrient?" is almost never a relevant question, as long as there is enough to eat. So, why have scientists, dietitians, medical doctors, diet-book authors, and the lay public become fixated on a non-existent problem? Protein is synonymous with eating meat, poultry, fish, dairy, and eggs—the foods traditionally consumed by the wealthier people in a society—thus, protein-eating means higher social status. High-protein foods are also high-profit foods. Therefore, propagating the protein myth is motivated by egos and money—and the usual consequences of pain and suffering follow closely behind these two human frailties.

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