

Plant Foods Have a Complete Amino Acid Composition

The American Heart Association (AHA) Science Advisory, “Dietary Protein and Weight Reduction: A Statement for Healthcare Professionals From the Nutrition Committee of the Council on Nutrition, Physical Activity, and Metabolism of the American Heart Association,” contains often quoted, but incorrect, information about the adequacy of amino acids found in plant foods.¹ This report states, “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.”

William Rose and his colleagues completed research by the spring of 1952 that determined the human requirements for the 8 essential amino acids.² They set as the “minimum amino acid requirement” the largest amount required by any single subject and then they doubled these values to make the “recommended amino acid requirement,” which was also considered a “definitely safe intake.” By calculating the amount of each essential amino acid provided by unprocessed complex carbohydrates (starches and vegetables)³ and comparing these values with those determined by Rose,¹ the results show that any single one or combination of these plant foods provides amino acid intakes in excess of the recommended requirements. Therefore, a careful look at the founding scientific research and some simple math prove it is impossible to design an amino acid-deficient diet based on the amounts of unprocessed starches and vegetables sufficient to meet the calorie needs of humans. Furthermore, mixing foods to make a complementary amino acid composition is unnecessary.⁴

The reason it is important to correct this misinformation is that many people are afraid to follow healthful, pure vegetarian diets—they worry about “incomplete proteins” from plant sources. A vegetarian diet based on any single one or combination of these unprocessed starches (eg, rice, corn, potatoes, beans), with the addition of vegetables and fruits, supplies all the protein, amino acids, essential fats, minerals, and vitamins (with the exception of vitamin B₁₂) necessary for excellent health. To wrongly suggest that people need to eat animal protein for nutrients will encourage them to add foods that are known to contribute to heart disease, diabetes, obesity, and many forms of cancer, to name just a few common problems.⁵

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2. Rose W. The amino acid requirement of adult man. *Nutr Abst Rev*. 1957;27:631–647.
3. Pennington J. *Bowes' & Church's Food Values of Portions Commonly Used*. 17th ed. Philadelphia, Pa: Lippincott; 1998.
4. M. Irwin, Hegsted D. A conspectus of research on protein requirements of man. *J Nutr*. 1971;101:385–428.
5. Weisburger J. Eat to live, not live to eat. *Nutrition*. 2000;16:767–773.

Response

We thank Dr McDougall for the thoughtful comments about the amino acid composition of plant foods. The American Heart Association (AHA) believes that vegetarian diets can be healthy, and we do not suggest that people need to eat animal protein exclusively for nutrients. You are correct that the reference to plant protein as being regarded as incomplete is often quoted, but we did carefully state that “most” are deficient in one or more essential amino acids and emphasized that there is an optimum ratio of essential amino acids that determines protein quality. The recommendation for mixing complementary vegetable protein sources to maximize the diet is an important principal on which vegetarian diets are based. Although an indiscriminate mixture of plant proteins could meet protein amino acid requirements, it must be remembered that the amino acid content in most plant proteins is more limited in amount per serving than that from animal sources. Thus, it is difficult to maintain essential amino acids at optimum quantity and distribution. We certainly agree with Dr McDougall that a vegetarian diet based on the AHA guidelines of 5 to 6 servings of whole grains and 5 or more servings of vegetables and fruit would, in fact, supply all of the amino acids necessary for health.

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